CRITICAL THINKING PROCESSES OF JUNIOR HIGH SCHOOL STUDENTS IN SOLVING CONTEXTUAL PROBLEMS OF DIRECT AND INVERSE PROPORTIONS BASED ON REFLECTIVE-IMPULSIVE STYLE

Bachelor Thesis

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PREFACE

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Sidoarjo, December 14, 2018

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ABSTRACT

CRITICAL THINKING PROCESSES OF JUNIOR HIGH SCHOOL STUDENTS IN SOLVING CONTEXTUAL PROBLEM OF DIRECT AND INVERSE PROPORTIONS BASED ON REFLECTIVE-IMPULSIVE STYLE

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Critical thinking is one of essential components in mathematics learning and its process becomes the focus to improve students' critical thinking. In mathematics instruction, mathematics can not be separated from problem solving, and critical thinking can help them in such a thing. Contextual problem is one of various problems which is related to context in a real life and can be found easily in topic direct-inverse proportions. This kind of problem gives opportunity to think more critically to find the solutions. When solving problems, students proceed information differently and it is affected by their cognitive style. One-dimensional model of variation in cognitive style is reflective-impulsive style.

The purpose of this research is to describe the critical thinking processes of reflective and impulsive junior-high-school-students in solving contextual problems of direct and inverse proportions. This research is descriptive qualitative research by using test and interview methods. The subjects consist of a

reflective and an impulsive students of class 7-8 State Junior High School 5 Sidoarjo.

The results showed that there were some similiarities and differences between reflective and impulsive student's critical thinking processes in solving contextual problems of direct and inverse proportions: (1) both students conducted interpretation by categorizing what are given and asked, but the reflective student clarified meaning in detail, while the impulsive student not in detail; (2) the reflecticve student analyzed well by examining ideas and identifying arguments as well as reasons, while the impulsive one did not analyse well that is caused by inability to find unstated information; (3) both students do inferences by querying evidence, forming hypothesis, and trying to prove the hypothesis and to draw a conclusion, but in querying evidence, the reflective student mentioned the relevant-irrelevant information confidently and used all relevant information to solve problem, while the impulsive student got confused in distinguishing between them; (4) both students carried out evaluation by assessing credibility of claims and quality of arguments before jumping to the next steps, yet the impulsive did not take any further actions; (5) the reflective student did explanation by stating results, justifying procedures, and presenting arguments clearly, while the impulsive student not clear (6) the reflcetive student always performed self-regulation by doing monitoring and correcting what they have done, while the impulsive one barely performed self-regulation.

Keywords: critical thinking process, contextual problem, direct and inverse proportions, reflective-impulsive style.

ABSTRAK

PROSES BERPIKIR KRITIS SISWA SMP DALAM MEMECAHKAN MASALAH KONTEKSTUAL PERBANDINGAN SENILAI DAN BERBALIK NILAI DITINJAU DARI GAYA KOGNITIF REFLEKTIF-IMPULSIF

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Berpikir kritis adalah salah satu komponen penting dalam pembelajaran matematika dan prosesnya menjadi fokus untuk meningkatkan berpikir kritis siswa. Matematika tidak dapat dipisahkan dengan pemecahan masalah dan berpikir kritis dapat membantu mereka dalam hal ini. Masalah kontekstual adalah masalah yang terkait dengan konteks kehidupan nyata dan dapat ditemukan dengan mudah dalam materi perbandingan senilai dan berbalik nilai. Masalah semacam ini memberi peluang untuk berpikir lebih kritis dalam menemukan solusi. Ketika memecahkan masalah, siswa memroses informasi secara berbeda yang dipengaruhi oleh gaya kognitif mereka. Salah satu model variasi pada gaya kognitif adalah gaya kognitif reflektif-impulsif.

Tujuan dari penelitian ini adalah untuk mendeskripsikan proses berpikir kritis siswa SMP reflektif dan impulsif dalam menyelesaikan masalah kontekstual perbandingan senilai dan berbalik nilai. Penelitian ini merupakan penelitian kualitatif deskriptif dengan menggunakan metode tes dan wawancara.

Subjek penelitiannya terdiri dari seorang siswa reflektif dan seorang siswa impulsif kelas 7-8 SMP Negeri 5 Sidoarjo.

Ada beberapa persamaan dan perbedaan dalam proses berpikir kritis reflektif dan impulsif siswa dalam memecahkan masalah perbandingan senilai dan berbalik nilai yaitu: (1) baik siswa reflektif maupun impulsif melakukan interpretasi dengan mengategorikan apa yang diketahui dan ditanya, tetapi siswa reflektif menglarifikasi makna dengan detail, sedangkan siswa impulsif tidak; (2) siswa reflektif menganalisis dengan baik dengan menguji ide dan mengidentifikasi argumen dan alasan, sedangkan siswa impulsif tidak menganalisis dengan baik dikarenakan ketidakmampuan untuk menemukan informasi yang tersirat; (3) baik siswa reflektif maupum impulsif melakukan inferensi dengan menacari bukti, membuat hipotesis, dan mencoba untuk membuktikannya untuk mengambil sebuah kesimpulan, tetapi dalam pencarian bukti, siswa reflektif menyebutkan informasi relevan-tidak relevan dengan percaya diri dan menggunakan informasi yang relevan untuk menyelesaikan masalah, sedangkan siswa impulsif bingung dalam membedakan keduanya; (4) siswa reflektif dan impulsif melaksanakan evaluasi dengan menilai argumen dan apa yang diklaim sebelum mengambil langkah selanjutnya, tetapi siswa impulsif tidak menindaklanjutinya; (5) siswa reflektif melakukan eksplanasi dengan menyatakan hasil, menjustifikasi langkah-langkah/prosedur, dan memaparkan argumen dengan jelas, sedangkan siswa impulsif melakukannya dengan tidak cukup jelas; (6) siswa reflektif selalu menjalankan regulasi diri dengan memonitor dan mengoreksi apa yang telah dilakukan, sedangkan siswa impulsif jarang menjalankannya.

Kata kunci: proses berpikir kritis, masalah kontekstual, perbandingan senilai dan berbalik nilai, gaya reflektif-impulsif.

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CHAPTER I
INTRODUCTION

A. Background

In the 21st century when there are many challenges in all aspects of life, problems have became more complex. As a result, people need to have higher quality in thinking in order to solve problems they face. Critical thinking is one of realizations of higher order thinking (Rasiman and Pramasdyahsari, 2014:537). Stockard (2007) stated that having critical thinking means having the ability and tendency to gather, evaluate, and use information effectively. It suggests that through critical thinking, students are able to solve problems better. This is in line with the statement from Chukwuyenum (2013:18), the critical thinking is one of the tools used in daily life to solve some problems.

In classroom, critical thinking is expected to help students in solving problems provided by the teachers. It is because they will use logical reasoning to interpret, analyse and evaluate information until they take reliable and valid decisions (Chukyuwenum, 2013). Kules (2016) argued that students learn and perform better when they think critically about the subject they are studying.

Considering the importance of critical thinking, the ability to think critically becomes one of essential components in education system (Stukalenko et al., 2016). In order to improve its education quality, Indonesia puts critical thinking as one of standard competences for students in learning mathematics. The standard competence states that students have to be able to think logically, analitically, sistematically, critically and creatively, and be able to work in group (Permendikbud, 2016). Besides, there are some

learning and innovation skills that have to be mastered by students in the 21st century: creativity and innovation, critical thinking and problem solving, communication, and collaboration. It indicates that critical thinking must be mastered by students, especially in mathematics learning.

Ulya et al. (2014) said that mathematics cannot be separated from problem solving. While Jacob and Sam (2008) argued that the activities of critical thinking are often associated with problem solving. From previous statements, it can be concluded that mathematics, problem solving and critical thinking show relationship to each other. Students who get used to solve mathematics problems will improve their critical thinking. Otherwise, critical thinking can support students to solve problems in mathematics learning. Therefore, teacher needs to give problems, especially contextual problems, during mathematics instruction so that students'critical thinking can be developed.

There are various problems that can be provided by teacher in mathematics learning and one of them is contextual problems. It is problems related to context in a real life. According to Gravemeijer & Doorman (1999), a context has important role since it becomes a starting point of learning for students to explore mathematical notions in a situation that is experintially real. In addition, this kind of problems gives opportunity to students realizing how close their life with mathematics and how much mathematics contributes in their life so that they will think that it is important to solve those problems. In consequence, they will try to find the solutions of given problem seriously and think more critically. In other words, the situations provided in the contextual problems can be utilized to encourage critical thinking of students.

For teaching improvement, evaluation of teaching is needed. After providing some problems to the students to solve, teacher needs to evaluate what was happening when the students were thinking in solving given problems. In other words, it is important to know students thinking processes while they are completing the task. By understanding the students' thinking processes, teacher is expected to know what kind of learning strategies can be used in order to improve teaching and learning.

Soedjadi (2000) stated that thinking process helps students to understand the abstract of mathematical basic objects which are facts, concepts, relations/operations and principels. Further, the learning objective based on Curriculum 2013 states that students must be able to proceed, reason, represent and create in concrete and abstract domain related to the development of what they learn in school independently, and be able to use methods that are compatible with the knowledge (Ministry of Education, 2016). Those two statements indicate that students' thinking process is necessary in mathematics learning. It is necessary for teachers to pay more attention to students' thinking processes in mathematics instruction. When students are using their critical thinking in solving problems, teacher needs to figure out those processes so that it can be a consideration to design teaching instructions.

As stated in the previous paragraphs, it can be said that critical thinking processes of students is important, since it can help teachers to improve students' critical thinking. Evidence suggests critical thinking of Indonesian students is low. It can be seen from students' performance in Trends International Mathematics and Science Study (TIMSS). Indonesia reached rank 44 of 49 participated countries by gaining 397 point mark which is low based on TIMSS 2015 International Benchmarks for

Mathematics (Mullis et al., 2016). TIMSS assesses students by providing questions required reasoning. According to Ennis (2011), critical thinking is reasonable and reflective thinking focused on deciding what to believe or do. So, we may say that TIMSS can measure how well students' critical thinking. If the students' achieved score is low, then it reflects that students' critical thinking is low as well.

Individual thinks in different ways. It is affected by their cognitive style. Sellah *et al*. (2017:10) defined cognitve styles as a term used to describe the way individuals think, percieve and remember information. That is why the same information might be interpreted and proceeded differently by different individual. It implies that each student has different thinking process based on their cognitive style, in consequence, students' critical thinking process must be different as well.

One-dimensional model of variation in cognitive style is reflective-impulsive proposed by Kagan (1964). He said that those who are relatively slow and highly accurate in their work are called reflective, while those who work both quickly and with errors are impulsive. Further, studies find that reflective participants were higher scoring than the impulsive category in elaboration, originality, and overall capacity for critical thinking. Therefore, there must be differences between reflective and impulsive students' critical thinking processes. This research will reveal what is happening when reflective and impulsive students are thinking critically.

As explained before, cognitive style plays a role in way of a student's thinking. Further, Riding and Grimley (McLoughlin, 1999) stated that the dimensions of cognitive style can be effectively applied to the design of instructional materials so that comprehension is facilitated by matching mode of presentation to

cognitive style. In other words, students' cognitive style is some aspect to be considered to design learning. Moreover, it also affects in problem solving. Sozcu (2014:140) argued that cognitive styles refer to the individual's consistent attitudes for perceiving, remembering, organizing, processing, thinking, and problem solving.

There are many topics in mathematics learned by students in high school. Some can be applied directly in daily life and the others must be connected with another concept before being implemented. Direct and inverse proportions is included in the topic of proportions related to the ratio that have many applications in the real life. It is in line with argument coming from Ben-Chaim et al. (2012), he argued, "Since ratio is usually a concept expressing real-life occurrences, there are many examples where the mathematical definition above applies logically." That is why teacher can find a wide range of contextual problems related to this topic and provide them in the classroom. In addition, proportions is one of the most mathematically complex and cognitively challenging topics in the school curriculum (Ben-Chaim et al., 2012). It implies that to solve problems related that topic, critical thinking of students is needed. Therefore, it is interesting to conduct research intended to describe critical thinking processes of reflective and impulsive students in solving contextual problems of direct and inverse proportions.

B. Research Questions

Based on the background above, it can be proposed these following research questions:

1. How is critical thinking processes of reflective 7th grade student in solving contextual problems of direct and inverse proportions?

2. How is critical thinking processes of impulsive 7th grade student in solving contextual problems of direct and inverse proportions?

C. Research Goals

According to the research questions, the goals of this research are:

1. To describe critical thinking processes of reflective 7th grade student in solving contextual problems of direct and inverse proportions.
2. To describe critical thinking processes of impulsive 7th grade student in solving contextual problems of direct and inverse proportions.

D. Research Benefits

Researcher hopes the result of this research has some benefits including:

1. As a consideration for teachers to decide the appropriate learning models for the students by having an insight about their students' critical thinking processes based on reflective-impulsive cognitive style.
2. As a reference for other researchers who want to conduct a relevant research.

E. Operational Terms

The terms used in this research are defined as follows:

1. **Thinking** is a mental activity directed at solving a problem, making inferences, judging certain facts, and deciding and choosing between some options. It is an internal mental process involving manipulation and analysis of information received from the environment.

2. **Critical thinking** is defined as mental activity in making decisions to solve problems in which one folllows these following acitvities comprised of interpretation, analysis, evaluation, inference, explanation, and self- regulation.
3. **Critical thinking process** of students is the sequence of activities that are taken by students in making decisions to solve problems.
4. **Contextual problem** is a situation in certain subject matter including mathematics related to context in a real life in which the route of its solution is not obvious and it cannot be solved by using routine procedure. The situation must be experientially real to the student.
5. **Solving contextual problem** is an activity involving sequence of actions to find a way out or solution of contextual problem.
6. **Cognitive style** is defined as a tendency of the way individual thinks to interpret and process information.
7. **Reflective and Impulsive Cognitive Style**
   Those who are relatively slow and highly accurate in their work are called reflective, while those who work both quickly and with errors are impulsive.
8. **Direct and Inverse Proportions**
   a. **Direct proportion** occurs when, given four variables, a, b, c, and d $(a \neq 0, b \neq 0, c \neq 0, d \neq 0)$ then $\left(\frac{a}{b} = \frac{c}{d}\right)$. That is, if $c = a \times m$ (a is multiplied by a factor m, $m \neq 0$), then $d = b \times m$ (b also is multiplied by m), or if $c = a : m$ (a is divided by a factor m, $m \neq 0$), then $d = b : m$ (b also is divided by m).
   b. **Inverse proportion** occurs when, given four variables, a, b, c, and d $(a \neq 0, b \neq 0, c \neq 0, d \neq 0)$ then $(\frac{a}{c} = \frac{d}{b})$.

That is, if $c = a \times m$ (a is multiplied by factor m, $m \neq 0$), then $d = b : m$ (b is divided by m), or if $c = a : m, m \neq 0$, then $d = b \times m$.

F. Limitations

To make the research focus on the goals, researcher gives some limitations as follows:

1. The research is conducted in SMPN 5 Sidoarjo in academic year 2017/2018.
2. The resarch subjects are high school students of 7^{th} grade who already learned about direct and inverse proportions.
3. The contextual problems that is tested to the subjects is related to direct and inverse proportions.
4. The classification of subjects is based on reflective-impulsive style.

CHAPTER II
LITERATURE REVIEW

A. Thinking

The term "think" is used in such various ways in daily conversations. Sometimes, it is used as synonim to remember ("I cannot think of what we learnt yesterday".), pay attention ("Think about this formula.") or convey uncertainty ("I think the class will finish early".). "Think" has a wide range of meanings which cover a number of psychological processes. However, in psychology, thinking is a core subject area with an independent existence and a meaning of its own (Myers and DeWall, 2015).

Our everyday life involves thinking activities. For instance, we decide what to have for breakfast, which task to finish first, etc. Some may take a few mental steps and the others need many steps. Frensch and Funke (2005) defined thinking as the cognitive processing of internal memory representations that may occur both consciously and subconsciously and may not always follow the laws of logic. The similiar definition comes from Myers and DeWall (2015). He said, "Thinking is a complex mental process through which we manipulate information (either acquired or stored). It is an internal process that can be inferred from behaviour. Thinking involves mental representations that are either mental images or concepts."

Experts often defined thinking based on its function. To cover the possible functions of thinking, Myers and DeWall (2015) defines thinking as a mental activity directed at solving a problem, making inferences, judging certain facts, and deciding and choosing between some options. It involves manipulation and analysis of information received from the environment.

Thinking is an internal mental process, which can be inferred from overt behaviour. When a student is facing mathematics problem, s/he thinks for a moment before writting the solution on their paper. Teacher cannot observe what s/he is thinking, yet they can simply infer what s/he was thinking or what strategies s/he was trying to evaluate from the solution s/he had written. However the whole thinking process cannot be seen from the paper only.

As theory of thinking is developed, thinking is distinguished based on the purpose. Critical thinking, creative thinking, reflective thinking, and logical thinking are some types of thinking that are used the most in educational field. Further, in his research, Knight (2005) simply defines those terms as followed:

1. Critical thinking is thinking which involves evaluation and, perhaps, challenge.
2. Creative thinking is directed towards solving a problem in one's own way. It often involves imagination and initiative.
3. Reflective thinking involves looking back on one's previous thinking, knowledge and understanding.
4. Logical thinking is directed towards making deductions or presenting arguments.

From the various definitions of thinking, in this research, it is defined as a mental activity directed at solving a problem, making inferences, judging certain facts, and deciding and choosing between some options. It is an internal mental process involving maipulation and analysis of information recieved from the environment.

B. Critical Thinking

One of the most interesting issues in recent years is the ability of critical thinking. However critical thinking has been

being debated for decades. Critical thinking has its roots in the work of such notables as Socrates, Thomas Aquinas, Francis Bacon, Rene Descartes, John Locke and Sir Issac Newton in its earliest times (Murawski, 2014:25). Socrates introduced critical thinking over 2,000 years ago. Then John Dewey in Fisher (2011), brought his idea about "reflective thinking" which came to be known as critical thinking. Further, he is widely regarded as the "father" of the modern critical thinking. The definition of critical thinking according to Dewey in Fisher (2011) is "An active, persinent, and careful consideration of a belief or supposed form of knowledge in the light of the grounds which support it and the further conclusions to which it ends. "

An 'active' process in the definition above means that in process of thinking, one thinks things through for themself, raises questions themself, finds relevant information themself and so on, rather than just recieves ideas and information from someone else ('passive' process). The terms 'persistent' and 'careful' refer to thinking more deeply before deciding and concluding about something. However, the most important thing in Dewey's definition is in what he says about the 'grounds which support' a belief and the 'further conclusions to which it tends'. It simply can be said that what matters are the reasons we have for believing something and the implications of our beliefs. The unpacking definition indicates that giving critical thinking involves reasoning, giving reasons and evaluating reasoning as well as possible. Therefore, skilful reasoning becomes a key element.

Currently many other researchers conduct research about this topic and have their own definition of critical thinking. According to Ennis (2011), critical thinking is reasonable and reflective thinking focused on deciding what to believe or do. While Rasiman (2015:41) states the critical thinking is mental

process that is organized and play a role in decision making process to resolve the problem. From those definitions, we can conclude that critical thinking is thinking reasonably in making decisions to solve problems.

Considering the conditions of 21st century, mastering the skill of critical thinking is necessary in everyday life. Critical thinking helps society to adapt to the social changes. Stukalenko et al. (2016) said that by having critical thinking, a person can be able to provide generation of efficient solutions and ideas and creation of new technologies.

Many studies result that critical thinking is able to propose new ideas and see new oportunities. Furthermore, it is necessary in solving problem. This ability prepares people for successful problem solving and decision making (Wallace and Jefferson, 2015:101). People who face a problem will have these following questions: "What do I know? What new have I learned? How did my knowledge change? What am I going to do with it?" (Stukalenko, 2016). Stukalenko also explained the characteristics of critical thinking, those are: building logical statements, creating corresponding logical models, accepting verified solutions about rejecting any of the statements, agreeing with it or postponing its analysis for some time and evaluation of the thought process itself (the way of thinking, which lead to our conclusions, or the factors, which we regarded during making the decision). The previous statements show us that people will think critically when face a problem. They will think to find the solution of that problem.

Critical thinking is often defined as an ability. While Ennis (2011) devided it into two different classifications which are critical thinking disposition and critical thinking ability.

Critical Thinking Dispositions

Ideal critical thinkers are disposed to do the following:

1. Care that their beliefs be true and that their decisions are justified; that is, care to "get it right" to the extent possible, or at least care to do the best they can
2. Represent a position honestly (theirs as well as others')
3. Care to understand and present a position honestly and clearly, theirs as well as others (Care about the dignity and worth of every person

Critical Thinking Abilities

The ideal critical thinker has the ability to clarify, to seek and judge well the basis for a view, to infer wisely from the basis, to imaginatively suppose and integrate, and to do these things with dispatch, sensitivity, and rhetorical skill.

Critical thinking can be recognized by taking a look at some criteria or elements of it. Facione (2013) identified six elements of critical thinking as follows:

1. Interpretation
   Interpretation is to comprehend and express the meaning of significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria. This element can be appeared by questioning these following questions:
2. Analysis
   Analysis is defined as an activity aiming to identify the intended and actual relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgement, experiences, reasons, information, and opinions. To fire up one's critical thinking about this element, these following questions can be asked.
3. Inference
   Inference means to identify and secure elements needed to draw reasonable conclusions; to form conjectures and

hypothesis, and to consider relevant information. These are following questions can be appeared to fire up ones' critical thinking:

4. Evaluation
   Evaluation means to assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgement, belief, or opinion. Besides, evaluation is intended to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions or other forms of representations. This element can be fired up by these following questions:
5. Explanation
   Explanation is to present a cogent and coherent way the results of one's reasoning. There are some questions usually appearing related to this element.
6. Self-regulation
   Self-regulatione is defined by experts as self-consciously to monitor one's cognitive activities, the elements used in those activities, and the results educed.

Based on critical thinking theories that are proposed by Ennis (1996), Jacob & Sam (2008), Facione (2013), and Rasiman & Pramasdyahsari (2015), the elements of critical thinking can be summarized as follows.

Table 2.1 A Summary of Elements of Critical Thinking to the Experts

	Expert(s)			
Elements of Critical Thinkin	**Ennis (1996)**	**Jacob and Sam (2008)**	**Facione (2013)**	**Rasiman and Pramasdyahsari (2015)**

	Expert(s)			
g	Focus	Clarification	Interpretation	Identification
	Reasons	Assessment	Analysis	Formulation
	Inference	Inference	Evaluation	Application
	Situation	Strategies	Inference	Revelation
	Clarity		Explanation	Decision
	Overview		Self-regulation	Evaluation
				Differentiation

As shown from the table above, each expert has their own way to recognize and measure critical thinking by proposing some phases, criteria, or elements of it. Further, critical thinking processes of students in this research will be assessed by using the elements of critcal thinking according to Facione (2013). Considering the similiarity between elements of critical thinking proposed by Ennis (1996) and Facione (2013), the researcher prefers to use Facione's since it is newer. Therefore, critical thinking in this research is defined based on the six elements proposed by Facione (2013), that is as mental process in making decisions to solve problems in which one folllows these following acitvities comprised of interpretation, analysis, evaluation, inference, explanation, and self- regulation.

Table 2.2 Questions to Fire Up Critical Thinking Skills

Element(s)	Questions
Interpretation	• What does this mean? • What's happening

Element(s)	Questions
	• How should we understand that? • What is the best way to characterize /categorize/classify this? • In this context, what was intended by saying/doing that? • How can we make sense out this (experience, feeling, statement)?
Analysis	• Please tell us again your reasons for making that claim. • What is your conclusions/What is it that you are claiming? • Why do you think that? • What are the arguments pro and con? • What assumptions must we make to accept that conclusion? • What is your basis for saying that?
Inference	• Given what we know so far, what conclusions can we draw? • Given what we know so far, what can we rule cut? • What does this evidence imply? • If we abandonded/accepted that assumption, how would things change? • What additional information do we need to resolve this question? • If we believed these things, what would they imply for us going forward? • What are the consequences of doing things that way? • What are some alternatives we haven't yet explored? • Let's consider each option and see where it takes us. • Are there any undesirable consequences

Element(s)	Questions
	that we can and should foresee?
Situation	• How credible is that claim? • Why do we think we can trust this person claims? • How strong are those arguments? • Do we have our facts right? • How confident can we be in our conclusion, given what we now know?
Explanation	• What were the specific findings/results of the investigation? • Please tell us how you conducted that analysis. • How did you come to that interpretation? • Please take us through your reasoning one more time. • Why do you think that (was the right answer/was the solution)? • How would you explain why this particular decision was made?
Self-Regulation	• Our position on this issue is still too vague; can we be more precise? • How good was our methodology, and how well did we follow it? • Is there a way we reconcile these two apparently conflicting conclusions? • How good is our evidence? • OK, before we commit, what are we missing? • I'm finding some of our definitions a little confusing; can we revisit what we mean by certain things before making any final decisions?

Source: Facione (2013)

C. Critical Thinking Process of Students

As mentioned above, critical thinking is thinking reasonably in making decisions to solve problems. While process is defined as a series of things that are done in order to achieve a particular result. From those explanation, critical thinking process of students can be said as steps that are taken by students in making decisions to solve problems.

According to Dowden in Wallace and Jefferson (2015), critical thinking can be used to grasp the point that a writer or speaker is trying to make; detect whether someone's claim needs more evidence to back it up; distinguish between strong arguments and weak ones; generate reasons for your viewpoint on some issue; decide what information in a piece of writing or speaking to accept and use, and decide what information to reject and not use; reason from a hypothetical assumption; make a potentially strong argument stronger; and practice conscious quality control as you think. Through critical thinking, students are trained to reason, analyze, and construct an idea based on their own arguments combined with the facts. In other words, students can improve their quality of thinking. It is strengthen by statement of Murawski (2014:25) says that critical thinking incorporates how learners develop and apply thought to understand how thinking can be improved. Because of this, teacher has to pay attention to the students' critical thinking processes.

Although critical thinking is one of abilities that has to be owned by students in Indonesia (Ministry of Education, 2016), evidence says that it is still ignored by teacher. In fact, we can find many teachers who conduct learning process classically. Teachers just provide the materials, give some examples, and give tasks to the students. The ignorance of students' thinking processes gives an impact to the the fact that many students have

low critical thinking skill. However the teacher can improve their critical thinking. It is supported by Willingham (2007) stating that critical thinking can be taught. Students' critical thinking can be improved if teachers provide problems to be solved by them.

As explained in the previous sub-chapter about critical thinking, the six elements proposed by Facione (2013) will be used in this reaseach. Those elements are developed as an indicator to assess critical thinking processes of students. The table below shows indicators for identifying engagement in critical thinking processes of students.

Table 2.3 The Indicators of Critical Thinking Process

Indicators	Sub Indicators	Criteria
Interpretation	Categorize	• Mention what are given. • Mention what are asked.
	Clarify meaning	• Describe the problem in own words.
Analysis	Examine ideas	• Mention unstated information of a given problem.
	Identify arguments	• Identify the relationship among information given in the problem. • Identify the relationship between what are given and asked of a provided problem.
	Identify reasons and claims	• Mention the reason of choosing certain approaches/strategies to the solution.
Inference	Query evidence	• Determine relevant and irrelevant information to draw reasonable conclusions. • Consider relevant

Indicators	Sub Indicators	Criteria
		information and ignore the irrelevant ones.
	Conjecture alternatives	• Form conjectures and hypothesis.
	Draw conclusions	• Educe the consequences flowing from data and opinions. • Make a conclusion as the final result of solving problem.
Evaluation	Assess credibility of claims	• Assess the logical strength in interprating problem. • Judge the credibility of conclusion.
	Asses quality of arguments	• Assess the applicability of strategies have been devised. • Assess the strength of each step has been taken in solving problem.
Explanation	State the results	• State the strategies have been devised • State final results as a solution of given problem.
	Justify procedures	• Justify every step of certain strategy to solve problem
	Present arguments	• Present arguments of identifying the relationship between given information and strategies to solve problem
Self-Regulation	Self-monitor	• Monitor the degree to which the understanding in interpreting problem. • Reconsider the judgement in view of further analysis.

Indicators	Sub Indicators	Criteria
	Self-correct	• Revise the answer in view of errors discovered. • Change the conclusion in view of the realization of misjudgement.

Above indicators cannot be seen from students' paper only. Some are revealed during interview process. Students are called fulfill the element if only if they do some activities based on the indicators while completing the test. Yet, students are called critical thinkers if and only if they have the six elements of critical thinking.

D. Contextual Problem

According to Yahya (2017), a problem is a situation which is experienced by an agent as different from the situation which the agent ideally would like to be in. While Barmby et al. (2014) said that a situation is not problem if the route to its solution is obvious. So, we can defined the problem as a matter or situation in which one would like to be in because it can not be solved by using routine procedure. While contextual, according to Oxford dictionary, is depending on or relating to the circumstances that form the setting for an event, statement, or idea. In classroom setting, contextual can be defined as relating or putting a context in subject matter.

Based on the definition of problem and contextual that have been described in paragraph above, we may conclude that contextual problem is a situation in certain subject matter related to context in a real life in which the route of its solution is not obvious and it cannot be solved by using routine procedure. That problem we often find in our daily life. Commonly, contextual

problem is also be said as context problem or contextualized problem.

Widjaja (2013:157) presented examples of contextual problems coming from 1500 years ago in China so clearly the use of context is not a novelty. It indicates that many people already realized about the role of contextual problems. According to Gravemeijer & Doorman (1999), a context has an important role since it becomes a starting point of learning for students to explore mathematical notions in a situation that is 'experientially real' for them. Further, they defined that term as problems of which the situation is experientially real to the student.

Not only offer some potentials to engage and motivate students in learning mathematics, the use contextual problems also presents some challenges for students in classrooms (Widjaja, 2013:157). Those challanges are expected to engage students in critical thinking.

E. Solving Contextual Problems

Contextual problems provide problems related to students' real life. Through real experience with how to solve problems, students will find something and grow ideas. The ability to solve problems, discover, and grow the ideas included in the critical thinking (Kurniati *et al*., 2015: 55). Those implies that students can develope their critical thinking while they are solving contextual problems.

As explained before, contextual problem is situation in certain subject matter related to context in a real life in which the route of its solution is not obvious and it cannot be solved by using routine procedure. Further, the "solve" term on that definition refers to a sequence of actions that reduce the different between the initial situation and the goal (Heylighen, 1998).

While Polya (2004) said that it refers to a process to find a way out of problem. Therefore solving contextual problems can be said as an activity involving sequence of actions to find a way out or solution of contextual problems.

F. Cognitive Style

1. Definition of Cognitive Style

Messixk in Onyekuru (2015:77) defined cognitive style as the process which is self-generated, transient, situationally-determined conscious activity that a learner uses to regulate, receive and transmit information and ultimately behaviour. It refers to an individual's way or method of processing information. Similiar definition came from Sellah *et al*. (2017:10). She stated that cognitive styles is a term used to describe the way individuals think, perceive and remember information. In this research, cognitive style is defined as a tendency of the way indivividual thinks to interpret and process information.

Every individual thinks with their own way. Different individual has different preffered way of thinking. The same information might be interpreted and proceeded differently. It is because they have different cognitive style. Riding and Rayner (2012) argued that cognitive style is associated with individual differences in the learner and learning environment. Furthermore, cognitive style influences a person's general attainment or achievement in learning situations

2. Reflective and Impulsive Style

Cognitive style has been catagorised in many dimensions. One of those is reflective-impulsive style that was developed by Kagan (1964). The concept of reflective

and impulsive refers to the tendency to finish task slow-accurate or fast-inaccurate.

Latency and accuracy scores are used to classify participants into four groups: (1) Impulsive: students who were quicker and therefore whose latency score was below median; however, with an error rate above the median; (2) Reflective: students with a latency score above the median with fewer errors; (3) Fast-accurate: fast and accurate students, and (4) Slow-inaccurate: slow students with a higher error rate (Al-Silami, 2010). However, the percentages for the reflective and impulsive participants in the majority of tests are found to be greater than for the remaining groups (slow-inaccurate and fast-accurate) (Al-Silami, 2010).

Al-Silami (2010) said that those who are relatively slow and highly accurate in their work are called reflective, while those who work both quickly and with errors are impulsive. That is why it is probable to obtain different results in the process of investigating these students having different cognitive characteristics. As a matter of fact, it appears in conducted studies that reflective and impulsive students reveal different results in terms of investigated variable.

3. Matching Familiar Figures Test (MFFT) for Measuring Reflective and Impulsive Style

Matching Familiar Figures Test (MFFT) is the most widely used instrument to group individuals into reflective and impulsive style (Webster and Jackson, 1997). Other instruments often used to measure the reflection-impulsivity construct are: (1) CST (Conseptual Style Test). It is a set of 30 cards, each with three black and white drawings of familiar objects. The child is asked to pick out two pictures that are alike or go together in some way and to state the basis for his grouping.; (2) word-association test. In this test, 40 words (20

singular nouns, 10 adjectives, and 10 verbs) are presented to each S with the some instructions.; (3) Hidden Figures Test (HFT). It is consisted of one practice and 11 test items. Each item includes a figure card ilustrating a familiar object (e.g., Mickey Mouse, a cowboy, a rose), and a hidden figure card in which the familiar object is embedded (i.e., blended into a patterned background) (Kagan, 1965).

Eventhough MFFT was first constructed by Kagan (1964), in this research, the MFFT used was owned by Al-Silami (2010). This test was examined to both rural and urban Arabian students. Since Indonesia has different culture with Arabic, the latency and the errors used in this research are not based on the research of Al-Silami (2010). However, the MFFT is overall the same, except its language. It would be translated into Indonesian language since the users/participants are Indonesian students.

The MFFT itself is a set of figures consisting of stimulus objects called *gambar standar* with eight associated variants named *gambar variasi* and the student must associate the correct variant with the stimulus object. There are 22 items of stimulus object comprised of old man, book, ship, telephone, bird, man, lion, apple, pen, shoe, fish, watch, bottle, tree, car, map, face, hair brush, camera, flower, spider, and television. The first two items (old man and book) are for practice. The figure below is the stimulus object followed by the eight associated variants for the first item.

Figure 2.1 Example of Stimulus Object in MFFT
Source: Al-Silami (2010)

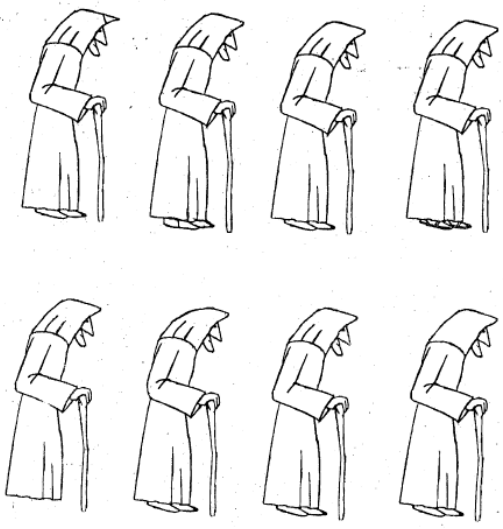

Figure 2.2 Example of Associated Variants in MFFT
Source: Al-Silami (2010)

As noted earlier, students need to match the stimulus object with the associated variants provided. Among eight old man figures which look similiar to each other, the students, individually, must find or identify one figure which is identical or exactly the same as the stimulus object. After writing the answer, the students need to raise their hands and wait for the researcher coming to them to tell how long they find the first answer and to check their answers. If the students get right answer, they can stop and is not allowed to go to the next item while waiting for other friends. But if they get wrong answer, they need to find another answer until find the right one. The amount of time to find the second answer is not counted.

The initial response time (latency) and the number of errors (accuracy) for the MFFT are used to classify students into the following four categories: reflective, impulsive, slow-inaccurate, and fast-accurate. So, there will be two scores generated in the MFFT of each student: (1) **latency score**, it refers to the amount of time spent by a student to get answer of each item and it is counted based on their initial response, regarding right or wrong; and (2) **error score**, it refers to the number of errors made by a student until found the right answer of each item**.**

Further, the **total latency score** of a student completing 20 items is symbolized as $\boldsymbol{t}$ while the **total error score** of a student made is symbolyzed as $\boldsymbol{f}$. After calculating the total latency score and the total error score of each student, **the median of the latency scores ($\boldsymbol{\gamma}$)** of the class, as well as **the mean of the error scores ($\boldsymbol{\delta}$)** of the class will be calculated.

The students whose $\boldsymbol{t > \gamma}$ and $\boldsymbol{f < \delta}$ are called **reflective students**. The students whose $\boldsymbol{t < \gamma}$ and $\boldsymbol{f > \delta}$ are called impulsive students. While students whose $\boldsymbol{t > \gamma}$ and

$\boldsymbol{f > \delta}$ are classified into slow-inaccurate category. The last, the students whose $\boldsymbol{t < \gamma}$ and $\boldsymbol{f < \delta}$ will be classified into fast-accurate student. However, the last two categories, slow-inaccurate and fast-accurate are not used in this research since the other two categories are often found the most dominant.

G. Ratio, Proportion, Fraction, and Rational Numbers

1. Ratio

Ratio is defined as a quotient or proportion of two numbers, magnitudes, quantities, or expressions, such as a measure of the relative size of two classes. In mathematical notation, it can be stated as $a : b$ or $\frac{a}{b}$, when $b \neq 0$.

Example of Ratio

The ratio between the numbers of boys and girls in a class is 1:3, meaning that for every 4 students in a class, 1 is boy and 3 are girls; or, $\frac{1}{4}$ of the students are boys, and ¾ are girls. If say, the total number of students in a class is 36, then there are 9 boys and 27 girls in that class.

Ways of Representing Ratio

Based on example above, we can write that the numbers of boy students to girl students in a class as 1 to 3, or 1:3, or $\frac{1}{3}$.

Each expression shows that for every 1 boy student, there are 3 girl ones. That is, the three expressions express the same situation. However, mathematically, each form presents a different emphasis.

Table 2.4 Ways of Representing Ratios

Expression	Describes:
1 to 3	the situation verbally, without any mathematical implication
1:3	the pattern using the concept of ratio.
$\frac{1}{3}$	a fraction, and thus implies that the given relationship can be defined in this case the rational number 1/3.

Actually, if given the ratio between boy students to girl students in a class is 1:3, then it is possible to present this ratio in five different forms:

a. For every 1 boy student there are 3 girls.
b. For every 4 students in the class, there are 1 boy and 3 girls.
c. $\frac{1}{4}$of all the students are boy and $\frac{3}{4}$ are girls.
d. Boy students are $\frac{1}{3}$ the number of girl students.
e. Girl students are $\frac{3}{1}$ the number of boy students.

2. Proportion

Proportion is a linear relationship between two vriable quantities or their inverses, corresponding elements of two sets that are in proportion are in a constant ratio. Another definition says that ratio is a relationship between four numbers or a quantitities in which the ratio of the first pair quals the ratio of the second pair; written $a: b = c: d$, or $a: b = c: d$.

In mathematical notation, this means that four variables, $a, b, c,$ and $d (a \neq 0, b \neq 0, c \neq 0, d \neq 0)$ will form a proportional relation in the following two situations:

a. When $\frac{a}{b} = \frac{c}{d}$. This is direct proportion: the quotient of the two parts of the ratio, a and b, is constantly equal to that of c and d.
b. When $a \times b = c \times d$. This is inverse proportion: the product of the two parts of the ratio, a and b, is constantly equal to that of c and d.

Examples of proportions:

a. According to the gas laws, pressure is directly proportional to temperature. The quotient derived from pressure (numerator) and temperature (denominator) will be constant.
b. According to the gas laws, pressure is inversely proportional to volume, meanging that the product between volume and pressure will be constant.

3. Fraction and Rational Number

A fraction is defined as a ratio of two numbers, where the number at the bottom cannot be equal to zero. In a fraction the number at the top is called the numerator, and the number at the bottom is called the denominator.
In mathematical notation, fraction as can be defined as:

"If a and b are contained in the number set S with $b \neq 0$, then $\frac{a}{b}$, if it exists, is that number $c \in S$ so that $b \times c = a$. In other words, $\frac{a}{b}$ is defined by the property $b \times \frac{a}{b} = a$. $\frac{a}{b}$ is called the quotient of a by b or a fraction."
Further, Wu (2008) said that "The set of all the fractions is called the rational numbers."

H. Direct and Inverse Proportions

Direct and inverse proportions is topic in mathematics that has to be mastered by Junior High School students based on Curriculum 2013. The standard competences said that students must be able to analyse direct and inverse proportions by using

tabel, data, graphic, and equation. They also have to be able to solve problem that is related to direct and inverse proportions.

The concept of proportion is often used in daily life. Therefore, it is an important topic since it is applicable in everyday situations. In fact, many students are still confused to distinguish between problem with direct proportion and problem with inverse proportion. Both terms are often used interchangeably.

Ben-Chaim et al. (2012) stated that fractions, ratios, and proportions are being the most protracted in terms of development, the most difficult to teach, the most mathematically complex,the most cognitively challenging, the most essential to success in higher mathematics and science, and one of the most compelling research sites among all topics is school curriculum. Considering that statement, we may say that direct and inverse proportions, ss a topic related to ratios and proportions, is topic that requires critical thinking.

1. Direct Proportion

   Direct proportion between two quantities occurs when quantitive changes to them occur uniformly. That is, if quantity a is multiplied by a factor m,then quantity b, must similiarly multiplied by m, which is the constant factor. In this case, the **quotient** (ratio) between the first two quantities is identical to the quotient (ratio) of the second pair.

   In mathematical notation: Direct proportion occurs when, given four variables, a, b, c, and d ($a \neq 0, b \neq 0, c \neq 0, d \neq 0$) then ($\frac{a}{b} = \frac{c}{d}$). That is, if $c = a \times m$ (a is multiplied by a factor m, $m \neq 0$), then $d = b \times m$ (b also is multiplied by m), or if $c = a{:}\,m$ (a is divided by a factor m, $m \neq 0$), then $d = b{:}\,m$ (b also is divided by m).

2. Inverse Proportion

Inverse proportion between two quantities occurs when quantitive changes to them occur uniformly but in opposite directions (multiplied vs. divided). That is, if quantity a is multiplied by a factor $m, m \neq 0$, then quantity b must be divided by m (m is a constant factor). In this case, the **product** of the first two quantities is identical to the product of the second pair.

In mathematical notation: Inverse proportion occurs when, given four variables, a, b, c, and d $(a \neq 0, b \neq 0, c \neq 0, d \neq 0)$ then $(\frac{a}{c} = \frac{d}{b})$. That is, if $c = a \times m$ (a is multiplied by factor m, $m \neq 0$), then $d = b : m$ (b is divided by m), or if $c = a : m, m \neq 0$, then $d = b \times m$.

I. Example of Contextual Problems of Direct and Inverse Proportions

1. Direct Proportion

Karin works as a tuition teacher. The salary will be directly proportional to the amount of hours she works and she is paid Rp 75.000,00 an hour. How much can Karin earn a month if she works for 50 hours?

It is a Direct Proportion since:

a. As the amount of working hours increases, so does the salary she will get.
b. As the amount of working hours decreases, so does the salary she will get.

2. Direct Proportion

Four people can paint a fence in 3 hours. How long will it take 6 people to paint it?

(Assume everyone works at the same rate)

It is an Inverse Proportion since:

a. As the number of people goes up, the painting time goes down.
b. As the number of people goes down, the painting time goes up.

Another Example

Toni spent 1 hour driving from his house to the campus. His average speed was 60 km/h. How long would it take if Toni drove at 40km/h?

J. Relevant Researches

1. A Comparison of Creative Thinking and Reflective-Impulsive Style in Grade 10 Male Students from Rural and Urban Saudi Arabia (Al-Silami, 2010). The research conducted by Al-Silami aimed to determine the differences between rural and urban Saudi male students in regard to creative thinking and cognitive style. While this ongoing research aims to describe critical thinking processes of students in solving contextual problems. Both researches classify students into reflective-impulsive style before asking them to complete the test. The result of Al-Silami's research showed: (1) students in urban schools scored higher in the TTCT characteristics than rural students; (2) urban students were more reflective than the rural students; (3) there is a positive relationship between creative thinking and reflective style; (4) the urban environment has a more positive influence on a student's creativity than that offered by the rural environment.
2. *Proses Berpikir Kritis Siswa Kelas V SDN Sidorejo Lor 03 Salatiga dalam Pemecahan Masalah Matematika pada Materi Pecahan (*Kelana et al., 2013). As mentioned in the title, the focus of that reasearch has similiarity with this ongoing

research which is about the critical thinking processes of students. But Kelana chose elementary students as subject of her research, while the subject of this research is high school students. Kelana's research showed that student with high mathematical ability is able to pass the whole phases of critical thinking which are clarification, assessment, inference, and strategy. While student who has average mathematical ability only passses until third phase and student with low mathematical ability passes only two phases which are clarification and assessment.

3. Mathematical Critical Thinking Ability through Contextual Teaching and Learning Approach (Kurniati et al., 2015). That research aims to examine the effect of the application of contextual teaching and learning (CTL) approach to the enhance of mathematical critical thinking ability (MCTA). So, "contextual" in that research plays a role in learning approach and as treatment of the research, while in this ongoing research that term is used in type of problem (contextual problem) and as instrument to describe critical thinking processes. The result of Kurniati's research showed: (1)the increase of MCTA of student who receive CTL better than students who receive tradional teaching and learning (TTL); (2) there are differences in the increase MCTA between students in groups of high mathematical prior ability (MPA), medium MPA, and low MPA, both the student who received the CTL and TTL; and (3) there is no interaction between learning factors (CTL and TTL) with MPA (high, medium and low) toward the enhance of MCTA.

CHAPTER III
METHODOLOGY

A. Research Approach Design

Based on the goal of this research which was describing critical thinking processes of students, it is used descriptive research with qualitative approach to carry out these plans of research. This research would describe students' critical thinking processes to reveal and explore how reflective and impulsive students proceed informations to solve contextual problems.

B. Research Design

1. Giving MFFT to all students in the class.
2. Classifying the students into two groups which were reflective and impulsive as a result of completing MFFT.
3. Choosing two subjects who are reflective and impulsive. The student whose the latency was very big, yet the errors approched to zero was determined to be a subject representing reflective group. The student whose the latency was very small, yet made many errors was determined to be a subject representing impulsive group. Gender and mathematics skills of students were involved in subjects selection. The subjects chosen had the same gender and their mathematics score was not much different.
4. Giving contextual problems of direct and inverse proportions to a reflective and an impulsive subject.
5. Interviewing the subjects related to the process of solving contextual problems in order to confirm their written answers and reveal some processes that cannot be seen.
6. Analysing all data had been gathered and those resulted a conclusion.

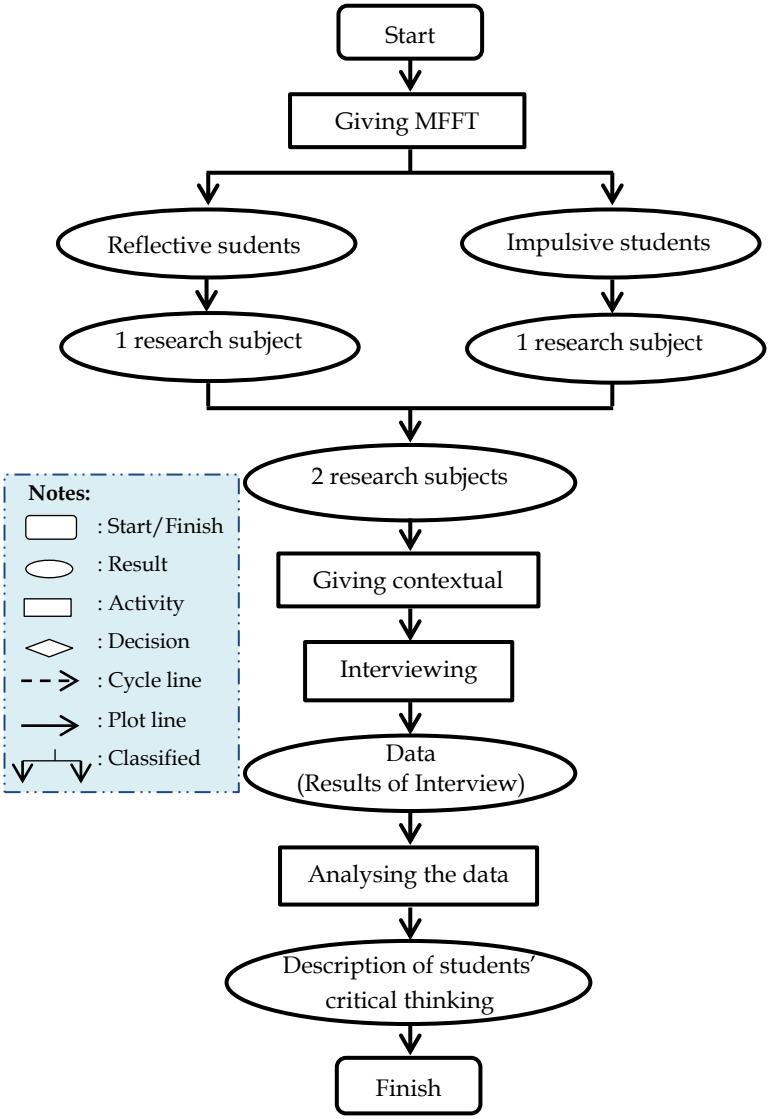

Figure 3.1 The Flow Chart of Research Design

C. Research Data

The subjects of this research were 7th grade students. This grade was selected since junior high school students of grade 7 had just studied direct and inverse proportions. It could be seen from basic competence for 7th grade in which stated, "distinguish between direct and inverse proportions by using tabel, graphic and equation; and also solve related problems".

There was one class chosen to conduct the research which was class 7-8. The consideration to choose this class was coming from the mathematics teachers in that school. The teachers recommended the class 7-8 to be the chosen class since the majority of students was critical thinkers and it was appropriate to this research topic, critical thinking. All students completed MFFT and then were classified into reflective and impulsive group. One student with reflective style and one student with impulsive style finally became the research subjects. To make it clear, research subjects were chosen based on this following flow chart.

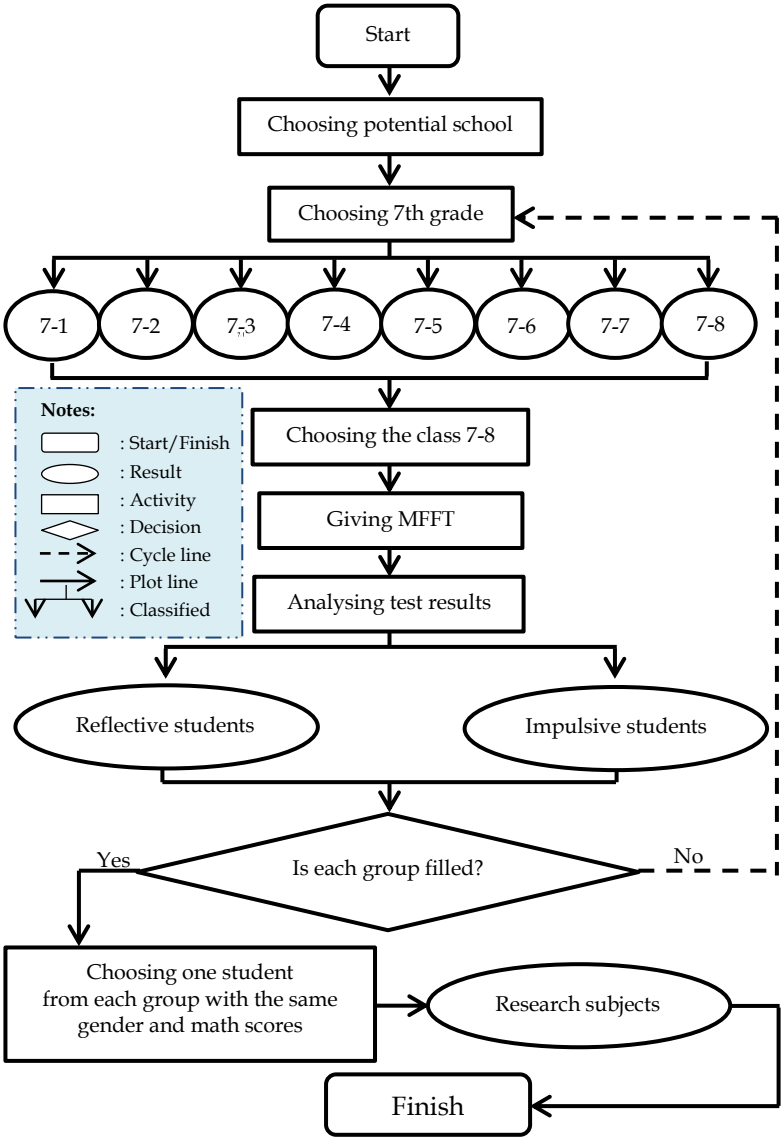

Figure 3.2 The Flow Chart of Choosing Subjects

D. Research Instruments

There were two types of instruments designed for this research. Those were main instrument and supporting instrument. Main instrument was researcher. While supporting instruments were MFFT, test for contextual problems, and questions for interview.

1. Main Instrument

The main or key instrument for measuring the outcome of this research was the researcher itself with validation includes comprehension of qualitative research methods, knowledge to the reasearch field, and the researcher readiness to enter the research subject. In his book, Creswell (2014) explained that qualitative researchers may use a protocol as an instrument but the researchers are the ones who actually gather the information.

2. Additional Instruments

a. MFFT (Matching Familiar Figures Test)

Matching Familiar Figures Test (MFFT) was a set of psychometric test first developed by Kagan (1964). However, the MFFT used in this research was based on the research of Al-Silami (2010). By completing this test, individual's cognitive style was known, whether they were reflective or impulsive. MFFT was able to analyse research subjects' skill by matching standard/stimulus figure with some associated figures.

The MFFT consisted of 20 matches to standard items, plus 2 practice items. Each student was examined individually and each test item comprised one standard picture with eight similar variants. In MFFT, the subjects needed to find the figure which corresponded exactly to a standard among similar variants.

The total number of errors and the latency of the first response for each test item was recorded. Those two areas: latency (initial response time) and accuracy (number of errors) were measured in order to classify the students into these following four groups:

1) The reflective student. This student scored more than the mean on the initial response and less than the mean amount of errors;
2) The impulsive student. This student scored less than the mean in the initial response and scored above the mean with the amount of errors;
3) The slow-inaccurate student. This student spent more than the mean time for the initial response and scored more than the mean with the amount of errors; and
4) The fast-accurate student. This student scored less than the mean in the initial response and made fewer errors than the mean score

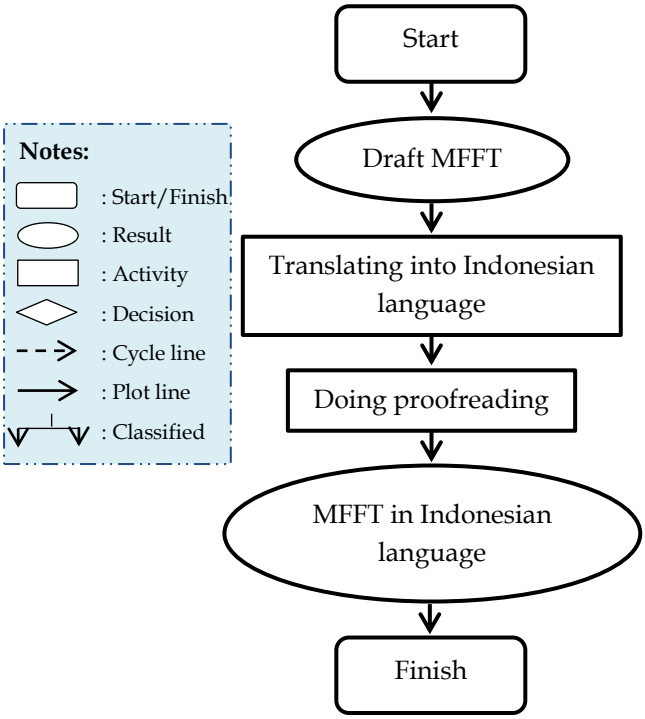

Figure 3.3 The Flow Chart of Developing MFFT

Since the subjects of this research were Indonesian students, the MFFT developed by Al-Silami (2010) was translated into Indonesian language before it was used. Then, the proofreading was done by the supervisor to correct typographical errors and mistakes. The translated MFFT was also tried to examine to some students.

b. Contextual Problems Test

Before using contextual problems test as an instrument, the test needed to be validated first. The

validity was important in order to improve the problems so that it could desribe students' critical thinking processes. The contextual problems were related to direct and inverse proportions learned by junior high school students.

The ones who validated this instrument were lecture and mathematics teacher. The validators must master direct and inverse proportions as well as contextual problems. There are 4 criteria for the validation: content material, language, information, and time alocation. The score is in scale 1-4. For a score 1, the problems is considered very bad. For a score 2, it is considered bad. For a score 3, the problems is considered good. For a score 4, it is considered very good. For overall validation, the problem is considered proper without revision if the validation gets mark A. The problems is considered proper with small revision and proper with big revision, respectively, if the validation gets mark B and C. If the validation gets mark D, the problems is considered improper.

In part of validation, the proofreading was done for the contextual
problems. It was done by two 7th grade students from SMP Al-Falah Deltasari who already learned about direct and inverse proportions. The indicators of proofreading are: (1) the problem can be red well, (2) the problem can be understood, (3) the problem can be explained by students with their own words. The scores of each indicator are as follows: 1=not sure, 2=a bit sure, 3=sure, and 4=very sure.

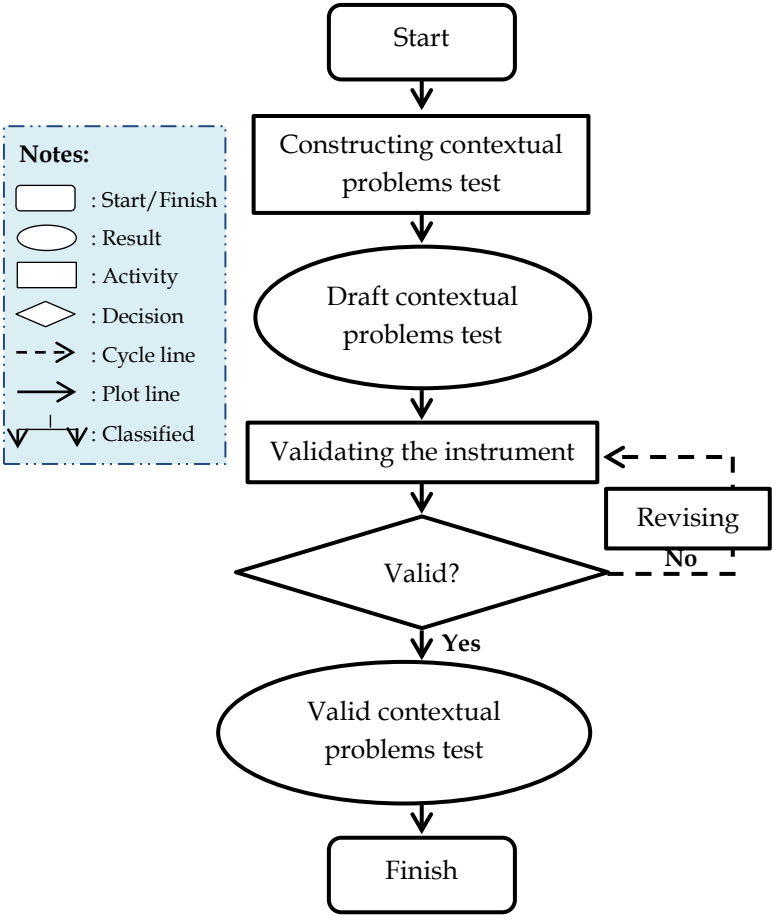

Figure 3.4 The Flow Chart of Constructing Contextual Problems Test

c. Interview Guidance

Interview was conducted to gather information from students directly is structured interview. Questions were developed based on indicators of

critical thinking process. Researcher followed such questions that had been developed, yet researcher could improve the questions based on students' answers to get further information. So that researcher might collect data more detail. The questions were discussed with lectures before ready to use.

E. Data Collection Methods

Data were collected by using two different methods. The first was tests and the second one was interview method.

1. Tests

Test is data collection method by giving subjects some written questions to complete. According to Frechtling (2002), tests provide a way to assess subjects' knowledge and capacity to apply this knowledge to new situations. There were two tests used in this research which were MFFT and contextual problems. MFFT took a role in classifying students into some groups (reflective and impulsive) and one of each group became researcher subjects. While contextual problems were tested to reveal students' critical thinking processes.

Based on the aim, contextual problems were presented in essay form so that subjects could create extended responses rather than to simply select a response. Essay questions was chosen by considering these following advantages mentioned by Reiner (2002) that essay questions could: assess higher-order or critical thinking skills, evaluate student thinking and reasoning, and provide authentic experience.

2. Interview

Interview was conducted to get more detail data in which support the test results. It provided opportunities for follow-

up of interesting comments (Frechtling, 2002). Researcher used semi-structured interview to gather information from subjects. Semi-structured interview was carefully planned. However, researcher was allowed to develope the questions based on the answers of subject.

All conversations in interview process were recorded by researcher. Recording helped in analysing data since it could be played many times to minimize misheard. The interview was executed after subjects completed contextual problems given. Critical thinking process might not be shown in the test. Because of this, researcher conducted the interview to reveal their critical thinking processes in solving direct and inverse proportions contextual problems.

F. Technique of Data Analysis

After the data were collected, they would be analyzed to draw a conclusion. The data analysis involved three concurrent flows of activity (Miles and Huberman, 2014).

1. Data Condensation

   The goal of this activity were to sharpen, focus, discard, and organize data (Miles and Huberman, 2014). The data as results of MFFT, written test, and interview were selected, simplified, and transformed into certain ways/forms

   After the data were gathered, they would be separeted into necessary and unnecessary data. The unnecessary ones were not used since they were inappropriate to the research.

2. Data Display

   The data gathered were presented in passage, table, and also figure. Data display allowed the researcher to get a general sense of information and to figure out what was happening so that a conclusion was easaily found.

After selecting the necessary data (activity number one), then the interview data was presented as interview transcripts showed in the table, the test results were presented as figure separated for each problem, and MFFT results were presented in the table and diagram showing the initial time and the number of errors. .

3. Conclusion

As conclusion was the main goal of analysing data, drawing conclusion was the last activity to do. From data had been displayed, some conclusions were taken corresponding to the indicators of critical thinking for this research.

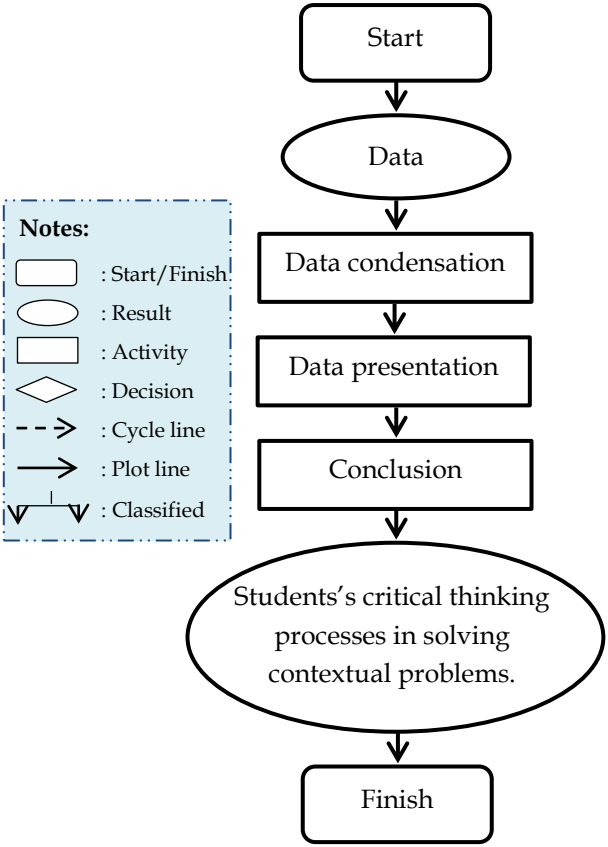

Figure 3.5 The Flow Chart of Analysis Data

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CHAPTER IV
RESEARCH RESULT AND DISCUSSION

In this chapter, critical thinking processes of high school students in solving contextual problems are described. Analysis is done for both contextual problems as well as interview results. The subjects in this research completed contextual problems on April 4, 2018, while interview was conducted on April 7 and 8, 2018.

A. Supporting Instruments

Instruments are validated before used in order to assess whether it is apropriate or not. The validation was done by a lecturer and a mathematics teacher. Both contextual problems and interview guidance are validated based on indicators of critical thinking. While MFFT which is an instrument for students' cognitive style, instead of being validated, is adapted from Al-Silami's paper.

1. Matching Familiar Figures Test (MFFT)

   Instrument used for MFFT in this research is owned by Al-Silami (2010). His instrument is considered being proper instrument since it is already examined to rural and urban students. However, the latency and the accuracy used are not based on his research. Those will be calculated based on data gathered in this research to avoid the difference between Arabian and Indonesian students.

   There are some ways to determine the latency. It can be determined based on the median or the mean of data. Here, the latency is determined based on the median since there are some outliers found in the data. The smallest datum is 206 while the biggest datum is 1630. The median of the data is 749.

B. Validation of Contextual Problems

Before being used, the contextual problems as research instrument was validated by the experts which were a lecturer and a mathematics teacher. The contextual problems test consisting three problems related direct and inverse proportions was validated based on the indicators of critical thinking processes used in this research. The first validation was done by the lecturer. After being revised in line with the suggestions from the validator, the instrument was validated by the teacher as second validator. The revision would be revised again and then was consulted with the supervisor. Besides, the proofreading was done for the contextual problems by two students who were not included in research subjects.

In the first validation, it was focus on the sentence arrengements. Some uncommon terms was changed by the common ones. Furthermore, some given information provided in the problems were removed and some were added. The result from this validation is shown in **Appendix 6 and 7**.

In the second validation, the instrument did not get any revision. However, there were some suggestions for the alternative solutions. The solutions should be written in the students' form and the conclusion must be added. The result of this validation can be seen in **Appendix 9**. Then, the instrument was consulted with the supervisor, resulting two problems only from three problems provided (removed problem number 2). Also, some instructions for students were added above the contextual problems test. The proofreading by two students showed that the contextual problems were clear enough and could be understood by the students. The final instrument that was used is in **Appendix 10**. Overall, the differences between the original instument and the revised instrument is shown on the table below.

Table 4.1 The Revision for Contextual Problems

No.	Before Validation	After Validation
1.	*Renovasi sebuah balai desa direncanakan selesai seminggu sebelum tanggal 17 Agustus karena akan digunakan sebagai tempat untuk perayaan hari Kemerdekaan Indonesia oleh warga setempat. Renovasi dimulai pada hari pertama di bulan Mei di tahun yang sama. Tiga pemuda dan empat pria dewasa dengan kemampuan dan jatah/porsi kerja yang sama akan dikerahkan untuk menyelesaikannya. Dua minggu setelah pengerjaan, pembangunan terhenti selama 11 hari karena sesuatu hal. Jika kepala desa tetap menginginkan pembangunan selesai tepat waktu, apakah beliau harus menambah pekerja? Jika iya, berapa pekerja yang harus ditambahkan?*	*Sebuah balai desa direnovasi untuk digunakan sebagai tempat perayaan Hari Kemerdekaan Indonesia oleh warga setempat. Kepala Desa mempekerjakan sekelompok tukang borongan yang terdiri dari 7 orang pekerja untuk menyelesaikannya dengan bayaran yang cukup besar. Karena darurat, para pekerja tersebut sepakat untuk bekerja setiap hari dan tanpa libur. Renovasi harus selesai paling lambat tanggal 10 Agustus 2018. Para pekerja memulai renovasi pada tanggal 1 Mei 2018. Dua minggu setelah pengerjaan, di luar rencana, pekerjaan renovasi harus terhenti selama 11 hari karena sesuatu hal, dan dilanjutkan kembali pada tanggal 26 Mei 2018. Apa yang harus dilakukan oleh Kepala Desa dan ketua pemborong jika diinginkan renovasi selesai tepat waktu pada 10 Agustus 2018?*
2.	*Sebuah industri rumah tangga memberdayakan 12 warga setempat untuk bekerja membuat tas. Industri tersebut memiliki jam kerja dari jam 8 pagi sampai jam 5 sore dengan waktu 1 jam untuk ishoma,*	

<table>
<tr><th>No.</th><th>Before Validation</th><th>After Validation</th></tr>
<tr><td></td><td>Senin-Jumat. Dalam seminggu, 30 tas mampu dihasilkan. Berapa hari yang dibutuhkan untuk menyelesaikan 4 lusin tas dengan pekerja yang ada?</td><td></td></tr>
<tr><td>3.</td><td>Bu Larasati memiliki usaha puding yaitu “Puding Cup Larasati”. Untuk mempertahankan cita rasa dari puding buatannya, Bu Larasati berpedoman pada resep berikut.
<table>
<tr><th>Vla</th><th>Puding Coklat</th></tr>
<tr><td>2 sdm gula</td><td>1 bungkus agar-agar coklat</td></tr>
<tr><td>6 sdm susu kental manis</td><td>4 gelas air</td></tr>
<tr><td>2 sdm santan instan</td><td>6 sdm gula</td></tr>
<tr><td>2 gelas air</td><td>6 sdm susu kental manis</td></tr>
<tr><td>2 sdm tepung custard</td><td>½ sdt garam</td></tr>
<tr><td>½ sdt garam</td><td rowspan="2"></td></tr>
<tr><td>1 sdt vanili</td></tr>
</table></td><td>Bu Larasati memiliki usaha puding yaitu “Puding Larasati”. Untuk menekan harga, puding coklat dibuat tanpa vla. Namun, Bu Larasati tetap mempertahankan cita rasa puding buatannya dengan komposisi bahan-bahan berikut.
<table>
<tr><th>Bahan Puding Coklat</th></tr>
<tr><td>1 bungkus agar-agar</td></tr>
<tr><td>4 gelas air</td></tr>
<tr><td>6 sdm gula</td></tr>
<tr><td>6 sdm susu kental manis</td></tr>
<tr><td>½ sdt garam</td></tr>
</table>
Resep di atas untuk 5 cup puding berukuran 450 ml. Puding tersebut dijual dengan harga Rp 7.000,00 per cup. Bantulah Bu Larasati untuk menentukan komposisi bahan-bahan puding coklat yang dibutuhkan jika ia menerima pesanan 60 cup puding berukuran 150 ml dengan harga Rp 2.500 per cup.</td></tr>
</table>

C. Validation of Interview Guidance

As a result of validation from the first validator, the interview guidance needed to be revised. The revision was on the terms used in the interview and the sequence of questions. It is shown on the **Appendix 13**. The interview guidance did get any revision from the secon validator.

D. Data Labelling

There are two kinds of data in this research, namely data from written test of contextual problems and data from interview result represented as transcripts. To make the data easy to analyse, they would be labelled. The data from written test are labelled by 5-digit-letter-and-number.

The rule of data labelling for data from written test is described as follows:

1. The labelling starts with student's cognitive style, " SR" refers to test done by reflective subject and "SI" for test done by impulsive subject.
2. Followed by contextual problem number, problem number 1 is written as "1" and so on.
3. The last two-digit shows the order which is preceded by hyphen "-".

Table 4.2 The Examples of Labelling for Written Test Results

Label	Meaning(s)
SR1-01	The 1st answer/statement written by reflective subject for problem number 1
SR2-10	The 10th answer/statement written by revlective subject for problem number 2
SI2-10	The 10th answer/statement written by impulsive subject for problem number 2

For data gathered during interview should be transcripted before being labelled and these following points are the rule of the labelling.

1. The first digit(s) refers to one who is speaking in the interview/conversation: label "R" stands for researcher, "SR" for reflective subject and "SI" for impulsive subject.
2. It is followed by "-" and label for contextual problem number ("1" or "2").
3. The next two digits refer to the order of the interview.
4. To differentiate from data of writen test, labelling for this data is ended by "W".

Table 4.3 The Examples of Labelling for Interview Results

Label	Meaning(s)
R1-01W	The 1st question from resercher for problem number 1
SR1-01W	The 1st answer/statement from reflective subject for problem number 1
SI1-01W	The 1st answer/statement from impulsive subject for problem number 1
R2-13W	The 13th question from researcher for problem number 2

E. Encoding Indicators of Critical Thinking

Coding process in this research is done to cluster data obtained from interview so the relation between interview transcripts and critical thinking indicators can be quickly found. These following points will be explained how each sub indicator of critical thinking to be coded .

1. The first two letters stand for critical thinking indicator: (1) "IT" for interpretation, (2) "AN" for analysis, (3) "IF" for

inference, (4) "EV" for evaluation, (5) "EX" for explanation, and (6) "SL" for self-regulation.

2. The last two digits are number referring to the order of criteria in each indicator.

Table 4.4 The Codes for Critical Thinking Indicators

Indicators	Sub Indicators	Criteria	Code
Interpretation	Categorize	• Mention what are given. • Mention what are asked.	IT01
	Clarify meaning	• Describe the problem in own words.	IT02
Analysis	Examine ideas	• Mention unstated information of a given problem.	AN01
	Identify arguments	• Identify the relationship among information given in the problem. • Identify the relationship between what are given and asked of a provided problem.	AN02
	Identify reasons and claims	• Mention the reason of choosing certain approaches/strategies to the solution.	AN03
Inference	Query evidence	• Determine relevant and irrelevant information to draw reasonable conclusions. • Consider relevant information and ignore	IF01

Indicators	Sub Indicators	Criteria	Code
		the irrelevant ones.	
	Conjecture alternatives	• Form conjectures and hypothesis.	IF02
	Draw conclusions	• Educe the consequences flowing from data and opinions. • Make a conclusion as the final result of solving problem.	IF03
Evaluation	Assess credibility of claims	• Assess the logical strength in interprating problem. • Judge the credibility of conclusion.	EV01
	Asses quality of arguments	• Assess the applicability of strategies have been devised. • Assess the strength of each step has been taken in solving problem.	EV02
Explanation	State the results	• State the strategies have been devised • State final results as a solution of given problem.	EX01
	Justify procedures	• Justify every step of certain strategy to solve problem	EX02
	Present arguments	• Present arguments of identifying the relationship between given information and	EX03

Indicators	Sub Indicators	Criteria	Code
		strategies to solve problem	
Self-Regulation	Self-monitor	• Reconsider the judgement in view of further analysis.	SL01
	Self-correct	• Revise the answer in view of errors discovered. • Change the conclusion in view of the realization of misjudgement.	SL02

F. Research Date and Time

Table 4.5 The Data Collection Activities

Date of Research	Activity
Tuesday, 3rd April 2018	All students in the class finish MFFT
Wednesday, 4th April 2018	Subjects complete Contextual problem of direct and inverse proportions
Saturday, 7th April 2018	Subject 1 is interviewed
Sunday, 8th April 2018	Subject 2 is interviewed

G. Research Subjects Selection

Research subjects were determined based on procedures which had been explained in chapter III. After deciding a potential school, one class was choosen to conduct research by these following criteria: the class must have gotten direct and inverse proportions material and be dominated by critical thinkers. All students in the chosen class finished MFFT around an hour to clasify them into reflective and impulsive students.

Data of their mark on the last semester were gathered to know their mathematical ability. Then, two subjects are selected from 32 students based on these following considerations: one has reflective cognitive style and one another has impulsive cognitive style, both are the same gender and have the same mathematical ability. These considerations were intended to reduce bias and get more trustworthy results. Bramley et al. (2015) claimed that boys and girls have difference in performance in mathematical or related cognitive ability. In addition, the research result of Jacob (2008) showed that there is a significant linear relationship between critical thinking and mathematical achievement. The selected subjects completed contextual problems in 45 minutes. Based on their works in completing the test, the subjects were interviewed one by one.

Latency and errors were calculated based on the result of finishing MFFT. The minimum latency of the chosen class is 119 and the maximum is 1690. The minimum errors is 3 and the maximum is 36. Then the median of latency was calculated resulting 749. While the errors has the mean 16.

Table 4.6 The MFFT Results of Students

No.	Name	Gender	Latency	Errors	Cognitive Style
1.	AAA	Male	566	14	Fast-Accurate
2.	AR	Male	894	13	Reflective
3.	ANR	Female	1343	13	Reflective
4.	ARA	Male	535	17	Impulsive
5.	BTAYN	Male	1049	27	Slow-Inaccurate
6.	CAA	Female	1056	8	Reflective
7.	FR	Male	206	33	Impulsive
8.	FMM	Female	1377	3	Reflective
9.	GPR	Female	1135	11	Reflective
10.	GZRA	Female	713	16	Fast-Accurate

No.	Name	Gender	Latency	Errors	Cognitive Style
11.	HSA	Male	681	12	Fast-Accurate
12.	IGAAB	Male	328	26	Impulsive
13.	IKF	Male	831	31	Slow-Inaccurate
14.	JFA	Female	612	25	Impulsive
15.	LFB	Female	532	18	Impulsive
16.	MAAP	Male	1212	13	Reflective
17.	MFE	Male	512	12	Fast-Accurate
18.	MRJ	Male	541	19	Impulsive
19.	MRA	Male	1207	22	Slow-Inaccurate
20.	MHY	Male	461	18	Impulsive
21.	NF	Male	155	16	Fast-Accurate
22.	NZKW	Male	953	5	Reflective
23.	NAPI	Female	1288	11	Reflective
24.	RMNC	Male	701	18	Impulsive
25.	RBP	Male	119	36	Impulsive
26.	RN	Male	460	26	Impulsive
27.	RAP	Female	855	24	Slow-Inaccurate
28.	RAI	Female	779	6	Reflective
29.	SSM	Female	1630	16	Reflective
30.	SOR	Female	1454	14	Reflective
31.	TAN	Female	1036	15	Reflective
32.	YPP	Female	544	19	Impulsive

It can be inferred from the table above that the number of individuals with reflective and impulsive style are greater than the number of individuals with fast-accurate and slow-inaccurate. There are 37.5% reflective students and 34.375% impulsive students. The sum of these percentages is consistent to the research result of Al Silami (2010) saying there are about 70% students in reflective-impulsive group. It means the reflective-

impulsive students are dominant comparing the remaining cognitive style. Therefore, this research is only focus on reflective and impulsive students.

Table 4.7 The Percentages of Students' Cognitive Style

Reflective	Impulsive	Fast-Accurate	Slow-Innaccurate
12 students	11 students	5 students	4 students
37.5%	34.375%	15.625%	12.5%
71.875%		28.125%	

From the above data, it is shown that the median of initial responses (latency) was calculated, not the mean. However, both median and mean are allowed to be used. Since there are some outliers in the data, median was choosen to determine the latency of the class. The calculation shows that the latency was 749. It means that studens who could complete the test less than 749 seconds, they can be called "fast". Otherwise, if they took more than or equal to 749 seconds to complete the test, they are "slow". The amount of errors (accuracy) indicates whether students are accurate or not. If the students' errors are less than 17, they can be called "accurate". Otherwise, if the errors are more than or equal to 17, they are "inaccurate". Further, students are classified into these four categories:

1. Reflective (slow and accurate)
2. Impulsive (fast and inaccurate)
3. Fast-accurate
4. Slow-inaccurate

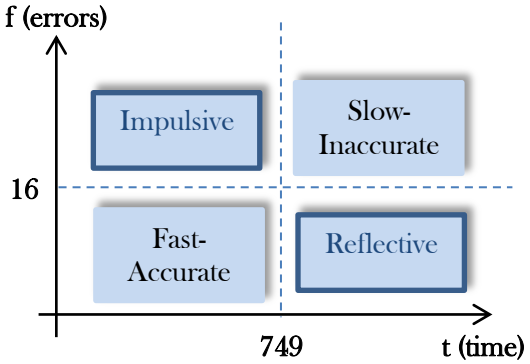


Figure 4.1 Classification of Reflective-Impulsive Style

Choosing subjects begins with eliminating fast-accurate and slow-inaccurate students, remaining reflective a nd impulsive students only. Then, the reflective subject is choosen by considering a student who took so long to respond (the latency was so big), yet the amount of errorrs (accuracy) approaches to zero. Therefore student with initial FMM is choosen. Since that subject is female, the impulsive subject was chosen to be girl and all boys students are automatically eliminated. Among the remaining girl students, one impulsive subject is choosen by considering the time in completing the test was so short (the latency was so small) while the amount of errors (accuracy) approaches the maximum errors students made. It results student with initial YPP to be choosen. In order to decrease the bias, the two subjects' mathematical ability are needed to be checked. Based on their mark or learning outcome on last semester, both of them are in the same level of mathematical ability. The reflective subject obtained 88 mark in mathematics, while the impulsive subject obtained 85 mark. Since the difference is not significant, hence they are appropriate being subjects in this research.

Table 4.8 The Chosen Research Subjects

Latency	1377	544
Accuracy	3	19
Cognitive Style	Reflective	Impulsive
Gender	Female	Female
Mathematics Mark	88	85
Initial Name	FMM	YPP
Code	SR	SI

The difference of both the latency and the accuracy between the two subjects is big. In other hands, it can be said that the reflective subject is so reflective, while the impulsive one is so impulsive. This consideration is expected to lead to the result that there is significant difference of critical thinking processes between reflective and impulsive students.

H. Discussion of the Problems

1. Sebuah balai desa direnovasi untuk digunakan sebagai tempat perayaan Hari Kemerdekaan Indonesia oleh warga setempat. Kepala Desa mempekerjakan sekelompok tukang borongan yang terdiri dari 7 orang pekerja untuk menyelesaikannya dengan bayaran yang cukup besar. Karena darurat, para pekerja tersebut sepakat untuk bekerja setiap hari dan tanpa libur. Renovasi harus selesai paling lambat tanggal 10 Agustus 2018. Para pekerja memulai renovasi pada tanggal 1 Mei 2018. Dua minggu setelah pengerjaan, di luar rencana, pekerjaan renovasi harus terhenti selama 11 hari karena sesuatu hal, dan dilanjutkan kembali pada tanggal 26 Mei 2018. Apa yang harus dilakukan oleh Kepala Desa dan ketua pemborong jika diinginkan renovasi selesai tepat waktu pada 10 Agustus 2018?

The first problem asks students to determine the decision that should be taken by the village chief so that the renovation will be done on time. The given conditions are: (a) the renovation is planned to start on May 1st and end on August 10th, (b) after two weeks of renovation, it stops for 11 days, (c) there are 7 workers who will renovate the building. In solving this problem, students only need to use their logic and apply the concept of inverse proportion. There is relation between the number of days used in renovating and the number of workers. The renovation stops for several days, yet the deadline does not change. As a result, the number of days will decrease. How about the number of workers? The students need to apply inverse proportion concept in the decision making to solve this problem.

2. *Bu Larasati memiliki usaha puding yaitu "Puding Cup Larasati".*

Untuk menekan harga, puding coklat dibuat tanpa vla. Namun, Bu Larasati tetap mempertahankan cita rasa puding buatannya dengan komposisi bahan-bahan berikut.

Bahan Puding Coklat
1 bungkus agar-agar rasa coklat
4 gelas air

Bahan Puding Coklat
6 sdm gula
6 sdm susu kental manis
½ sdt garam

Resep di atas untuk 5 cup puding berukuran 450 ml. Puding tersebut dijual dengan harga Rp 7.000,00 per cup. Bantulah Bu Larasati untuk menentukan komposisi bahan-bahan puding coklat yang dibutuhkan jika ia menerima pesanan 60 cup puding berukuran 150 ml dengan harga Rp 2.500 per cup.

The last problem puts both direct and inverse proportion concepts. It is given a recipe to make 5 cups of pudding with 450 ml cup size.

Chocolate Pudding
1 sachet chocolate pudding powder
4 cups water
6 spoons sugar
6 spoons condansed milk
½ teaspoon salt

Then students are asked to find the new recipe or the new compositions to make 60 cups of pudding with 150 ml cup size. The number of cups increases while the size of cup is decreases. The students need to know whether the compositions increase or decrease. There is irrelevant information put in the problem which is the price of a cup of pudding. It aims to know the inference element of critical thinking that students have.

I. Research Result

1. Research Result of Reflective Subject

a. Test and Interview Result for Problem 1

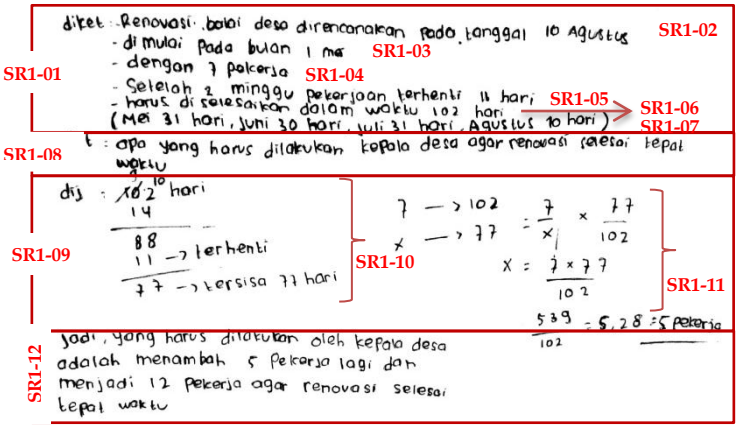


Figure 4.2 SR's Test Result for Problem 1

Based on the contextual problem test and interview results, here's the analysis of critical thinking processes of reflective subject (SR).

1) Interpretation

The interview transcript is written in Indonesian.

Label	*Transkrip*	*Kode*
R1-01W	*Coba dibaca ulang soalnya.*	
SR1-01W	*Sudah.*	
R1-02W	*Sekarang coba ceritakan kembali menggunakan bahasamu sendiri apa yang sebenarnya ada pada soal tersebut.*	
SR1-02W	*Ceritanya itu kan ada renovasi balai desa. Waktunya itu kalo nggak salah 102 hari. Dari*	IT02 AN01

Label	*Transkrip*	*Kode*
	bulan Mei, Juni, Juli, sampai Agustus. Mei itu kan 31 hari, Juni 30, Juli 31, sama Agustus 10 hari. Jadi ini kan ditanyakan apa yang harus dilakukan kepala desa untuk selesai tepat waktu. Jadi ini nanti dihitung harinya agar bisa tau berapa jumlah pekerja yang ditambahkan supaya selesai tepat waktu.	
	. . .	
R1-08W	*Apa aja yang diketahui?*	
SR1-08W	*Yang diketahui itu ada 7 pekerja, harus diselesaikan dalam 102 hari, sudah dikerjakan selama 2 minggu, terhenti selama 11 hari. Terus yang ditanyakan itu apa yang harus dilakukan supaya selesai dalam 102 hari ini.*	IT01

a. Categorize

(1) SR wrote all information as what were given (SR1-01) in detail and ordered. On that paper, it was written 5 points: i) renovation of a building was planned on August 10 (SR1-02), ii) it started on May 1 (SR1-03), iii) finished by 7 workers (SR1-04), iv) after 2 week-renovation, it stopped for 11 days (SR1-05), v) should be finished in 102 days (SR1-06), and all information provided in the problem were included already. The complete

answers related to the what were given and asked were also able to mention by SR during interview (SR1-08W).

(2) The last point was information that could not be gotten directly from the problem given. She mentioned that the renovation would be done in 102 days (SR1-06), while in the problem it was only written that it started on May 1 and finished a week before Indonesia independence day which was August 10. It indicated that she was able to derive more detail information about the amount of time by adding up the number of days spent in each month starting from May until August (SR1-07).

(3) SR wrote what was asked exactly as written in the problem given. It was the thing that should be done by the chief so that the renovation would be finished on time (SR1-08).

b. Clarify meaning

(1) It could be seen that SR described the problem based on her understanding as she did not copy the sentences written in the problem. She arranged word by word in her own (SR1-02W).

(2) She even mentioned unstated information, for instance the renovation schedule. In the problem, it was only written that the renovation would be finished a week before August 17 and

started on the first day in May. SR mentioned that it would take 102 days during 4 months, May until August followed by the number of days each month (31 days in May, 30 days in June, 31 days in July, and 10 days in August) (SR1-02W). She explained that it was necessary to find the number of additional workers in order to finish the renovation on time based on a schedule change (SR1-02W).

2) Analysis

Label	***Transkrip***	***Kode***
R1-02W	*Sekarang coba ceritakan kembali menggunakan bahasamu sendiri apa yang sebenarnya ada pada soal tersebut.*	
SR1-02W	*Ceritanya itu kan ada renovasi balai desa. Waktunya itu kalo nggak salah 102 hari. Dari bulan Mei, Juni, Juli, sampai Agustus. Mei itu kan 31 hari, Juni 30, Juli 31, sama Agustus 10 hari. Jadi ini kan ditanyakan apa yang harus dilakukan kepala desa untuk selesai tepat waktu. Jadi ini nanti dihitung harinya agar bisa tau berapa jumlah pekerja yang ditambahkan supaya selesai tepat waktu.*	IT02 AN01
	. . .	
R1-05W	*Kalimat ini paham ya? "Dua minggu setelah pengerjaan, pembangunan terhenti selama*	

Label	*Transkrip*	*Kode*
	11 hari." Maksud kalimatnya gimana?	
SR1-05W	*Oh iya. Ini terhenti 11 hari, jadi nanti dikurangi, 102 hari-11 hari. Jadi total 102 hari. Udah dikerjakan 14 hari , terus terhenti 11 hari. Jadi totalnya itu 77. Jadi selesainya nggak tepat waktu. Harus menambah pekerja sehingga selesai sesuai yang ditargetkan.*	AN02 IF03
	. . .	
R1-10W	*Hubungan dari poin 1, 2, dan 4? Apa yang bisa kamu dapatkan dari informasi-informasi itu?*	
SR1-10W	*Ini kan target penyelesaian (menunjuk pada poin 1 dan 2), sedangkan ini waktu pengerjaannya (menunjuk pada poin 4). Pekerjaannya 102 hari, udah dikerjain 2 minggu, terus terhenti selama 11 hari. Sebelas hari ini kan harusnya buat dikerjakan, tapi terhenti.*	AN02 EX01
R1-11W	*Terus 7 pekerja ini adalah pekerja untuk apa? (merujuk pada poin 3)*	
SR1-11W	*Untuk mengerjakan renovasi balai desa dengan 102 hari.*	
	. . .	
R1-18W	*Ini kan konsep perbandingan, ada strategi lain nggak buat menyelesaikan soal?*	
SR1-18W	*Nggak ada. Yang terpikirkan cuman ini.*	AN03
R1-19W	*Terus kenapa kamu yakin kalo*	

Label	*Transkrip*	*Kode*
	strategi ini bisa untuk (mencari pekerja yang dibutuhkan) menyelesaikan masalah ini?	
SR1-19W	*Udah diajarin. Udah dapet dari pengalaman sebelumnya.*	AN03
R1-20W	*Ini perbandingan senilai atau berbalik nilai?*	
SR1-20W	*Berbalik nilai karena ini kan harinya menurun tapi pekerjanya meningkat.*	EX01

a) Examine ideas
   (1) Either on the test paper (SR1-06) or in the interview (SR1-02W), the subject mentioned unstated information about the amount of days spent by the workers for renovation. In the given problem, it was only said that the renovation would begin on the first day of May and end the week before Indonesian independence day (August 17). Yet she mentioned that the renovation would take 102 days which was unstated.
   (2) That length of days was explained more detail by mentioning the number of days each month (31 days in May, 30 days in June, 31 days in July, and 10 days in August) (SR1-07 & SR1-02W).

b) Identify arguments
   (1) During interview, the subject was asked about the relationship between statement saying "the renovation started on May 1 and finished on August 10" and "after

two week renovation, it stopped for 11 days". SR was able to identify the relationship between those two statements. She answered that the renovation should be done in 102 days (from May 1 until August 10), but it stopped for 11 days. Meaning that the amount of time would decrease since the workers should work, but they did not (SR1-10W).

(2) She added that there were 7 workers to finish the renovation in 102 days (SR1-11W).

(3) Besides, SR explained the meaning of this sentence "*Dua minggu setelah pengerjaan, pembangunan terhenti selama 11 hari.*" by relating to other given information such as the total number of days provided (SR1-05W).

c) Identify reasons and claims

(1) The subject decided to apply inverse proportion concept in solving this problem as she had experience in doing similar problem (SR1-19W). By considering the number of workers increased while the number of days decreased (SR1-20W), she used that strategy and had any other alternative solutions (SR1-18W). It implied that she counted on her prior knowledge.

3) Inference

Label	*Trankrip*	*Kode*
R1-05W	*Kalimat ini paham ya? "Dua minggu setelah pengerjaan, pembangunan terhenti selama 11 hari." Maksud kalimatnya gimana?*	
SR1-05W	*Oh iya. Ini terhenti 11 hari, jadi nanti dikurangi, 102 hari-11 hari. Jadi total 102 hari. Udah dikerjakan 14 hari , terus terhenti 11 hari. Jadi totalnya itu 77. Jadi selesainya nggak tepat waktu. Harus menambah pekerja sehingga selesai sesuai yang ditargetkan.*	AN02 IF03
R1-06W	*Jadi masalah itu muncul karena ada apa?*	IF03
SR1-06W	*Terhenti selama 11 hari.*	
R1-07W	*Misal nggak terhenti. Setelah dikerjakan selama 14 hari, sisanya x hari. Nah untuk mengerjakan x hari itu butuh berapa pekerja? Pekerjanya tetep, nambah, atau berkurang?*	
SR1-07W	*Tetep.*	IF03
	. . .	
R1-14W	*Jadi dari informasi yang diketahui, menurut kamu sudah cukup atau belum untuk menjawab apa yang ditanya?*	
SR1-14W	*Udah.*	IF01
R1-15W	*Sekarang dibalik, informasinya berlebihan nggak? Ada informasi yang nggak penting nggak? Yang nggak berhubungan sama yang*	

Label	*Trankrip*	*Kode*
	ditanyakan?	
SR1-15W	*Nggak ada, Kak. Semuanya penting.*	IF01
R1-16W	*Jawaban di awal, sebelum ngitung, apa yang terlintas di pikiran kamu? Apa dugaanmu?*	
SR1-16W	*Waktu itu tak pikir nggak ada hitung-hitungan. Cuma apa yang harus dilakukan (oleh kepala desa). Jadi waktu itu mau cuma jawab nambah pekerja aja soalnya waktunya (waktu renovasi) nggak cukup.*	IF02

a) Query evidence
   (1) SR said that all information given in the problem were important (SR1-15W). Not a single information was irrelevant.
   (2) Previously, she already determined that all information given in the problem were important/relevant (SR1-15W). SR considered such relevant-irrelevant information. It could be proven from her paper. She used them all in the calculation of finding the number of additional workers.

b) Conjecture alternatives
   (1) Eventhough SR tried to find the number of additional workers needed, at the beginning, she predicted that adding workers for the renovation was a solution to the problem (SR1-16W). It was asked what the chief should do to finish the

renovation on time. However, she did not end up with that hypothesis only. She did calculation to prove it (SR1-09).

c) Draw conclusions

(1) When SR was asked about the meaning of sentence "*Dua minggu setelah pengerjaan, pembanguan terhenti selama 11 hari karena sesuatu hal*", she answered by saying the consequences flowing from that data/statement (SR1-05W). The renovation stopped for 11 days, meaning that the number of days of renovation would decrease. So, 102 days (the total number of days) was subtracted by 11. The result must be subtracted again by 14 since the renovation had been done for 2 weeks or 14 days resulting 77 days. Therefore, she educed that the renovation would not be done on time and concluded that the chief needed to add some workers.

(2) SR also understood that the renovation would be done on time if the workers kept working (SR2-06W & SR2-07W)

4) Evaluation

Label	***Transkrip***	***Kode***
R1-13W	*Kenapa enggak? Kenapa kamu yakin itu bener?*	
SR1-13W	*Soalnya tiap nulis satu poin, lihat soal lagi.*	EV01 SL02
	. . .	
R1-17W	*Nah kemudian kenapa kamu*	

Label	*Transkrip*	*Kode*
	memutuskan untuk melakukan penghitungan ini, padahal sebetulnya ngga ditanyakan.	
SR1-17W	*Kalo misalnya nggak dihitung, nanti kan bisa aja kurang, bisa aja kelebihan.*	EV01
	. . .	
R1-23W	*Kalo ini dicek lagi per langkah?*	
SR1-23W	*Iya, waktu pembagian.*	EV02
	. . .	
R1-26W	*Yakin dengan jawabanmu?*	
SR1-26W	*Yakin sih, Kak. Yakin.*	EV01
R1-27W	*Kemaren sebelum lanjut ke soal no. 2, kamu mikir nggak ini masuk akal nggak kalo nambah 5 pekerja?*	
SR1-27W	*Iya mikir kayak gitu. Masuk akal.*	EV01

a) Assess credibility of claims

(1) To assess the credibility of claims in understanding problem, SR made sure that she did not miss any single information of a given problem by checking each point of what were given and asked right after writing them (SR1-13W).

(2) Also, SR did some calculation to prove her hypothesis saying that some workers were needed as a solution of given problem (SR1-17W).

(3) At first, she thought that to answer the question did not require any calculation. She just needed to give her opinion to help the chief—what action he should take in order to make the renovation finished on time (SR1-16). Yet, she reconsidered her judgment about it. She thought that she needed to prove it in view of further analysis (SR1-17W). In the end, she decided to did calculation to make sure if her judgment was correct. She tried to find the exact number of workers needed in finishing the renovation (SR1-09).

(4) SR did assess the conclusion she made by considering its logic and was very sure about it (SR1-27W). It could be seen when she emphasized her statement saying that she was sure (SR1-26W).

d) Asses quality of arguments

Assessing quality of arguments could be seen from how sure SR was about her arguments in solving the problem. After devised strategy to solve problem, she started writting the steps. SR claimed that she was sure enough that her solution was already correct (SR1-24W) as she checked every step she had written, especially for division step (SR1-23W).

5) Explanation

Label	***Transkrip***	***Kode***
R1-10W	*Hubungan dari poin 1, 2, dan 4? Apa yang bisa kamu dapatkan dari informasi-*	

Label	*Transkrip*	*Kode*
	informasi itu?	
SR1-10W	*Ini kan target penyelesaian (menunjuk pada poin 1 dan 2), sedangkan ini waktu pengerjaannya (menunjuk pada poin 4). Pekerjaannya 102 hari, udah dikerjain 2 minggu, terus terhenti selama 11 hari. Sebelas hari ini kan harusnya buat dikerjakan, tapi terhenti.*	AN02 EX01
SR1-13W	*Soalnya tiap nulis satu poin, lihat soal lagi.*	EV01 SL01
	. . .	
R1-20W	*Ini perbandingan senilai atau berbalik nilai?*	
SR1-20W	*Berbalik nilai karena ini kan harinya menurun tapi pekerjanya meningkat.*	EX01
R1-21W	*Sebelumnya pernah menyelesaikan soal yang kayak gini?*	
SR1-21W	*Pernah. Caranya juga pakai cara kayak gini. (menunjuk pada langkah penyelesaian perbandingan berbalik nilai yang ia tuliskan di kertas)*	EX01
	. . .	
R1-25W	*Kesimpulan apa yang bisa kamu tarik sebagai jawaban dari soal itu?*	
SR1-25W	*Bahwa 5,28 pekerja ini bisa menyelesaikan renovasi balai desa dalam waktu 77 hari. Yang harus dilakukan kepala desa adalah menambah pekerja sebanyak 5.*	EX01
	. . .	

Label	*Transkrip*	*Kode*
R1-28W	*Ini 5 pekerja yang harus ditambahkan atau apa 5 pekerja untuk menyelesaikan dalam 77 hari?*	
SR1-28W	*Lima pekerja untuk menyelesaikan dalam 77 hari. Jadi 7 pekerja ditambah 5 pekerja.*	EX01
R1-29W	*Tujuh pekerja untuk 102 hari, x pekerja untuk 77 hari.Berarti ini pekerja untuk 77 hari, gitu dong? Karena x itu adalah total pekerja untuk 77 hari. Berarti 5 pekerja adalah total pekerja, bukan tambahan pekerja. Gimana?*	
SR1-29W	*Tapi waktu itu yang terlintas pengen nyari tambahan.*	EX01

a) State the results

(1) SR could state the strategies had been devised. The decreasement on the amount of renovation time resulted an increasement on the number of workers. Therefore, SR decided to apply inverse proportion concept (SR1-20W). This strategy was considered to be appropriate because she had an experince in solving similiar problem (SR1-21W).

(2) The final result was stated by SR in detail. She said that 5.28 workers could finish the renovation in 77 days. Therefore, the thing needed to do by the

chief was employing additional workers which was 5 (SR1-25W).

(3) Although in calculation variable x appeared to represent the total number of workers, but SR conclude that the number she obtained was the number of additional workers (SR1-28W & SR1-29W).

b) Justify procedures

(1) Based on subject's work written on the test paper, it could be seen that the subject was fine in finding the number of days by using substraction. She subtracted 14 (the number of days in which the renovation had done) from 102 (the number of days scheduled). $102 - 14 = 88$. She obtained 88 and then subtracted it by 11 (the number of days in which the renovation stopped). $88 - 11 = 77$. Finally, SR got 77 as the number of days in which the renovation should be done (SR1-10). Then x appeared as a variable representing the number of additional workers for 77 days of renovation. She paired 7 (the number of initial workers) with 102 days (the numer of initial) and x (the number of additional workers) with 77 (the number of days left).

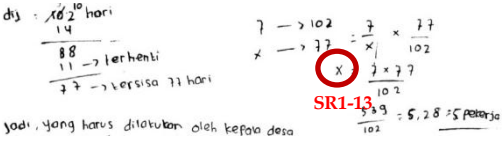
$$7 \rightarrow 102 \text{ and } x \rightarrow 77$$

And the SR applied the inverse proportion concept to those two, resulting

$$\frac{7}{x} \times \frac{77}{102}$$

$$<=> x = \frac{7 \times 77}{102} = \frac{539}{102} = 5.28 = 5$$

(2) Through those calculation. She obtained 5 as the number of additional workers (SR1-11 & SR1-22W).



SR did did mistake in representing x (SR1-13). In fact, x was the **total** number of workers to finish the renovation with 77 days left, not the number of workers must be added.

c) Present arguments

When being asked about relationship of two information, SR was able to present her argument clearly. She said that one information was about finishing target and the other was about the amount of time for renovation (SR1-10W). She understood that the amount of time for renovation had changed since the work stopped for 11 days. The workers should keep renovating in those 11 days, yet the renovation stopped (SR1-

10W). She added that there were 7 workers to renovate the building with in 102 days (non-stop) (SR1-11W).

6) Self-Regulation

Label	*Transkrip*	*Kode*
R1-03W	*Yakin soalnya kayak gitu? Kemaren baca soal berapa kali sampe paham maksudnya?*	
SR1-03W	*3 kali.*	SL01
R1-04W	*Dibaca semua atau informasi-informasi penting aja?*	
SR1-04W	*Yang ini kayak tanggal-tanggalnya, terus yang ditanyakan.*	SL01
	. . .	
R1-09W	*Informasinya sudah kamu sebutin semua? Yakin nggak ada yang terlewat?*	
SR1-09W	*Yakin, nggak.*	SL02
	. . .	
R1-12W	*Kemaren waktu ngerjain, setelah nulis diketahui dan ditanya, kamu koreksi lagi nggak?*	
SR1-12W	*Enggak.*	SL02
R1-13W	*Kenapa enggak? Kenapa kamu yakin itu bener?*	
SR1-13W	*Soalnya tiap nulis satu poin, lihat soal lagi.*	EV01 SL02
	. . .	
R1-17W	*Nah kemudian kenapa kamu memutuskan untuk melakukan penghitungan ini, padahal sebetulnya ngga ditanyakan.*	
SR1-17W	*Kalo misalnya nggak dihitung, nanti kan bisa aja kurang, bisa aja kelebihan.*	EV01

Label	*Transkrip*	*Kode*
R1-18W	*Ini kan konsep perbandingan, ada strategi lain nggak buat menyelesaikan soal?*	
SR1-18W	*Nggak ada. Yang terpikirkan cuman ini.*	AN03
	. . .	
R1-24W	*Seberapa yakin kalo jawabanmu bener?*	
SR1-24W	*Yakin. Udah ngitung beberapa kali soalnya.*	SL02
	. . .	
R1-28W	*Ini 5 pekerja yang harus ditambahkan atau apa 5 pekerja untuk menyelesaikan dalam 77 hari?*	
SR1-28W	*Lima pekerja untuk menyelesaikan dalam 77 hari. Jadi 7 pekerja ditambah 5 pekerja.*	EX01
	. . .	
R1-30W	*Kalo sekarang mikirnya gimana? "Oh, aku salah atau aku tetep bertahan dengan jawabanku?"*	
SR1-30W	*Salah. (sambil tertawa kecil)*	SL02

a) Self-monitor

(1) Rereading the problem three times proved that SR tried to reconsider her judgment about situation of given problem (SR1-03W). Instead of rereading the whole problem, SR checked certain information only, such as important dates and what was being asked (SR1-04W).

(2) SR reconsidered her answer. It was proven by her statement. She said that she was sure about the answer she obtained. The subject supported the statement by explaining that she did calculation many times until she obtained the final result (SR1-24W).

(3) There was some incosistency. The subject said that she did calculation to know wether the number of workers decreased or increased (SR1-17W). While during calculating, she focused on finding the additional number of workers (SR1-28W). It implied that she still held her judgment. She tried to retain her judgement believing that the chief needed to add some workers.

b) Self-correct

(1) By checking that there was no any single information missed, SR tried to make sure that there was no any misjudgements (SR1-09W).

(2) In view of errors discovered, SR confirmed her works with the provided problem in writing what were given and asked right after she wrote every point (SR1-12W & SR1-13W). It could be proven by comparing what she mentioned during interview and what she had written on her paper. Both showed the same thing: there were 7 workers and the renovation took 102

days, but after two week renovation, it stopped for 11 days.

(3) During interview, in view of errors discovered, SR realized and tried to revise it if any chance provided (SR1-30W).

a. Test and Interview Result for Problem 2

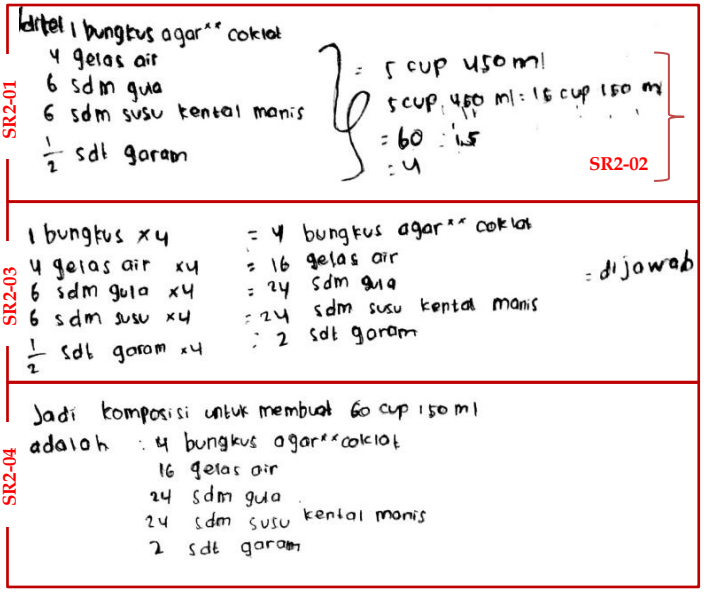


Figure 4.3 SR's Test Result for Problem

1) Interpretation

Label	*Trankrip*	*Kode*
R2-01W	*Dibaca ulang. Coba ceritakan kembali.*	
SR2-01W	*Ini kan ada resep buat 5 puding ukuran 450 ml, terus itu ada orang yang pesan 60 cup puding ukuran 150 ml.*	IT02

Label	*Trankrip*	*Kode*
R2-02W	*Sudah? Masalahnya dimana memangnya?*	
SR2-02W	*Menentukan komposisi bahan-bahan untuk 60 cup puding ukuran 150 ml.*	IT01

a) Categorize

(1) SR rewrote the pudding recipe as what were given (SR-01). She made note that the recipe was for 5 cups-450 ml which was equal to 15 cups-150 ml (SR-02).

(2) In her test paper, SR did not wrote what was being asked. However, she could mention it during interview. When she was questioned about what the problem was, SR answered that she needed to determine the composition of pudding for 60 cups-150 ml (SR2-02W).

b) Clarify meaning

The problem was briefly described by SR, yet she got the whole situation. She said that it was written a pudding recipe for 5cups-450 ml and then someone ordered 60 cups-150 ml puddings (SR2-01W). She could figure out the situation in the problem. She understood that she needed to find the new composition of pudding as requested (SR3-02W) .

2) Analysis

Label	*Transkrip*	*Kode*
R2-11W	*Kenapa harganya?*	
SR2-11W	*Menurutku sih, nggak berpengaruh, Kak. Soalnya yang ditanyakan Cuma*	AN02 IF01

Label	*Transkrip*	*Kode*
	komposisinya aja, nggak ditanyakan harganya. . . . *Berarti harga jualnya nggak berpengaruh.*	
	. . .	
R2-14W	*Kenapa kok kamu cuman mengali dan membagi?*	
SR2-14W	*Karena aku bisanya pake cara itu. Soalnya ribet.*	AN03
	. . .	
R2-20W	*Sekarang pertanyaannya kenapa kok nggak ditambah 4? Ketika ditambah 4, jumlah pesanannya juga lebih banyak kan?*	
SR2-20W	*Kalo ditambah 4 itu untuk kasus jika ada yang kurang. Kalau untuk menentukan komposisi baru, maka dikali. Kalo ditambah 4, komposisinya nggak sesuai. Nggak jadi.*	AN02 EX02

a) Examine ideas

SR mentioned unstated information in her test paper. She wrote that the recipe for 5 cups-450 ml was the same recipe to make 60 cups-150ml pudding (SR2-02).

b) Identify arguments

(1) SR understood that linear relationship applied among ingridients written in the recipe. Any given change in an ingridient would produce a corresponding change in other ingridients. Let's say, SR multiplied an ingridient by 4, so that

other ingridients changed in the same given amount which increased by a factor of 4 (SR2-03).

(2) The price-the number of puddings relationship was ignored by SR since she realized that the price of ordered puddings was not being asked (SR2-11W).

(3) The relationship between the composition of old recipe and the new one was multiplicative relationship, and it was understood by SR. After dividing 60 by 15, she got "4" as the result (SR2-02). Instead of adding each ingridient by 4, the next step she took was multiplied it by 4 (SR2-03). Further, she explained that "adding" was used if there is any "lacking" composition. While for this case, determining new composition, "multiplication" must be applied (SR2-20W). "By adding 4, the composition would be different, did not work", she said.

c) Identify reasons and claims

(1) Instead of applying direct and inverse proportions concept, SR just played around with multiplication and division (SR2-02 & SR2-03). This was because the student used to apply that strategy, so that she did not think of applying direct and invers proportions (SR2-14W). Eventhough, she did not write the

strategy in those format, SR understood the proportion concept. It could be seen when SR would rather choose to multiply the composition instead of adding each ingridient by 4 (SR3-03). According SR, it would be complicated if she wrote in direct and inverse proportions format (SR2-14W).

3) Inference

Label	***Transkrip***	***Kode***
R2-10W	*Informasi yang ada pada soal bermanfaat semua kah?*	
SR2-10W	*Harganya.*	IF01
R2-11W	*Kenapa harganya?*	
SR2-11W	*Menurutku sih, nggak berpengaruh, Kak. Soalnya yang ditanyakan cuma komposisinya aja, nggak ditanyakan harganya.* . . . *Berarti harga jualnya nggak berpengaruh.*	AN02 IF01
R2-12W	*Dari awal kamu baca informasi tentang harga, tau nggak kalo informasi itu nggak bakal kamu pake?*	
SR2-12W	*Tau.*	IF01
	. . .	
R2-22W	*No 3 ini kan double, ukuran cup yang diminta semakin kecil tapi jumlah yang dipesan semakin banyak. Kamu di awal bisa memprediksi nggak bahwa komposisi yang baru akan lebih banyak atau lebih sedikit dari komposisi semula.*	

Label	*Transkrip*	*Kode*
SR2-22W	*Kepikiran gitu. Komposisi yang baru akan lebih banyak.*	IF02
R2-23W	*Kenapa? Padahal ukurannya lebih kecil.*	
SR2-23W	*Soalnya kalo dijadikan 150 ml, jumlahnya lebih banyak. Aku lihat dari hitunganku ini, Kak. Kalau 450 ml bisa jadi 5 cup, sedangakan untuk cup 150 ml bisa jam 15. Jadi nanti seterusnya akan lebih banyak.*	IF02 IF03
R2-24W	*Sebelum ngitung itu, sudah bisa memprediksi.*	
SR2-24W	*Sudah kak, tapi pake logika, nggak bisa dijelasin.*	IF02 SL01

a) Query evidence

(1) SR was able to determine relevant and irrelevant information. When she was asked wheter all information was useful, SR replied with a straight answer, "the price" (SR2-10W). It implied that she was sure enough with her claim. She claimed that the price provided in the problem was irrelevant (SR2-11W). Eventhough it was written for each pudding size, she still believed that she did not need that information to draw conclusion (SR2-12W).

(2) After claiming that information related the price was irrelevant, she was consistent with her claim. SR ignored that information and it could be proven since

SR did not use it in her strategy to solve the problem (SR2-03).

b) Conjecture alternatives

It was quite difficult to determine whether the composition needed to be increased or decreased since the number of cups increased while the size of cup decreased. However by doing some calculation, SR could form a hypothesis that the composition would increase by a factor of x (SR2-22W). The ideas came up from the result of converting the composition of 5 cups-450 ml to y cups-150 ml (SR2-23W). SI obtained 5 cups-450 ml was equal to 15 cups-150 ml (SR2-02). Since the puddings ordered was 60 cups-150 ml, 15 cups must be raised by a factor of x to obtain 60 (SR3-03). In other words the composition must be increased to produce the new one. That finding led her to form a hypothesis saying each ingridient would be in greater amount (SR3-22W).

c) Draw conclusions

(1) Since SR found out that 5 cups-450 ml (the given recipe) was equal to 15 cups-150 ml (the requested one). She infered that the requested puddings was in greater amount than the puddings made from the given recipe. Therefore, the composition for the new recipe was greater as well (increased) (SR2-23W).

(2) SR arrived at the conclusion saying that the composition increased by a factor of

4. Therefore, she multiplied the amount of each ingridient by 4 (SR2-03).

4) Evaluation

Label	***Transkrip***	***Kode***
R2-08W	*Kenapa kok nggak 5 dibagi 3, padahal 450 kamu bagi 3. Kok malah dikali, kenapa?*	
SR2-08W	*Soalnya ini perbandingan tak senilai (berbalik nilai).*	EX01
R2-09W	*Semakin besar cupnya, maka semakin?*	
SR2-09W	*Banyaknya puding semakin sedikit.*	EX01
	. . .	
R2-14W	*Kenapa kok kamu cuman mengali dan membagi?*	
SR2-14W	*Karena aku bisanya pake cara itu. Soalnya ribet.*	AN03
R2-15W	*Langkah pertama, kamu merubah cup ukuran 450 ml menjadi 150 ml. Langkah kedua apa?*	
SR2-15W	*Jumlah pesanannya dibagi 15 cup.*	EX02
R2-16W	*Berarti dari ukuran cup, kemudian jumlah atau banyaknya cup puding?*	
SR2-16W	*Iya, baru nanti komposisinya dikali 4.*	EX02
R2-17W	*Dikali 4 dari?*	
SR2-17W	*Dari 60 dibagi 15.*	EX02
R2-18W	*Kenapa?*	
SR2-18W	*Soalnya 60 itu jumlah pesanannya, 15 itu (banyak puding yang bisa dibuat dengan) komposisi yang diketahui.*	EX03

Label	*Transkrip*	*Kode*
R2-19W	*Kenapa kok nggak dibagi 4?*	
SR2-19W	*Soalnya jumlah pesanannya lebih banyak. Maka dikalikan 4.*	EX03
	. . .	
R2-21W	*Oke, kan kamu tadi mengubah ukuran cupnya dulu baru menghitung jumlahnya? Bisa nggak kalau langkah-langkahnya dibalik?*	
SR2-21W	*Nggak bisa. (Mulai menghitung). . . . Tarnyata bisa, hasilnya sama.*	EV02
	. . .	
R2-24W	*Sebelum ngitung itu, sudah bisa memprediksi.*	
SR2-24W	*Sudah kak, tapi pake logika, nggak bisa dijelasin.*	IF02 SL01
R2-25W	*Yakin ya?*	
SR2-25W	*Iya.*	EV01

a) Assess credibility of claims

(1) From the test paper, it could be seen that SR did assess the logical strength in interprating problem. She assessed her understanding by rerewriting the recipe as what was given (SR2-02). The more SR red the problem (to rewrite information given), the more she gained good understanding/insight.

(2) When SR was asked whether she was sure about the answer, she replied, "Yes, I am" without no doubt (SR2-25W). It indicated that she made her claim certain

before continuing her work and arriving at the conclusion.

b) Assess quality of arguments

(1) Having an experience of using this strategy (SR2-14W), SR assessed that it was applicable for this problem.

(2) There were only two steps that SR took to solve the problem. First, she converted the compostion into 150 ml cups (SR2-02). Second, she raised the amount of ingridients to obtain the number of cups being ordered (SR2-03). Each step taken was strong enough and it could be proven by her consistency while explaining during interview (SR2-15W, SR2-16W, SR2-17W, & SR2-18W).

(3) SR did assess quality of her arguments in taking steps. Instead of applied the same thing, divided by 3, she multiplied it by 3. She did assess it by supporting with her knowledge about the concept of inverse proportion (SR2-08W & SR2-09W).

(4) When interview, SR was asked about the other possible strategy, the reverse. She said, "It couldn't work" (SR2-21W). But then she took further action to assess its applicability. She started to give it a whirl, and finally she said that such strategy worked (SR2-21W).

5. Explanation

Label	***Transkrip***	***Kode***
R2-05W	*Kenapa kamu jadikan 150 ml?*	
SR2-05W	*Karena yang dipesen ukuran*	EX02

Label	*Transkrip*	*Kode*
	150 ml.	
R2-06W	*Oke, kan kamu bilang kalau 5 cup 450 ml itu sama dengan 15 cup 450 ml. Berarti kalau 15 cup 150 ml itu komposisinya gimana?*	
SR2-06W	*Sama kayak ini (yang tertulis di soal).*	IF03
R2-07W	*Kenapa 5 cup 450 ml itu sama dengan 15 cup 450 ml?*	
SR2-07W	*450 ml dibagi 150 ml itu kan 3, terus 5 dikali 3 itu 15.*	EX02
	. . .	
R2-15W	*Langkah pertama, kamu merubah cup ukuran 450 ml menjadi 150 ml. Langkah kedua apa?*	
SR2-15W	*Jumlah pesanannya dibagi 15 cup.*	EX02
R2-16W	*Berarti dari ukuran cup, kemudian jumlah atau banyaknya cup puding?*	
SR2-16W	*Iya, baru nanti komposisinya dikali 4.*	EX02
R2-17W	*Dikali 4 dari?*	
SR2-17W	*Dari 60 dibagi 15.*	EX02
R2-18W	*Kenapa?*	
SR2-18W	*Soalnya 60 itu jumlah pesanannya, 15 itu (banyak puding yang bisa dibuat dengan) komposisi yang diketahui.*	EX03
R2-19W	*Kenapa kok nggak dibagi 4?*	
SR2-19W	*Soalnya jumlah pesanannya lebih banyak. Maka dikalikan 4.*	EX03
R2-20W	*Sekarang pertanyaannya*	

Label	*Transkrip*	*Kode*
	kenapa kok nggak ditambah 4? Ketika ditambah 4, jumlah pesanannya juga lebih banyak kan?	
SR2-20W	*Kalo ditambah 4 itu untuk kasus jika ada yang kurang. Kalau untuk menentukan komposisi baru, maka dikali. Kalo ditambah 4, komposisinya nggak sesuai. Nggak jadi.*	AN02 EX03

a) State the results

(1) SR considered the information saying that the pudding volume decreased. So, she understood that there was increasement and also decreasement. This was the reason that she converted the composition in the new volume. She found out that 5 cup-450 ml was equal to 15 cup -150 ml (SR2-03).

(2) Although the cup size got decreased 3 times, SR increased the number of cup. This strategy was devised because she understood that inverse proportion concept must be applied. As the cup size increased, the number of cup would decrease (SR2-05W).

b) Justify procedures

SR decided to calculate the total volume of given composition in order to know how much composition needed to make requested pudding. At first, SR converted the pudding volume of given recipe into cup sized 150 ml.

She found out that the pudding volume of 5 cup-450 ml recipe was equal to the pudding volume for 15 cup-150 ml (SR2-02 & SR2-07W).

$$V = 5 \times 450 = 2250 \text{ ml} = 15 \times 150.$$

Since the cup size of the given recipe was already in 150 ml, which was the same as the cup size as requested, she divided the number of ordered pudding, 60 cups, by 15 and she obtained 4 (SR2-02 & SR2-15W).

$$60 \div 15 = 4.$$

Therefore, to make 60 cups pudding, SR raised the volume up to 4 times by multiplying the composition by 4 (SR2-03, SR2-16W, & SR2-17W).

c) Present arguments
   (1) SR was able to explain that pudding composition would raise in some amount. Hence, she multiplied the composition by a factor of x which was 4 (SR2-18W & SR2-19W).
   (2) By paying attention to the given recipe and its relation to strategy devised, SR formed the new recipe by multiplying the composition by a factor of x. She did know that what was given was a recipe, so she considered proportional situation might be applied. (SR2-20W).

6. Self-Regulation

Label	*Transkrip*	*Kode*
R2-24W	*Sebelum ngitung itu, sudah bisa memprediksi.*	
SR2-24W	*Sudah kak, tapi pake logika, nggak bisa dijelasin.*	IF02 SL01

a) Self-monitor

SR took further action by doing calculating in order to prove the hypothesis she formed was correct. (SR2-24W).

b) Self-correct

By rewriting the composition of the new recipe, SR tried to checked any errors she might discover in her calcuation and conclusion (SR2-03 & SR2-04).

2. Research Result of Impulsive Subject

a. Test and Interview Result for Problem 1

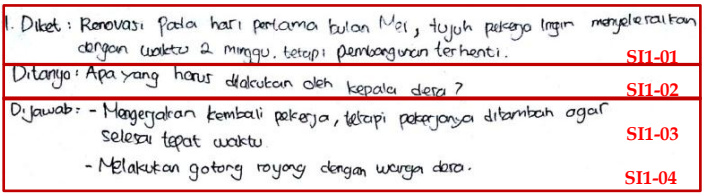


Figure 4.4 SI's Test Result for Problem 1

1) Interpretation

Label	*Transkrip*	*Kode*
RI-06W	*Coba sebutkan apa yang diketahui dan ditanya.*	
SI1-06W	*Diketahui balai desa direnovasi*	IT02

Label	*Transkrip*	*Kode*
	hari pertama bulan Mei. Terus ada 7 orang pekerja yang mengerjakan balai desa tersebut. Dua minggu setelah pengerjaan, pembangunan terhenti 11 hari.	

a) Categorize
   (1) Only 3 points mentioned by SI as what were given: i) renovation started on May 1, ii) 7 workers were employed, iii) after two-week renovation, it stopped (SI1-01 & SI1-06W).
   (2) When SI was being asked of what were given during interview, she did not try to reread the given problem. She just red her answer written in her tes paper (SI1-06W). In consequence, she was not able to complete in mentioning what were given. Some information was missed which was when the renovation should be done.
   (3) She could mentioned what was asked from the problem eventhough not in detail. She just said, "What should be done by the chief?" without any condition (SI1-02). What was exactly asked from the problem was "What should the chief do in order to make renovation finish on time?".

b) Clarify meaning
   (1) SI described the situation in the problem by mentioning all informations provided. But while she was retelling the problem,

she could not show her version. SI just copied what was written in given problem and only made a bit change in arranging the sentences. In other words, she could not describe the problem in her own words. (SI1-02W).

(2) She mentioned stated information only. While unstated information, for instance the number of days needed to renovate the building, was not mentioned.

2) Analysis

Label	***Transkrip***	***Kode***
R1-08W	*"Direncanakan selesai seminggu sebelum 17 Agustus", kemudian ada kalimat "Renovasi dimulai pada awal bulan Mei". Nah, dua kalimat itu hubungannya apa sebenernya?.*	
SI1-08W	*Itu jangka waktu selesainya.*	AN01
R1-09W	*Berapa hari?*	
SI1-09W	*Lima minggu berarti.* *Iya, Kak. Meinya 31, terus Agustusnya 10.* *Oh iya ya. Mei, Juni, Juli, Agustus.* *. . . (Dengan bimbingan)* *Eh 102.*	ST05
R1-10W	*Bener. Berarti normalnya kan 102 hari, rencananya. Di situ kendalanya apa?*	
SI1-10W	*Setelah 2 minggu pengerjaan, terhenti selama 11 hari.*	IF01
R1-11W	*Kalo kita hubungkan dengan informasi 102 hari apa berarti?*	
SI1-11W	*Berkurang. Tambah lama.*	IF01
	. . .	

Label	*Transkrip*	*Kode*
R1-24W	*Tapi gimana kamu yakin bahwa ada pekerja yang harus ditambahkan agar selesai tepat waktu padahal kamu nggak tau pekerjanya berkurang atau bertambah? Atau mungkin kita nggak butuh tambahan pekerja untuk menyelesaikannya.*	
SI1-24W	*Pastinya kan butuh pekerja soalnya dari waktu yang ditargetkan, pembangunannya terhenti selama 11 hari. Artinya waktunya kebuang selama 11 hari. Nah kalo misal pekerjanya tetap 7 , pembangunannya nggak bakal selesai tepat waktu. Jadi kita pasti nambah pekerja.*	IF03

a) Examine ideas

As SI did not do any calculation, she was not able to mention unstated information of given problem. She failed to mention the number of days needed for renovation.

b) Identify arguments

(1) The relationship between what were given and what was asked were identified by SI and it was known from her statement (SI1-24W).

(2) SI could also identify the relationship between two given information. She associated "The renovation was planned to be completed a week before August 17" with "It started in the beginning of

May" as period of renovation completion (SI1-08W).

(3) Besides, she connected between the number of days to complete the renovation and "After 2 week-renovation, it stopped for 11 days". That last information was identified as a constraint in renovation which led to the reduction in period of completion (SI1-11W). SI thought that there must be a change in the number of days in renovating since the workers stopped the work for a few days. In consequence, the workers had shorter time to finish the renovation.

c) Identify reasons and claims

As the result of her analysis, the subject understood that to solve the problem, the village chief had to add some workers, although she did not think any helpful strategies to find the exact number of additional workers. None of strategy and their steps written on her test paper.

3) Inference

Label	***Transkrip***	***Kode***
R1-11W	*Kalo kita hubungkan dengan informasi 102 hari apa berarti?*	
SI1-11W	*Berkurang. Tambah lama.*	IF01
R1-12W	*Yakin?*	
SI1-12W	*Terhenti. Tambah lama kan ya?*	ST05
R1-13W	*Jadi yang tambah lama apa?*	
SI1-13W	*Tambah lama harinya. Soalnya kan nggak ada yang kerja.*	
R1-14W	*Jadi waktunya berkurang atau*	

Label	*Transkrip*	*Kode*
	bertambah?	
SI1-14W	*Berkurang aslinya. Kan pembangunan itu nggak bakal selesai-selesai kalo nggak dikerjakan selama 11 hari.*	
	. . .	
R1-17W	*Dari informasi yang ada, sudah cukup belum untuk menentukan jawaban? Dari yang diketahui udah cukup belum untuk jawab yang ditanya? Atau sebenernya ada informasi yang hilang atau kurang yang dibutuhkan tapi tidak ada di soal?*	
SI1-17W	*Enggak deh kayaknya.*	IF02
R1-18W	*Cukup? Atau malah ada informasi yang nggak relevan? Jadi ada informasi yang berlebihan, nggak berhubungan tapi ada di soal.*	
SI1-18W	*Cuman mbuletin aja.*	IF02
R1-19W	*Tapi semuanya penting?*	
SI1-19W	*Lumayan.*	IF02
R1-20W	*Misalkan gini, kalo informasi 7 pekerja tak hilangkan, kamu masih bisa jawab soal nggak?*	
SI1-20W	*Nggak. Kan nggak tau yang ngerjain berapa.*	IF01
R1-21W	*Kalo kamu waktu di awal, setelah baca soal, apa yang kamu pikirkan sebagai jawaban? Dugaan apa?*	
SI1-21W	*Kemaren aku cuman mikir kayak gini. Tujuh pekerja bisa nyelesaikan beberapa hari dari ini (1 Mei) ke ini (10 Agustus).*	AN01 AN02

Label	*Transkrip*	*Kode*
	Tapi kena ini. Terus pokoknya dihitung berapa pekerja yang harus ditambah agar selesai tepat waktu karena udah kebuang selama 11 hari.	
R1-22W	*Tapi kenapa nggak dihitung?*	
SI1-22W	*Nah itu. Bingungi, Kak.*	
	. . .	
R1-25W	*Kamu punya estimasi ngga? Kira-kira berapa pekerja yang harus ditambahkan?*	
SI1-25W	*Emm... Gatau, 4 mungkin. Empat kalo nggak 5.*	EX06

a) Query evidence
   (1) The subject was not able to give an exact answer when she was asked about relevant and irrelevant information (SI1-17W, SI1-18W, & SI1-19W). It indicated that she was not sure in determining relevant information and the irrelevant ones. In other words, there was a confusion in determining important-unimportant and relevant-irrelevant information.
   (2) The confusion could also be seen clearly when the subject mentioned unimportant information, in this case it was the number of workers, in interpreting problem (SI1-02W).
   (3) She also said that such information was important and if it was removed, she

could not solve the problem (SI1-20W). The subject was incosistent because in fact, she did not use that information at all. She did not write how many workers should be added. Probably the subject used that iformation as the minimum number of workers, so that if the village chief added some, meaning the number got bigger than the previous one (written information).

b) Conjecture alternatives

The subject was able to form hypothesis from given informations. She thought that there would be some additional workers so that the renovation could be finished on time. It was the result of 11 days wasted as the workers did not work. (SI1-21W).

c) Draw conclusions

Further, the hypothesis arised became the final conclusion without any proof. SI counted on her logical thinking without doing some calculation and without taking further action (SI1-27W). One of reasons was she confused about what to do (SI1-22W).

4) Evaluation

Label	***Transkrip***	***Kode***
R1-09W	*Berapa hari?*	
SI1-09W	*Lima minggu berarti.* *Iya, Kak. Meinya 31, terus Agustusnya 10.* *Oh iya ya. Mei, Juni, Juli, Agustus.* *. . . (Dengan bimbingan)*	ST05

Label	*Transkrip*	*Kode*
	Eh 102.	
R1-10W	*Bener. Berarti normalnya kan 102 hari, rencananya. Di situ kendalanya apa?*	
SI1-10W	*Setelah 2 minggu pengerjaan, terhenti selama 11 hari.*	IF01
R1-11W	*Kalo kita hubungkan dengan informasi 102 hari apa berarti?*	
SI1-11W	*Berkurang. Tambah lama.*	IF01
R1-12W	*Yakin?*	
SI1-12W	*Terhenti. Tambah lama kan ya?*	ST05
	. . .	
R1-15W	*Oke. Apa hubungan antara informasi tujuh pekerja dan informasi hari? Ada hubungannya nggak dengan jangka waktu yang ada?*	
SI1-15W	*Tujuh pekerja ini kan bisa menyelesaikan selama 102 (hari). 102 dikurangi 11, iya nggak sih? 91.*	AN02 ST02
R1-16W	*Yakin kayak gini?*	
SI1-16W	*Kayaknya.*	ST02
	. . .	
R1-27W	*Sebelumnya pernah ngerjain soal serupa? Soal yang mirip.*	
SI1-27W	*Nggak serumit ini.*	
R1-28W	*Terus kamu pake cara apa waktu itu?*	
SI1-28W	*Perbandingan berbalik nilai.*	
R1-29W	*Terus di sini nggak bisa diaplikasikan?*	
SI1-29W	*Bingungi, kak.*	
R1-30W	*Jadi kesimpulan apa yang bisa kamu dapatkan?*	
SI1-30W	*Kalo kepala desanya mau selesai*	EX09

Label	*Transkrip*	*Kode*
	tepat waktu, salah satu cara yang harus dilakukan adalah mempekerjakan kembali 7 pekerja tapi ditambah beberapa pekerja lain.	

a) Asses credibility of claims

(1) The activities related evaluation were very rare. The subject wrote all things coming up in her mind without assessing them (SI1-09W). She was quite fast in aswering questions during interview, but her answers seemed like questions rather than answers (SI1-15W).

(2) She spoke what she tought and mostly needed some agreements. For instance, during making conclusion from important information. She understood that the number of days got shorter, but she got confused since the time was not extended. "Did it mean getting shorter or longer?" (SI1-12W). She failed to assess that kind of question. Therefore she worked in doubt and it was continued until the subject took a final conclusion.

b) Asses quality of arguments

Eventhough the subject did not write any strategy to solve the problem, during interview she was asked about possible strategy she might used. She said that she would apply inverse proportion concept to find the number of workers (SI1-30W). In

consequence, she needed information about the number of days needed during renovation.

5) Explanation

Label	*Transkrip*	*Kode*
R1-09W	*Berapa hari?*	
SI1-09W	*Lima minggu berarti.* *Iya, Kak. Meinya 31, terus Agustusnya 10.* *Oh iya ya. Mei, Juni, Juli, Agustus.* *. . . (Dengan bimbingan)* *Eh 102.*	ST05

a) State the results

The information that the renovation started from May 1st until August 10th was not described in detail. Therefore she did not clarify how many days exactly needed to finish the renovation (SI1-01).

b) Justify procedures

In addition, the subject did not pay attention about sequences. It could be seen by not considering June and July between May and August (SI1-09W). Or it could also imply that she was not detailed in a such thing.

c) Present arguments

The subject was good enough to explain what in her mind was. She was success to explain her thought so it could be understood. Yet her explanation was not too detail. The subject ignored some detail information because she tought it was not necessasry. As written before, during interpreting problem,

she explained all information stated in the problem yet not in detail.

6) Self-Regulation

Label	*Transkrip*	*Kode*
R1-04W	*Yakin dengan pehamanmu yang kayak gitu? Berapa kali baca soal sampai kamu paham maksudnya soal?*	
SI1-04W	*Nggak tau, sering pokoknya.*	ST01
R1-05W	*Dibaca semua gitu dari awal sampai akhir?*	
SI1-05W	*Iya.*	ST01
	. . .	
R1-08W	*"Direncanakan selesai seminggu sebelum 17 Agustus", kemudian ada kalimat "Renovasi dimulai pada awal bulan Mei". Nah, dua kalimat itu hubungannya apa sebenernya?.*	
SI1-08W	*Itu jangka waktu selesainya.*	AN01
R1-09W	*Berapa hari?*	
SI1-09W	*Lima minggu berarti.* *Iya, Kak. Meinya 31, terus Agustusnya 10.* *Oh iya ya. Mei, Juni, Juli, Agustus.* *. . . (Dengan bimbingan)* *Eh 102.*	ST05
	. . .	
R1-30W	*Jadi kesimpulan apa yang bisa kamu dapatkan?*	
SI1-30W	*Kalo kepala desanya mau selesai tepat waktu, salah satu cara yang harus dilakukan adalah mempekerjakan kembali 7 pekerja tapi ditambah beberapa pekerja*	EX09

Label	*Transkrip*	*Kode*
	lain.	
R1-31W	*Berapa presentase keyakinanmu?*	
SI1-31W	*50%an lah. Bingungin.*	ST06
R1-32W	*Nah kalo kamu lagi bingung kayak gini, apa yang kamu lakukan? Mengecek soalnya lagi kah? Mengecek diketahui dan ditanya lagi kah? Atau apa yang kamu cek?*	
SI1-32W	*Soalnya dulu.*	SL04

a) Self-monitor

It can be said that the subject's self-regulation was low. The subject just spoke and wrote what flashed through her mind without confirming the validity (SI1-09W).

b) Self-correct

Since the subject did not write any single strategy on her paper, she could not check the steps of strategy she might use. In checking activity during interprating problem, the subject checked her understanding by rereading the whole problem (SI1-05W). It was also done when making final conclusion, instead of checking what she wrote already, she did check from the provided problem (SI1-30W).

b. Test and Interview Result for Problem 2

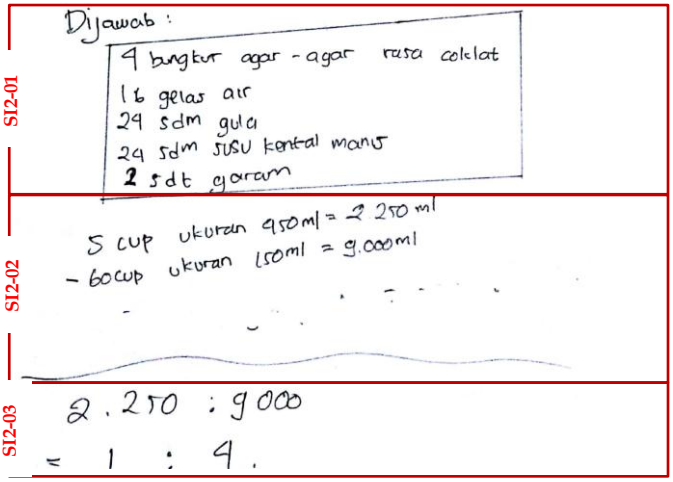


Figure 4.5 SI's Test Result for Problem 2

1) Interpretation

Label	***Transkrip***	***Kode***
R2-01W	*Coba ceritakan kembali.*	
SI2-01W	*Pokoknya yang diketahui ini kan resepnya -menunjuk resep pada soal- untuk 5 puding ukuran cup 450 ml. Sedangkan yang dibutuhin 60 puding ukuran cup 150 ml.*	IT02
R2-02W	*Jadi apa aja yang diketahui?*	
SI2-02W	*Ya kita butuhkan 60 cup puding berukuran 150 ml dengan harga Rp 2.500 per cup. Berapa resepnya (komposisinya). Dari resep ini berapa yang dihasilkan. Dijual dengan harga*	IT01

Label	*Transkrip*	*Kode*
	Rp 7.000. Terus yang kita butuhin segini dengan harga segitu. Ya pokoknya gitu.	

a) Categorize
   (1) SI did not write what was given on her test paper. During interview, instead of mentioning the composition of the recipe one by one, she just pointed out the recipe written in the problem (SI2-02W).
   (2) SI did not write what was asked as well.

b) Clarify meaning

SI described the problem briefly by mentioning the pudding cup size based on recipe and the requested pudding cup size (SI2-01W). Instead of mentioning the recipe, the subject pointed out the table written on paper (SI2-02W). However, she could figure out the situation in the problem. She understood that she needed to find the new composition of pudding as requested.

2) Analysis

Label	*Transkrip*	*Kode*
R2-03W	*Oke. Dari soal ada yang dibingungin nggak?*	
SI2-03W	*Fungsi dari harganya.*	AN02 IF01
	. . .	
R2-05W	*Ada cara lain nggak? Kepikirang nggak?*	
SI2-05W	*Enggak, soalnya bingung. Ukuran cupnya beda. Pokoknya kemaren mikir resep ini berapa*	AN03 EX01

Label	*Transkrip*	*Kode*
	ml dan yang kita butuhkan berapa ml.	
R2-06W	*Nggak ada hubungannya sama harga?*	
SI2-06W	*Enggak, menurutku.*	AN02 IF01 EX03
	. . .	
R2-11W	*Kalo soal sejenis ini, pernah nemuin nggak?*	
SI2-11W	*Enggak.*	AN03
R2-12W	*Makanya kamu nggak pake konsep perbandingan?*	
SI2-12W	*Iyaa.*	AN03
R2-13W	*Empat di sini artinya apa?*	
SI2-13W	*Empat kali lipat.*	EX02
R2-14W	*Kok nggak ditambah 4.*	
SI2-14W	*Nanti beda, komposisinya.*	EX02

a) Examine ideas

Neither test result nor interview result showed that SI mentioned any unstated information of a given problem. All information she mentioned were already written in the problem.

b) Identify arguments

She connected the number of cups and the size of cup. Those two things that she paid attention to. To make it simpler, the subject tried to combine both by multiplying so that she could figure out the amount of pudding in ml (SI2-02). However, the relationship between "price" information and other information was unable to find by SI (SI2-

03W). But later on, she found out that such information had nothing to do with what was being asked (SI2-06W).

c) Identify reasons and claims

SI applied ratio concept for strategy to solve the given problem(SI2-02). Previously, she calculated the volume of pudding based on the old recipe and the the requested one (SI02-03 & SI2-05W). Her analyis did not reach to direct and inverse proportions concept since she had no experience in solving this kind of problem (SI2-11W & SI2-12W), yet the subject understood that she was playing with proportion. It could be seen from her understanding about the final result she got. It was "four" and she said that it meant she needed to multiply each composition with 4, instead of adding with 4 (SI2-13W & SI2-14W).

3) Inference

Label	***Transkrip***	***Kode***
R2-03W	*Oke. Dari soal ada yang dibingungin nggak?*	
SI2-03W	*Fungsi dari harganya.*	AN02 IF01
	. . .	
R2-06W	*Nggak ada hubungannya sama harga?*	
SI2-06W	*Enggak, menurutku.*	AN02 IF01 EX03
R2-07W	*Coba kita lihat jawabanmu. Pada akhirnya komposisi yang dibutuhkan itu bertambah banyak atau sedikit dari komposisi awal?*	

Label	*Transkrip*	*Kode*
SI2-07W	*Bertambah banyak.*	IF03
R2-08W	*Sebelum kamu ngitung totalnya, kepikiran nggak apakah bertambah banyak atau sedikit?*	
SI2-08W	*Bertambah banyak lah. Kan jumlahnya tambah banyak. Pokoknya pas dikaliin, bertambah banyak.*	IF03
R2-09W	*Berarti dugaanmu itu muncul setelah kamu menghitung totalnya?*	
SI2-09W	*Iyaa.*	IF02
R2-10W	*Kalo tepat setelah baca, sudah kepikiran nggak?*	
SI2-10W	*Waktu itu kepikirannya banyak yang komposisi awal karena cupnya ukuran 450 ml, tapi setelah ngitung ternyata banyak komposisi yang baru karena 60 cup puding.*	IF02

a) Query evidence

Eventhough the subject did not proceed the price in calcultion, she got confused to classify that information to relevant or irrelevant one. She still mentioned such informaion when described the problem and she directly confessed that it was such a confusion for her (SI2-03W & SI2-06W).

b) Conjecture alternatives

By doing some calculation in the beginning, SI formed hypothesis for given problem. She guessed that the composition of new recipe would be greater than the given

recipe since the volume of requested pudding was greater as well (SI2-02, SI3-09W, & SI2-10W).

c) Draw conclusions

From multiplying the cup size with the number of pudding, SI found the amount of pudding in ml. As she obtained 2,250 ml and 9,000 ml from the given recipe and the requested recipe, respectively, she conclude that the requested recipe would be greater than the given one (SI2-07W & SI2-08W). At last, she got ratio 1:4 between the composition of given recipe and the requested recipe, she multiplied each composition by 4 in order to get the new recipe which was propotional with the old one as follows (SI2-01).

Chocolate Pudding
4 sachet chocolate pudding powder
16 cups water
24 spoons sugar
24 spoons condansed milk
2 teaspoon salt

4) Evaluation

Label	***Transkrip***	***Kode***
R2-08W	*Sebelum kamu ngitung totalnya, kepikiran nggak apakah bertambah banyak atau sedikit?*	
SI2-08W	*Bertambah banyak lah. Kan jumlahnya tambah banyak. Pokoknya pas dikaliin, bertambah banyak.*	IF03
	. . .	
R2-16W	*Dari 3 soal, mana yang kamu*	

Label	*Transkrip*	*Kode*
	paling yakin bener?	
SI2-16W	*No 3. Soalnya yang no 1, tak kira matematika, lha kok komentar. Terus yang ini jam dan hari.*	EV01
R2-17W	*Kamu cek lagi nggak? Kira-kira masuk akal nggak ya?*	
SI2-17W	*Iyaa, mikir lagi dan masuk akal.*	EV02 SL02

a) Asses credibility of claims

SI was sure enough about her claim that the new recipe would need greater amount of ingridients. It is the result from her activity in doing calculation obtaining the volume of requested pudding was greater than the volume of pudding made from given recipe. In other words, she assesed the credibility of her claims she got while forming hypothesis (SI2-08W). Her confidence about her judgement also could be seen from her statement saying that she was more sure in completing this problem comparing the first problem. (SI2-16W).

b) Assess quality of arguments

Eventhough she had no alternative strategy to solve given problem, SI tried to asses the applicability of strategies had been devised which was finding the volume and its ratio. After applying the starategy, she obtained 1:4 as the ratio between the composition of old and new recipe. She arrived at final conclusion that the composition of the new recipe was 4 times

greater. According her, her result made sense already (SI3-17W).

5) Explanation

Label	*Transkrip*	*Kode*
R2-05W	*Ada cara lain nggak? Kepikirang nggak?*	
SI2-05W	*Enggak, soalnya bingung. Ukuran cupnya beda. Pokoknya kemaren mikir resep ini berapa ml dan yang kita butuhkan berapa ml.*	AN03
R2-06W	*Nggak ada hubungannya sama harga?*	
SI2-06W	*Enggak, menurutku.*	IF01 IF02 EX03
R2-07W	*Coba kita lihat jawabanmu. Pada akhirnya komposisi yang dibutuhkan itu bertambah banyak atau sedikit dari komposisi awal?*	
SI2-07W	*Bertambah banyak.*	IF03
R2-08W	*Sebelum kamu ngitung totalnya, kepikiran nggak apakah bertambah banyak atau sedikit?*	
SI2-08W	*Bertambah banyak lah. Kan jumlahnya tambah banyak. Pokoknya pas dikaliin, bertambah banyak.*	IF03
	. . .	
R2-13W	*Empat di sini artinya apa?*	
SI2-13W	*Empat kali lipat.*	EX02
R2-14W	*Kok nggak ditambah 4.*	
SI2-14W	*Nanti beda, komposisinya.*	EX02
R2-15W	*Kalo dikali empat kan nanti juga beda?*	
SI2-15W	*Tapi nggak merubah resepnya.*	EX02

a) State the results

(1) SI explained the strategy had been devised. She was confused since the size of cups were different. But further on, she understood that all she needed to know was finding the volume of pudding based on given recipe and what requested (SI2-05W).

(2) She got 2,250 ml for the old recipe and 9,000 ml for the new one. Based on these findings, she explained that the composition would increase (SI2-07W & SI2-08W).

b) Justify procedures

Instead of applying direct and inverse proportions, SI used multiplication to find the volume of pudding. By multiplying the number of cups and its size, SI found out 2,250 ml and 9,000 ml (SI2-02). Then those quantities formed ratio 1:4 (SI2—03). Although she did not used proportion concept, but in some ways she was able to explain, yet not in detail and clearly, the proportional relation between the old recipe and the new one. SI multiplied each ingridient with 4 since for every 1 certain amount in the old recipe, there would form 4 certain amount in the new recipe (SI2-13W, SI2-14W, & SI2-15W).

c) Present arguments

Not every statement could be presented by SI well. Sometimes she failed to state the relationship of information and just expressed

her argument without showing the reason (SI2-06W).

6) Self-Regulation

Label	*Transkrip*	*Kode*
R2-04W	*Ketika kamu baca dan ingin memastikan pemahamanmu, kamu baca ulang semuanya atau cuman angka-angkanya? Misal nulis yang diketahui dan ditanya, kamu cek tiap poinnya atau nulis semua dulu baru dicek?*	
SI2-04W	*Intinya doang. Nulis semua dulu, baru dicek.*	SL01 SL02
	. . .	
R2-16W	*Dari 2 soal, mana yang kamu paling yakin bener?*	
SI2-16W	*No 2. Soalnya yang no 1, tak kira matematika, lha kok komentar.*	EV01
R2-17W	*Kamu cek lagi nggak? Kira-kira masuk akal nggak ya?*	
SI2-17W	*Iyaa, mikir lagi dan masuk akal.*	EV02 SL02

a) Self-monitor

SI tried to reconsider her judgement about the problem given. She reread the problem a couple of times by paying attention to the points only (SI2-04W).

b) Self-correct

(1) After finishing writing what were given and what was asked, SI confirmed them at one time by looking back at the given problem (SI2-04W).

(2) When SI arrived at the final conclusion, she reviewed her work to check whether

or not there are any misjudgements. (SI2-17W).

J. Discussion

1. Critical Thinking Processes of Junior High School Students

Referring to the the previous sub chapter, these are the critical thinking processes of high school students based on their cognitive style.

a. Critical Thinking Processes of Reflective Student

1) Interpretation

The reflective subject was able to classify informations into what were given and what was asked. She wrote all important informations, so that she had good understanding about the problem. As a result, she could interpret the problem clearly and describe the situation of the given problem in her own words. Not only copying the text, but the subject also mentioned unstated information that had connection with the problem. This subject could elaborate all information well, so that her understanding was good. It was in line with statement of Frare (1986) saying that reflective students had higher scoring in elaboration comparing to impulsive ones. The informations mentioned were detail and ordered. This was supported by research of Messer (1976) stating that reflective student gathered more information more carefully and systematically

2) Analysis

The information given in the problem were connected well by the subject. She was able to mention unstated information by deriving from given information. The subject also identified the

relationship among those informations. Good analysis could be gained from how strong the students remembered the structured informations. Reflective students tended to work slowly but accurate so they could remember structured informations (Kagan, 1965). By capturing the whole structured informations, the subject was able to associate one and another easily. Not only identifying the relationships, the subject identified the claim of choosing certain strategy. She mentioned the reason behind why she took such strategy or approach.

3) Inference

The reflective subject could determine relevant and irrelevant informations without no doubt. Those two kinds of information could be distinguished by this subject. Santrock (2010) said that reflective student was able to focus on relevant information and tended to be right. Further, consideration about relevant-irrelevant information helped her to think more effective. As a result, the subject could infer the consequences flowing from data and opinions and draw a conclusion as the final result.

4) Evaluation

The reflective subject did evaluation activity well. Doing evaluation supported her to get correct answer. The reflective subject always made sure that she had credible and logical arguments before jumping to the next step by assessing them. This characteristic led her to avoid much mistakes.

5) Explanation

The reflective subject was able to explain well. This subject could state the results and justify procedures and present arguments clearly and precisely. These thngs could be explained by referring one of some characteristics of reflective student which was accurate in understanding given text (Kagan, 1965). In consequence, the reflective subject was good in explaining.

6) Self-Regulation

Self-regulation was done by the reflective subject so often. It took time for her to correct her works and made her out of time when solving many problems although she checked important informations only. It was parallel to statement of Kagan (1965) which said reflective student tended to work slowly.

b. Critical Thinking Processes of Impulsive Student

1) Interpretation

The impulsive student described the problem by mentioning all information in the problem. Yet, this student mentioned written/ given information only. Unstated information that could be gotten from those was not derived by the student. However, the informations was mentioned gradually. It indicated that her elaboration was low as what was said by Frare (1986) that impulsive student had low score in elaborating.

2) Analysis

As said before, good analysis could be gained from how strong the student remembered structured information. Impulsive student could

not remember it well (Kagan, 1965), resulting she was not able to get big picture of what was happening in given problem. So that, this student was not too good in identifying the relationship among informations given in the problem. Eventhough she was able, sometimes she could not give the best reason behind her argument.

3) Inference

Mostly the impulsive subject got confusion with determining relevant and irrelevant problem. This caused by her inability to focus on relevant information (Socrat, 2010). Although she did not use certain information in solving a problem, she could not say whether such information was relevant or not. It implied that this student considered between relevant and irrelevant one, yet she could not distinguish them well.

4) Evaluation

The impulsive student did evaluation. But she was not able to take many advantages from this activity. The student always assesesed the credibility and the logical strength of her statements or arguments, yet she did not do further action. When the credibility was low, she kept jumping up to the next step without any consideration. This thing made impulsive student tended to work incorrectly (Kagan, 1965).

5) Explanation

Eventhough the impulsive student could explain well, but this student gave less detail information comparing to the reflective student. She only explained what was seen by her.

6) Self-Regulation

Self-regulation was barely done by the impulsive student. If so, she would check from the beginning, the whole information.

2. Research Weaknesses
   a. The instructions of MFFT was not written in detail. In consequence, the students could not understand how to do the test without the explanation from the researcher. If the researcher told the students verbally, it meant the researcher was interfering the test and it was not allowed since MFFT was a written test. Besides, the procedure of doing MFFT was incorrect. The researcher told the students about their latency (intial time to respond) in a loud voice. The latency should not be told to the students, so there would be no any noise that might be an interference for the students completing the test.
   b. The proofreading for contextual problems test that was done by 7th grade students had no certain criteria to be considered whether or not it was a proper instrument. Therefore, the problems could not considered contextual enough. Some revisions needed to make it more contextual.
   c. The interview guidance was not too good since there were some indicators of critical thinking could not be observed deeply, for instance self-regulation.

CHAPTER V
CONCLUSIONS AND SUGGESTION

A. Conclusion

In line with the result and discussion that had been explained in chapter IV, the conclusions that can be drawn are:

1. Critical Thinking Processes of Reflective Student

   Reflective students are able to categorize informations as what are given and asked. Not only that, they mention important information only yet the information included are in detail and oredered. They could interpret the problem clearly and describe the situation of a problem in her own words.

   During the step of analysis, reflective students try to discover unstated information of a given problem. By associating those stated and unstated information, the students identify the relationships among them and take certain approach/strategy followed by the reason/claim behind their action.

   Relevant-irrelevant information can be determined because the reflective subjects are able to distinguish between those two. From the relevant information combined with their opinions, they infer the consequences. Reflective students form a hypothesis that will be followed by some proofs. They try to know if their claims are correct. Finally, this hypothesis arrives as an inference (conclusion) if it is tested already and is true.

   Before jumping to the next step, reflective students always do evaluation by assessing credibility of claims and quality of arguments. They assess the logical strength in interparting problem, assess the applicability of strategy has

been devised, assess the stregth of each step has been taken, and judge the credibility of conclusion as the final result.

Not only choose certain strategies and take some steps to solve problem, but reflective students can also state the strategies and justify every step. They are able to present arguments and state final results clearly and precisely as parts of activities in explanation.

Self-regulation is well done by refletive students. They reconsider their judgment carefully, so that they can find some mistakes if any and try to revise the answer and change the conclusion.

2. Critical Thinking Processes of Impulsive Student

In interpratation, impulsive students are able to categorize informations into what are given and what is asked. Yet they do not include all informations. One or two information are often missed by them. The students interpret the situation of the given problem quite well but they too focus on text given and also still mention irrelevant information. In other words, they are not too good while describing in their own words.

For analysis, since impulsive students do not try to discover unstated information of a given problem, they are not able to identify the relationship among infomations completly. The can connect those infomations but they cannot get the perfect ones. Strategies or approaches which they take are often not followed by certain reason.

Since impulsive students are low in distinguishing between relevant and irrelevant informations, they are also low in determining wich one and another. However, they do not use the irrelevant information to solve problem, they are just not able to present reason behind it. The same thing happened while they are forming a hypothesis. The

hypothesis may be correct but they do not follow it by some proof. Therefore, they arrive to weak conclusion.

It can be said that impulsive students do evaluation activities. They assess their claims and arguments, but they do not do further actions. They keep going although they know that their judgments are not that strong.

As said before, impulsive students often hold their believe eventhough they do not know the reason of it. They prefer to finish the problem fast rather than do it correctly. In other words, they are not sure while stating either the strategies or steps had been taken.

Self-regulation is not executed by impulsive subjects well. They are not careful enough, so that they failed to find some mistake.

B. Suggestion

In consonance with the conclusion and the research weaknesses that had been explained before, it can be suggested these following points:

1. This research shows that there are some differences in critical thinking between reflective and impulsive students. Therefore, the teacher is strongly suggested to pay attention to the students' cognitive style, especially in reflective-impulsive domain.
2. For further relevant research, a class that students with strong critical thinking are in is highly recommended. It will help researcher to obtain more complete data since strong critical thinkers have many things to observe.
3. The MFFT must provide detail instructions so that the users/students will understand it by themselves, without any additional explanations. Also, there are some factors that

are needed to pay attention to, so that the latency score of each student is accurate.

4. The proofreading of contextual problems test must include some criteria, based on certain theory, to determine whether or not the instrument is proper to use.
5. The interview guidence must be constructed and prepared really well since it is one of the important instruments to reveal unseen processess of students' critical thinking.

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APPENDICES

APPENDIX 1
MATCHING FAMILIAR FIGURE TEST (MFFT)
By Al-Silami (2010)

Instruction for the Matching Familiar Figure Test

The examiner will show you a picture of something you know and then some pictures that are similar to you will have to point to the picture on the bottom page. Lets' do some for practice.

1. The examiner will show you some practice items and help you to find the correct answer. Now we are going to do some that are a little bit harder.
2. You will see a picture on the top page and eight pictures on the bottom page. Find the one that is just like the one on top and point to it.

Note to examiners:

The examiner will record the latency of the first response the total number of errors for each item and the order in which the errors are made. If the participant is correct, the examiner will praise them. If wrong, the examiner will say, "NO, that is not the right one". Find the one that is just like this one (point). Continue to code responses (not time) until the participant gets the item correct. The examiner should take into consideration:

1. The place for the test is comfortable.
2. If the participant becomes tired, the examiner should stop the test and complete it later.

Instruksi untuk Matching Familiar Figure Test (MFFT)

Peneliti akan menununjukkanmu sebuah gambar dan beberapa gambar yang mirip. Diantara gambar yang mirip tersebut, kamu harus menunjukkan satu gambar yang sama persis dengan gambar sebelumnya. Ayo melakukan latihan.

1. Penguji akan menunjukkanmu beberapa item latihan dan membantumu untuk menemukan jawaban yang benar. Sekarang, kita akan melakukan yang lebih susah.
2. Kamu akan melihat sebuah gambar pada bagian atas halaman dan delapan gambar pada bagian bawah halaman. Temukan satu gambar yang sama persis dengan gambar pada bagian atas halaman.

Catatan untuk penguji:

Penguji akan mencatat lamanya waktu respon pertama , banyaknya kesalahan dari setiap item dan urutan kesalahan dibuat. Jika peserta menjawab dengan benar, penguji akan memujinya. Jika salah, penguji akan berkata, "Bukan, itu bukan jawaban yang benar". Temukan gambar yang seperti ini (menunjuk gambar pada bagian atas halaman". Lanjutkan untuk mengode respon (bukan waktu) sampai peserta mendapatkan item yang benar. Penguji seharusnya mempertimbangkan hal-hal berikut:

1. Tempat untuk tes harus nyaman.
2. Jika peserta lelah, penguji harus menghentikan tes dan melengkapinya nanti.

Petunjuk untuk Tes Kecocokan Gambar

Petunjuk ini hanya untuk "CONTOH":

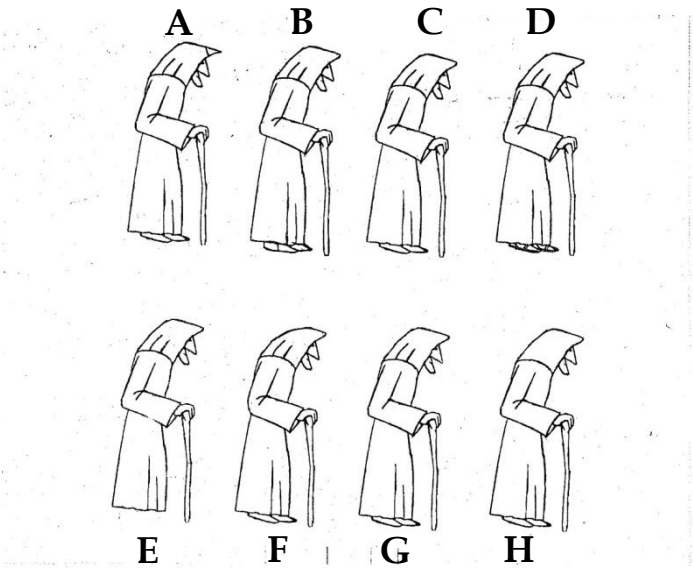
1. Perhatikan secara cermat gambar **contoh 1** yang terdapat pada halaman berikutnya. Terdapat 1 *gambar standar* dan 8 *gambar variasi* yang dinamai abjad A, B, C, ..., dan H. Kamu harus memilih **satu** *gambar variasi* (A, B, C, ..., dan H) yang sama persis dengan *gambar standar*. Kalau kamu cermati, *gambar variasi* yang paling tepat dengan *gambar standar* adalah gambar C. Sedangkan *gambar variasi* A, B, D, E, F, G, dan H bukan pilihan yang tepat.
2. Agar lebih memahami tes ini, buka halaman selanjutnya untuk **contoh 2**. Seperti pada contoh 1, terdapat sebuah *gambar standar* dan 8 *gambar variasi*. Sekarang coba temukan *gambar variasi* yang sama persis dengan *gambar standar* tersebut dan acungkan tangan jika telah menemukannya. Apakah jawabannya? Kalian yang menjawab dengan benar harus menunggu teman kalian yang menjawab dengan salah untuk mencermati lagi soal sampai menemukan jawaban yang benar.
3. Jika kamu telah memahami petunjuk ini, lanjutkan dengan mengerjakan Tes Kecocokan Gambar yang disediakan.

CONTOH 1

Old Man
(Pria tua)

Gambar Standar

Gambar Variasi

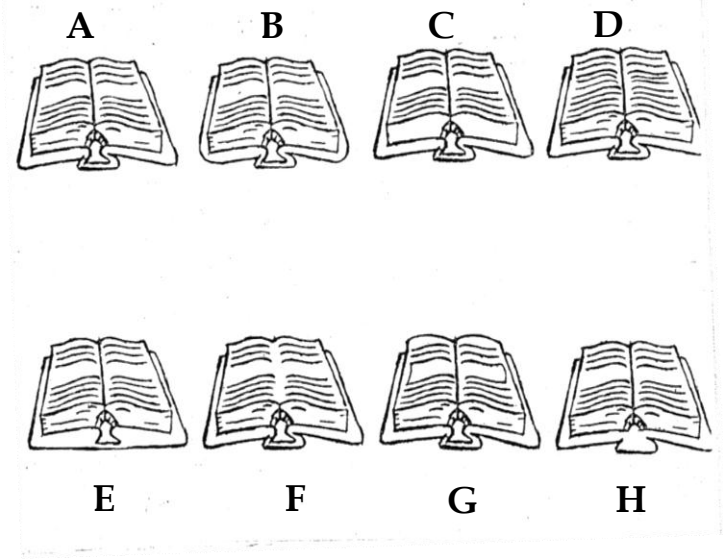


CONTOH 2

Book
(Buku)

Gambar Standar

Gambar Variasi



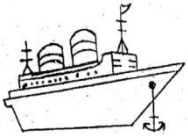
Petunjuk Tes MFFT:

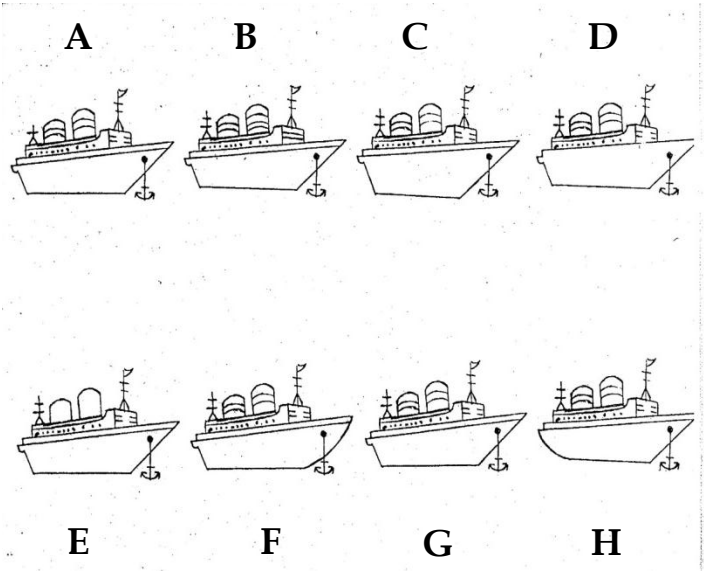
1. Selama mengerjakan tes, kamu akan didampingi oleh seorang asisten peneliti.
2. Tes ini terdiri dari 20 soal yang harus kamu kerjakan secara **individu**. Temukanlah satu *gambar variasi* (A, B, C, ..., dan H) yang sama persis dengan *gambar standar* yang ditampilkan pada setiap soal.
3. Acungkan tangan jika kamu sudah menemukan gambar yang dimaksud dan tunggu sampai peneliti **di barismu** menghampirimu untuk mengecek apakah jawabanmu benar atau salah.
    - Jika jawabanmu benar, maka kamu harus menunggu teman-teman **di barismu** untuk selanjutnya beralih ke soal berikutnya. **Jangan membuka halaman berikutnya sebelum ada instruksi dari peneliti.**
    - Jika jawabanmu salah, cermati lagi gambar tersebut sampai menemukan jawaban yang menurutmu benar.

Catatan untuk (asisten) peneliti:

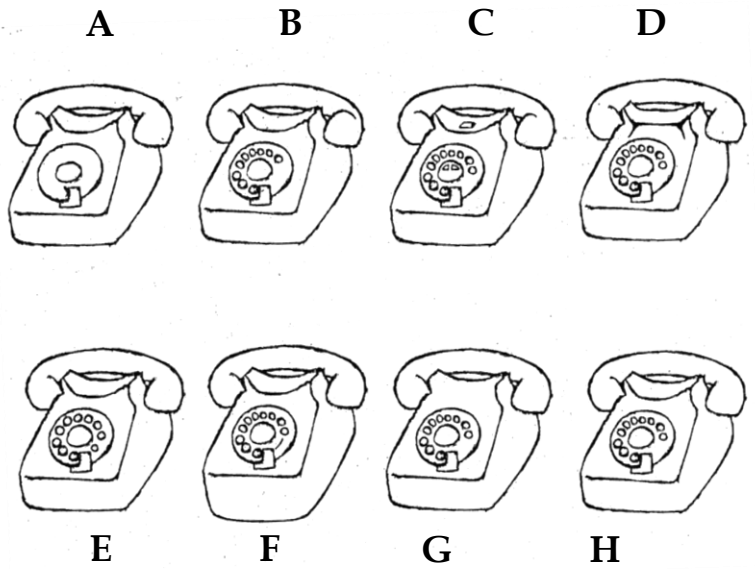
1. Satu asisten peneliti mendampingi satu baris siswa (4-6 siswa) selama tes berlangsung.
2. Dengan menggunakan *stopwatch* asisten peneliti mencatat lama waktu siswa untuk menemukan jawaban/respon pertama pada setiap soal.
3. Asisten peneliti mengecek benar tidaknya jawaban siswa.
4. Jika siswa menyebutkan jawaban yang benar, peneliti meminta siswa untuk menunggu teman-temannya dalam satu baris menyelesaikan soal tersebut.
5. Jika siswa menyebutkan jawaban yang salah, asisten peneliti meminta siswa untuk mencermati lagi soal tersebut sampai jawaban yang benar ditemukan.
6. Asisten peneliti menuliskan waktu setiap respon dari setiap siswa.

Ship
(Kapal)

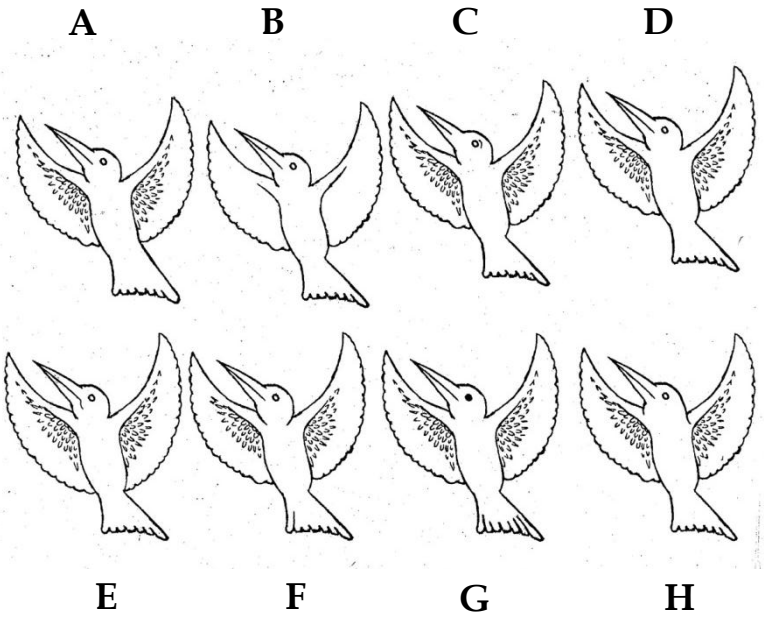




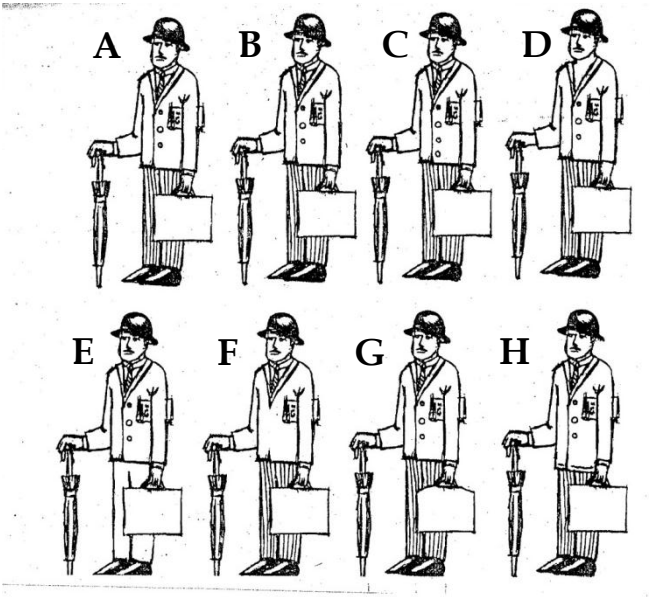
Telephone
(Telepon)



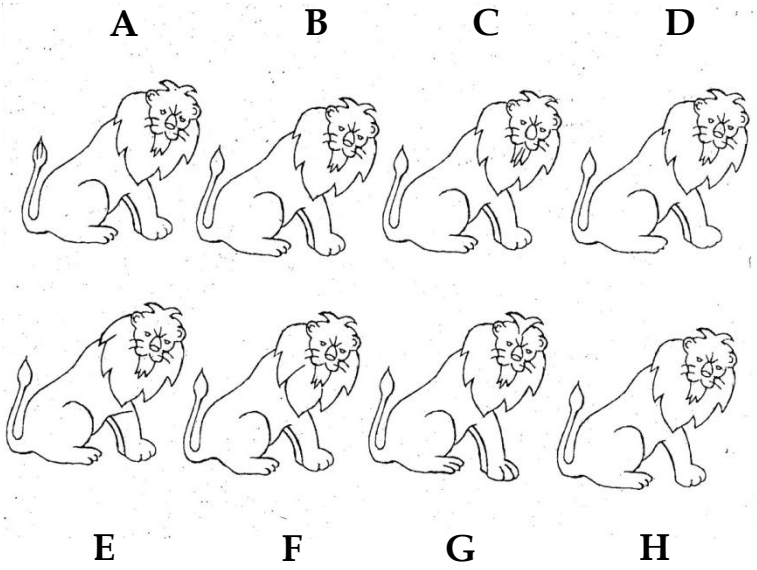
Bird
(Burung)



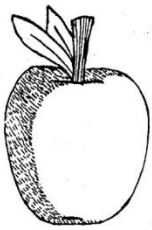
Man
(Pria)

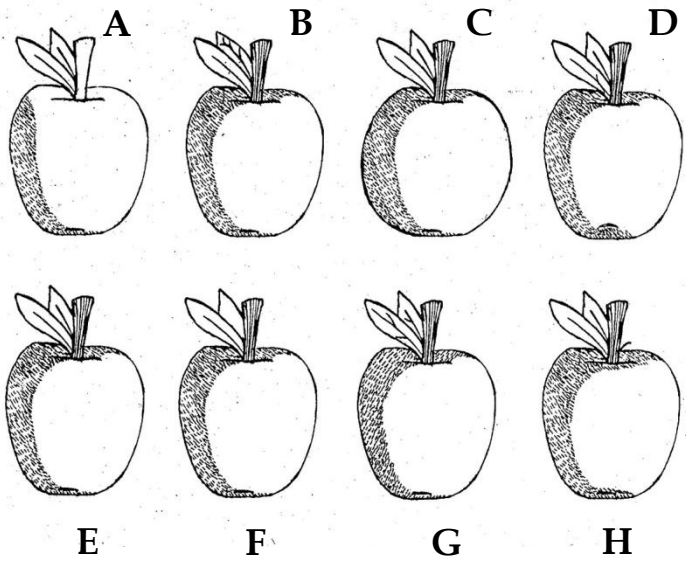


Lion
(Singa)

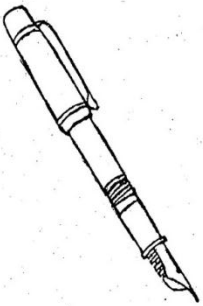


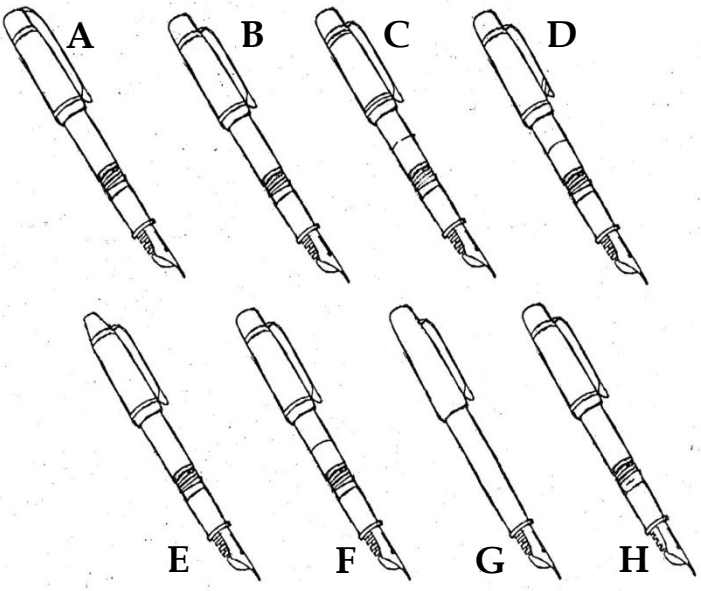
Apple
(Apel)



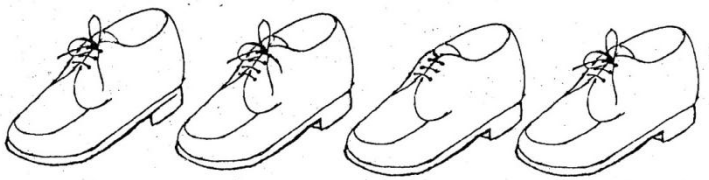


Pen
(Pena)

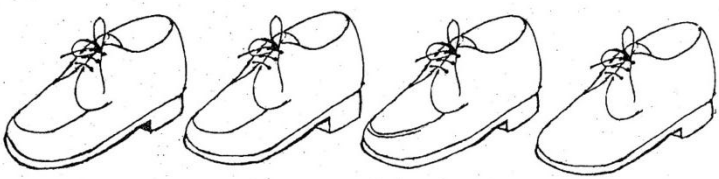




Shoes
(Sepatu)

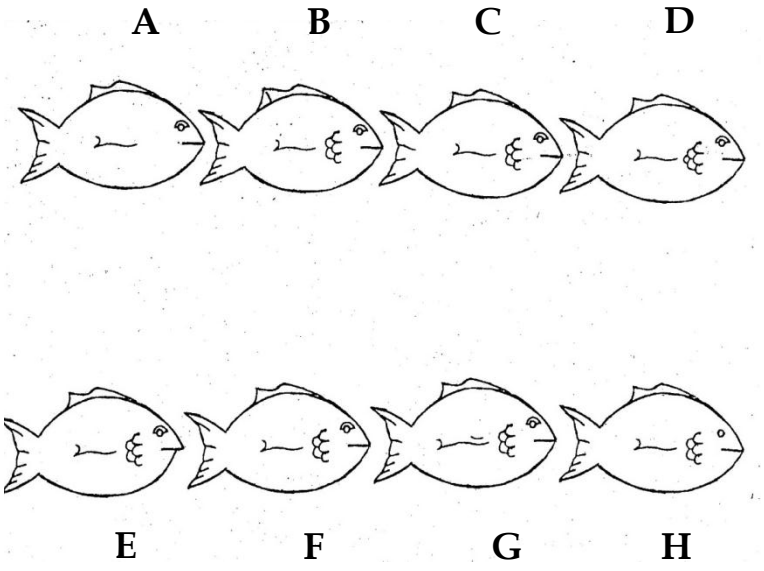


A **B** **C** **D**

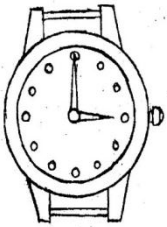


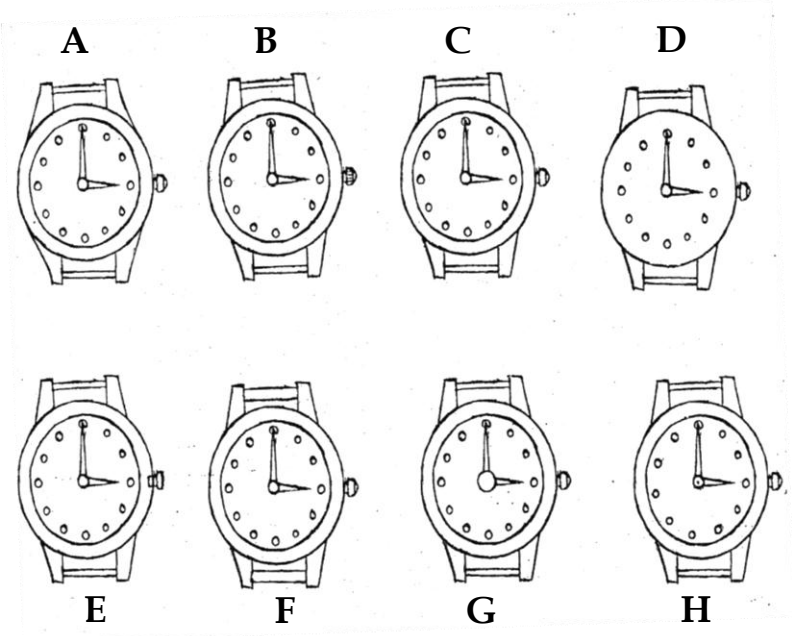
E **F** **G** **H**

Fish
(Ikan)

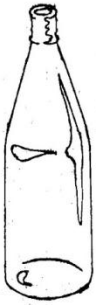


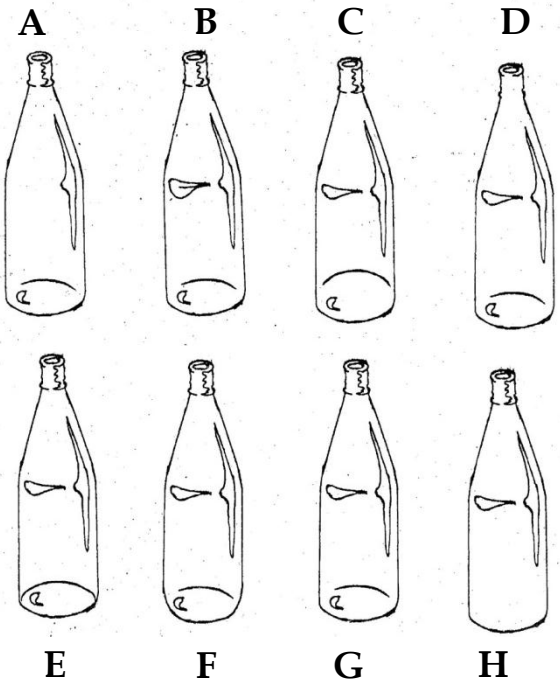
Watch
(Jam tangan)



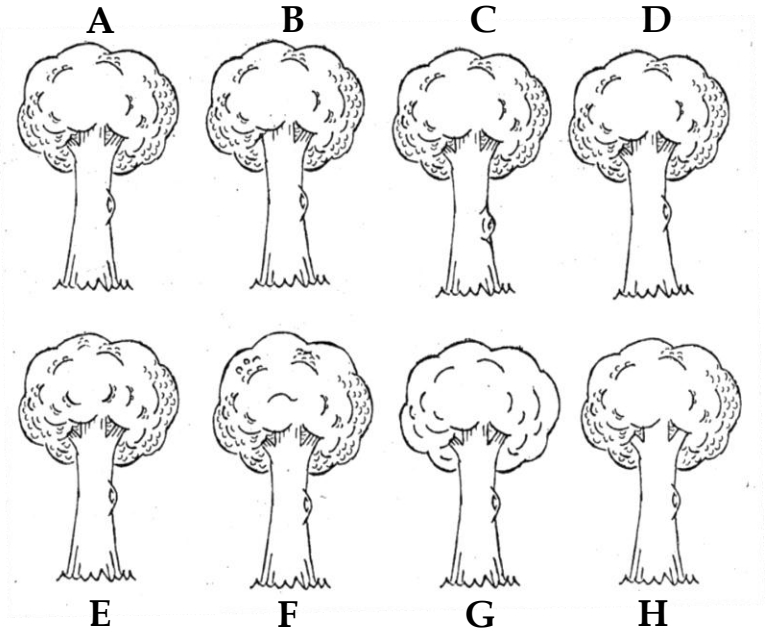


Bottle
(Botol)

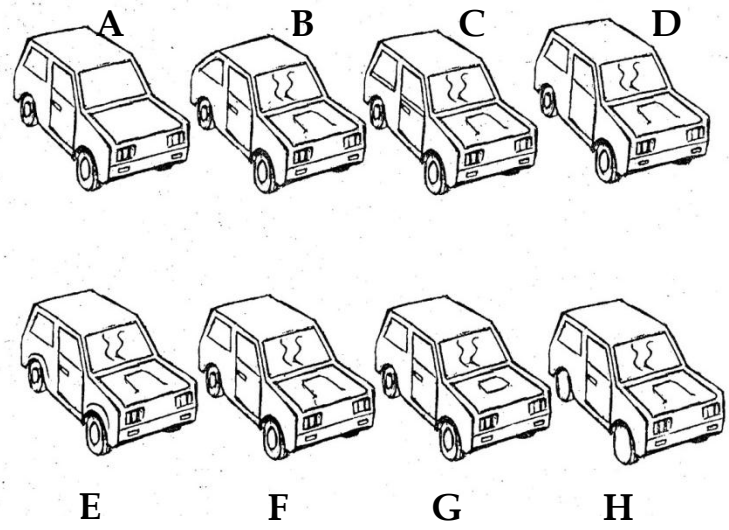




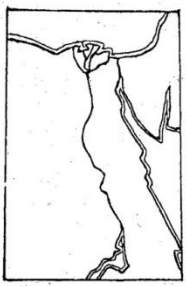
Tree
(Pohon)

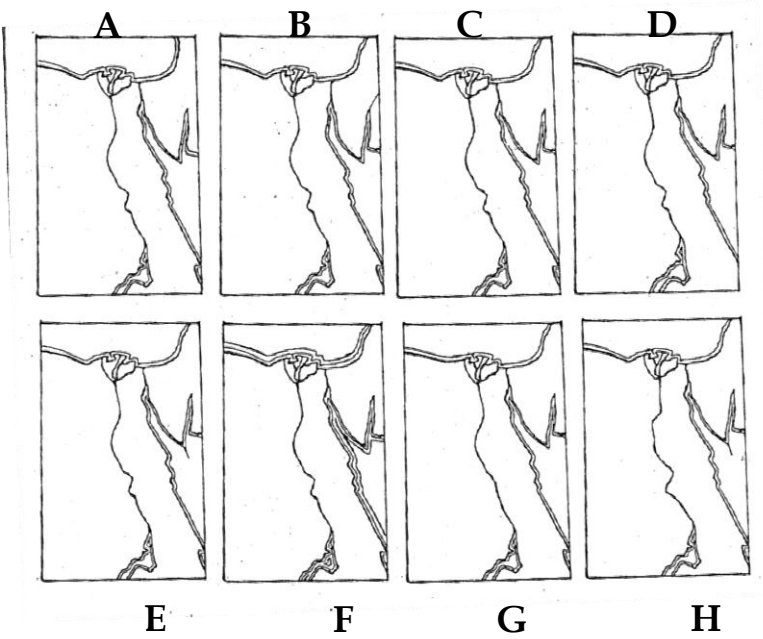


Car
(Mobil)

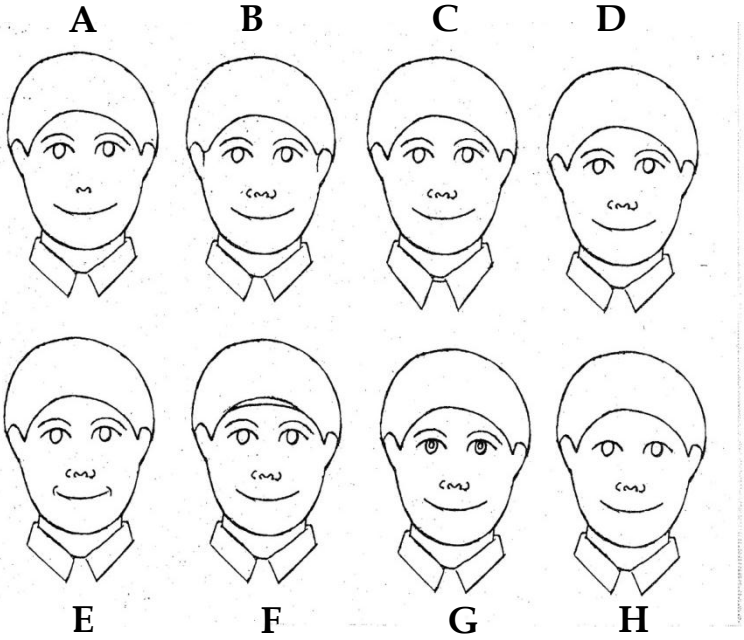


Map
(Peta)

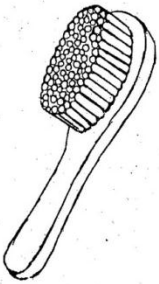


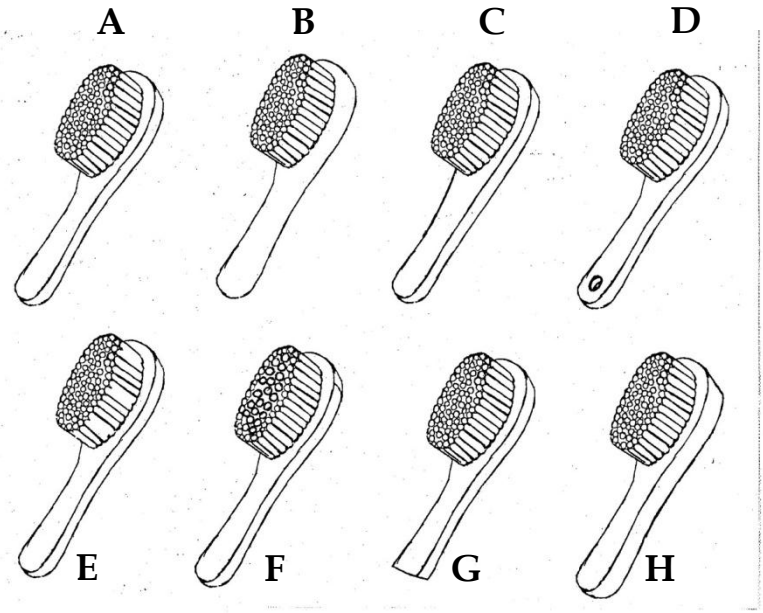


Face
(Wajah)

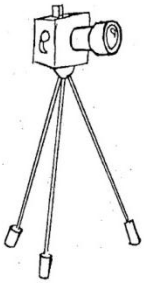


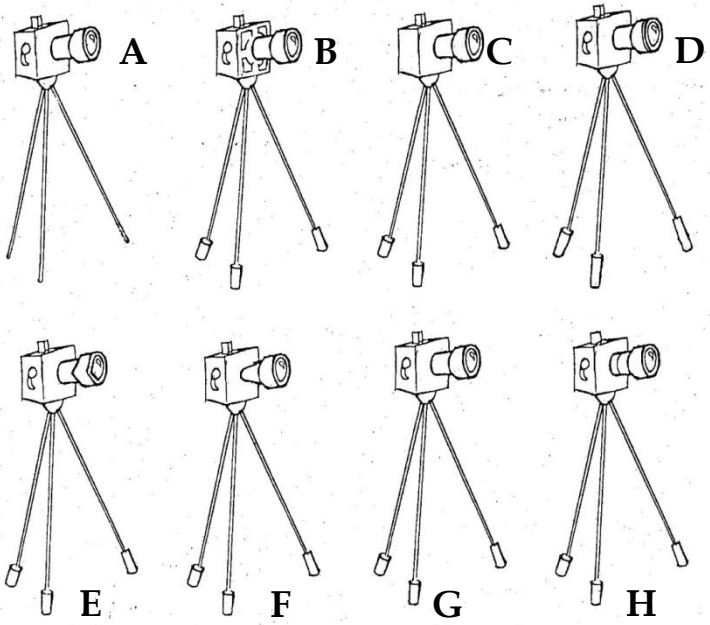
Hair Brush
(Sikat rambut)



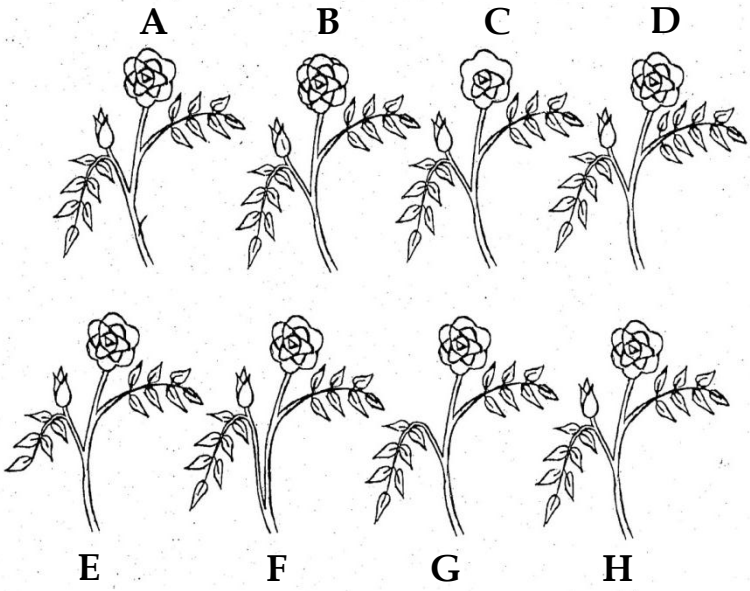


Camera
(Kamera)

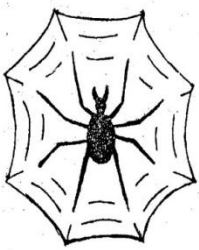


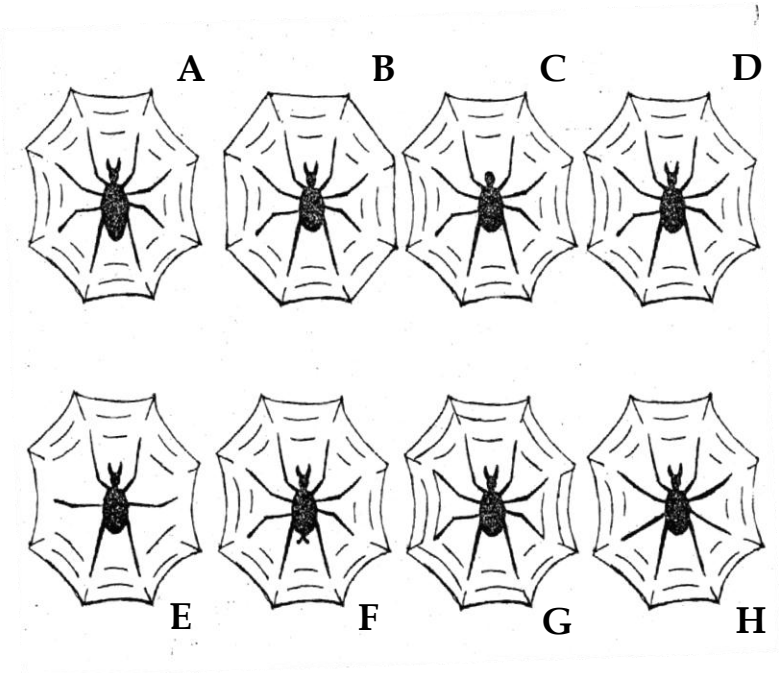


Flower
(Bunga)

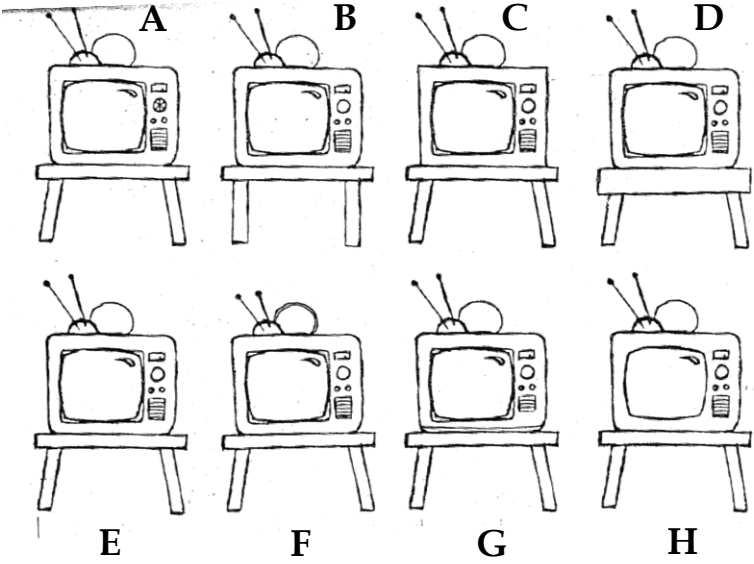


Spider
(Laba-laba)





Television
(TV)



APPENDIX 2
ANSWER KEY OF MATCHING FAMILIAR FIGURES TEST (MFFT)

No.	Item (Figure)	Answer
1.	Old man (*Pria tua*)	C
2.	Book (*Buku*)	A
3.	Ship (*Kapal*)	G
4.	Telephone (*Telepon*)	H
5.	Bird (*Burung*)	D
6.	Man (*Pria*)	A
7.	Lion (*Singa*)	B
8.	Apple (*Apel*)	E
9.	Pen (*Pena*)	B
10.	Shoe (*Sepatu*)	D
11.	Fish (*Ikan*)	F
12.	Watch (*Jam tangan*)	C
13.	Bottle (*Botol*)	G
14.	Tree (*Pohon*)	A
15.	Car (*Mobil*)	E
16.	Map (*Peta*)	C
17.	Face (*Wajah*)	D
18.	Hair brush (*Sikat rambut*)	A
19.	Camera (*Kamera*)	G
20.	Flower (*Bunga*)	H
21.	Spider (*Laba-laba*)	D
22.	Television (*TV*)	E

APPENDIX 3
SCORING GUIDANCE FOR MATCHING FAMILIAR FIGURES TEST (MFFT)

Lembar Penilaian

No.	Item (Gambar)	Waktu (detik)	Jawaban ke-								Eror
			1	2	3	4	5	6	7	8	
1.	Ship (*Kapal*)										
2.	Telephone (*Telepon*)										
3.	Bird (*Burung*)										
4.	Man (*Pria*)										
5.	Lion (*Singa*)										
6.	Apple (*Apel*)										
7.	Pen (*Pena*)										
8.	Shoe (*Sepatu*)										
9.	Fish (*Ikan*)										
10.	Watch (*Jam tangan*)										
11.	Bottle (*Botol*)										
12.	Tree (*Pohon*)										
13.	Car (*Mobil*)										
14.	Map (*Peta*)										
15.	Face (*Wajah*)										
16.	Hair brush (*Sikat*)										
17.	Camera (*Kamera*)										
18.	Flower (*Bunga*)										
19	Spider (*Laba-laba*)										
20.	Television (*TV*)										
Total		***t***									***f***

Catatan:

1. Kolom "**Waktu (detik)"** diisi dengan waktu yang dibutuhkan siswa dalam menemukan **jawaban pertama.**
2. Kolom "**Jawaban ke-**" diisi dengan **abjad** gambar *variasi* yang dipilih siswa. Setiap abjad yang dipilih siswa harus dituliskan pada sub "**Jawaban ke-**" sampai menemukan jawaban yang benar.

3. Kolom **"Banyak eror"** diisi oleh **peneliti**.
4. **Peneliti** menghitung total waktu yang dibutuhkan siswa untuk menjawab respon pertama ($\boldsymbol{t}$) dan total eror yang dilakukan ($\boldsymbol{f}$).

Kesimpulan:
Karena $\boldsymbol{t} \ldots \boldsymbol{\gamma}$ dan $\boldsymbol{f} \ldots \boldsymbol{\delta}$, maka siswa tergolong. . .

APPENDIX 4
VALIDATION LETTER

KEMENTERIAN RISET, TEKNOLOGI DAN PENDIDIKAN TINGGI
UNIVERSITAS NEGERI SURABAYA
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
JURUSAN MATEMATIKA

Kampus Ketintang
Jalan Ketintang Gedung C3
Lt. 2, Surabaya 60231
T: +6231-8298382
F: +6231-8298382

Surabaya, 07 Maret 2018

Yth. Abdul Haris Rosyidi, M.Pd.
di tempat

Bersama ini kami mohon kesediaan Bapak untuk menjadi validator instrumen penelitian, dalam rangka penelitian skripsi mahasiswa berikut:

Nama : Nindya Waspaning Dyah
NIM : 14030174103
Judul Skripsi : Critical Thinking Processes of High School Students in Solving Contextual Problem of Direct and Inverse Proportions Based on Reflective-Impulsive Style

Terlampir kami sertakan instrumen yang akan divalidasi dan lembar validasi yang harus diisi. Atas bantuan dan kerja sama Bapak, kami berterima kasih.

Mengetahui,
Kaprodi Pendidikan Matematika,

Rooselyna Ekawati, Ph.D.
NIP 198210152005012002

Menyetujui,
Dosen Pembimbing Skripsi,

Dr. Rini Setianingsih, M.Kes.
NIP 196109091986032002

APPENDIX 5
VALIDATION FORM FOR CONTEXTUAL PROBLEMS (BY LECTURER)

LEMBAR VALIDASI
TES MASALAH KONTEKSTUAL

Nama Validator : Abdul Haris R

Pekerjaan : Dosen

Peneliti meminta kesediaan Bapak untuk mengisi lembar validasi tes masalah kontekstual yang terlampir. Hal ini bertujuan untuk memperoleh data tentang kevalidan tes tersebut. Tes ini digunakan untuk mengetahui proses berpikir kritis siswa dalam menyelesaikan masalah kontekstual yang berkaitan dengan perbandingan senilai dan berbalik nilai. Peneliti mengucapkan terima kasih atas kesediaan Bapak untuk mengisi lembar validasi ini.

Petunjuk Pengisian

1. Mohon Bapak memberikan penilaian (validasi) untuk soal tes masalah kontekstual yang terlampir.
2. Berilah tanda centang (√) pada kolom penilaian yang telah disediakan sesuai dengan penilaian Bapak untuk setiap kategori.
3. Jika ada yang perlu direvisi, mohon Bapak menuliskannya pada naskah tes masalah kontekstual.
4. Jika ada komentar atau saran untuk perbaikan tes ini, mohon Bapak menuliskannya pada bagian yang telah disediakan.
5. Skala penilaian untuk setiap kategori, yaitu:
   1= sangat buruk; 2 = buruk; 3 = baik; 4 = sangat baik

Tabel Penilaian

No	Uraian	Skala Penilaian			
		1	2	3	4
1.	KRITERIA ISI MATERI				
	a. Petunjuk informasi cukup untuk tugas menyelesaikan masalah kontekstual perbandingan.				✓
	b. Batasan dan syarat-syarat yang diberikan cukup untuk menyelesaikan masalah kontekstual perbandingan.				✓
2.	KRITERIA BAHASA				
	a. Soal menggunakan bahasa yang sesuai dengan kaidah Bahasa Indonesia yang baik dan benar.			✓	
	b. Soal menggunakan bahasa yang sederhana dan mudah dipahami siswa.			✓	
	c. Soal tidak menimbulkan penafsiran ganda.				✓
3.	KRITERIA INFORMASI				
	a. Informasi mudah dimengerti.				✓
	b. Informasi berkaitan dengan pengetahuan matematika yang sudah dimiliki siswa.				✓
	c. Informasi berkaitan dengan masalah kehidupan sehari-hari.				✓
4.	KRITERIA WAKTU				
	Alokasi waktu pengerjaan soal sesuai dengan banyaknya soal yang diberikan.			✓	
	Kesimpulan				(*)

(*) Keterangan

Untuk baris kesimpulan mohon diisi salah satu dari:

A : Layak digunakan tanpa revisi

(B) : Layak digunakan dengan revisi kecil

C : Layak digunakan dengan revisi besar

D : Tidak layak digunakan

Komentar/ Saran

Perb. Sinopsis

Surabaya, 19 Maret 2019

Validator

(Abd. Haris M.)

APPENDIX 6
INSTRUMENT FROM 1ST VALIDATION

INSTRUMENT OF CONTEXTUAL PROBLEMS OF DIRECT AND INVERSE PROPORTIONS

1. Renovasi sebuah balai desa direncanakan selesai seminggu sebelum tanggal 17 Agustus karena akan digunakan sebagai tempat untuk perayaan hari Kemerdekaan Indonesia oleh warga setempat. Renovasi dimulai pada hari pertama di bulan Mei di tahun yang sama. Tiga pemuda dan empat pria dewasa dengan kemampuan dan jatah/porsi kerja yang sama akan dikerahkan untuk menyelesaikannya. Dua minggu setelah pengerjaan, pembangunan terhenti selama 11 hari karena sesuatu hal. Jika kepala desa tetap menginginkan pembangunan selesai tepat waktu, apakah beliau harus menambahkan pekerja? Jika iya, berapa pekerja yang harus ditambahkan?
2. Sebuah industri rumah tangga memberdayakan 12 warga setempat untuk bekerja membuat tas. Industri tersebut memiliki jam kerja dari jam 8 pagi sampai 5 sore dengan waktu 1 jam untuk ishoma, Senin-Jumat. Dalam seminggu, 30 tas mampu dihasilkan. Berapa hari yang dibutuhkan untuk menyelesaikan 4 lusin tas dengan pekerja yang ada?
3. Bu Larasati memiliki usaha puding yaitu "Puding Cup Larasati".

Untuk mempertahankan cita rasa dari puding buatannya, Bu Larasati berpedoman pada resep berikut.

Vla	Puding Coklat
2 sdm gula	1 bungkus agar-agar rasa coklat
6 sdm susu kental manis putih	4 gelas air
2 sdm santan instan	6 sdm gula
2 gelas air	6 sdm susu kental manis

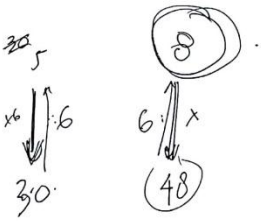
2 sdm tepung custard	½ sdt garam
½ sdt garam	
1 sdt vanili	

Resep di atas adalah resep untuk 5 cup puding dengan cup ukuran 450 ml. Bantulah Bu Larasati untuk menentukan komposisi bahan-bahan "puding coklat" jika menerima pesanan 60 cup puding dengan cup ukuran 150 ml.

APPENDIX 7
INSTRUMENT FROM 2ND VALIDATION

INSTRUMENT OF CONTEXTUAL PROBLEMS OF DIRECT AND INVERSE PROPORTIONS

1. Renovasi sebuah balai desa direncanakan selesai seminggu sebelum tanggal 17 Agustus karena akan digunakan sebagai tempat untuk perayaan hari Kemerdekaan Indonesia oleh warga setempat. Renovasi dimulai pada hari pertama di bulan Mei di tahun yang sama. Tujuh pekerja akan dikerahkan untuk menyelesaikannya. Dua minggu setelah pengerjaan, pembangunan terhenti selama 11 hari karena sesuatu hal. Apa yang harus dilakukan oleh kepala desa jika beliau tetap menginginkan renovasi selesai tepat waktu?
2. Sebuah industri rumah tangga memberdayakan 12 warga setempat untuk bekerja membuat tas. Para karyawan bekerja pada hari Senin-Jumat dari jam 8 pagi sampai 5 sore dengan waktu 1 jam untuk istirahat. Dalam seminggu, 30 tas mampu dihasilkan. Berapa hari yang dibutuhkan untuk menyelesaikan 48 buah tas dengan karyawan yang ada?



3. Bu Larasati memiliki usaha puding yaitu "Puding Cup Larasati".

Untuk mempertahankan cita rasa dari puding buatannya, Bu Larasati berpedoman pada resep berikut.

Puding Coklat
1 bungkus agar-agar rasa coklat
4 gelas air
6 sdm gula
6 sdm susu kental manis
½ sdt garam

Resep di atas adalah resep untuk 5 cup puding berukuran 450 ml. Puding tersebut dijual dengan harga Rp 7.000,00 per cup. Bantulah Bu Larasati menentukan komposisi bahan-bahan "puding coklat" jika ia menerima pesanan 60 cup puding berukuran 150 ml dengan harga Rp 2.500 per cup.

APPENDIX 8
VALIDATION FORM OF CONTEXTUAL PROBLEMS (BY TEACHER)

LEMBAR VALIDASI
TES MASALAH KONTEKSTUAL

Nama Validator : ISWATI, S.Pd., M.Pd.

Pekerjaan : GURU SMPN 5 SIDOARJO

Peneliti meminta kesediaan Ibu untuk mengisi lembar validasi tes masalah kontekstual yang terlampir. Hal ini bertujuan untuk memperoleh data tentang kevalidan tes tersebut. Tes ini digunakan untuk mengetahui proses berpikir kritis siswa dalam menyelesaikan masalah kontekstual yang berkaitan dengan perbandingan senilai dan berbalik nilai. Peneliti mengucapkan terima kasih atas kesediaan Ibu untuk mengisi lembar validasi ini.

Petunjuk Pengisian

1. Mohon Ibu memberikan penilaian (validasi) untuk soal tes masalah kontekstual yang terlampir.
2. Berilah tanda centang (√) pada kolom penilaian yang telah disediakan sesuai dengan penilaian Ibu untuk setiap kategori.
3. Jika ada yang perlu direvisi, mohon Ibu menuliskannya pada naskah tes masalah kontekstual.
4. Jika ada komentar atau saran untuk perbaikan tes ini, mohon Ibu menuliskannya pada bagian yang telah disediakan.
5. Skala penilaian untuk setiap kategori, yaitu:
   1= sangat buruk; 2 = buruk; 3 = baik; 4 = sangat baik

Tabel Penilaian

No	Uraian	Skala Penilaian			
		1	2	3	4
1.	KRITERIA ISI MATERI				
	a. Petunjuk informasi cukup untuk tugas menyelesaikan masalah perbandingan.			✓	
	b. Batasan dan syarat-syarat yang diberikan cukup untuk menyelesaikan masalah perbandingan.			✓	
2.	KRITERIA BAHASA				
	a. Soal menggunakan bahasa yang sesuai dengan kaidah Bahasa Indonesia yang baik dan benar.			✓	
	b. Soal menggunakan bahasa yang sederhana dan mudah dipahami siswa.			✓	
	c. Soal tidak menimbulkan penafsiran ganda			✓	
3.	KRITERIA INFORMASI				
	a. Informasi mudah dimengerti.			✓	
	b. Informasi berkaitan dengan pengetahuan matematika yang sudah dimiliki siswa.			✓	
	c Informasi berkaitan dengan masalah kehidupan sehari-hari.			✓	
4.	KRITERIA WAKTU				
	Alokasi waktu pengerjaan soal sesuai dengan banyaknya soal yang diberikan.			✓	
	Kesimpulan	B.			(*)

(*) Keterangan

Untuk baris kesimpulan mohon diisi salah satu dari:

A : Layak digunakan tanpa revisi

B : Layak digunakan dengan revisi kecil

C : Layak digunakan dengan revisi besar

D : Tidak layak digunakan

Komentar/ Saran

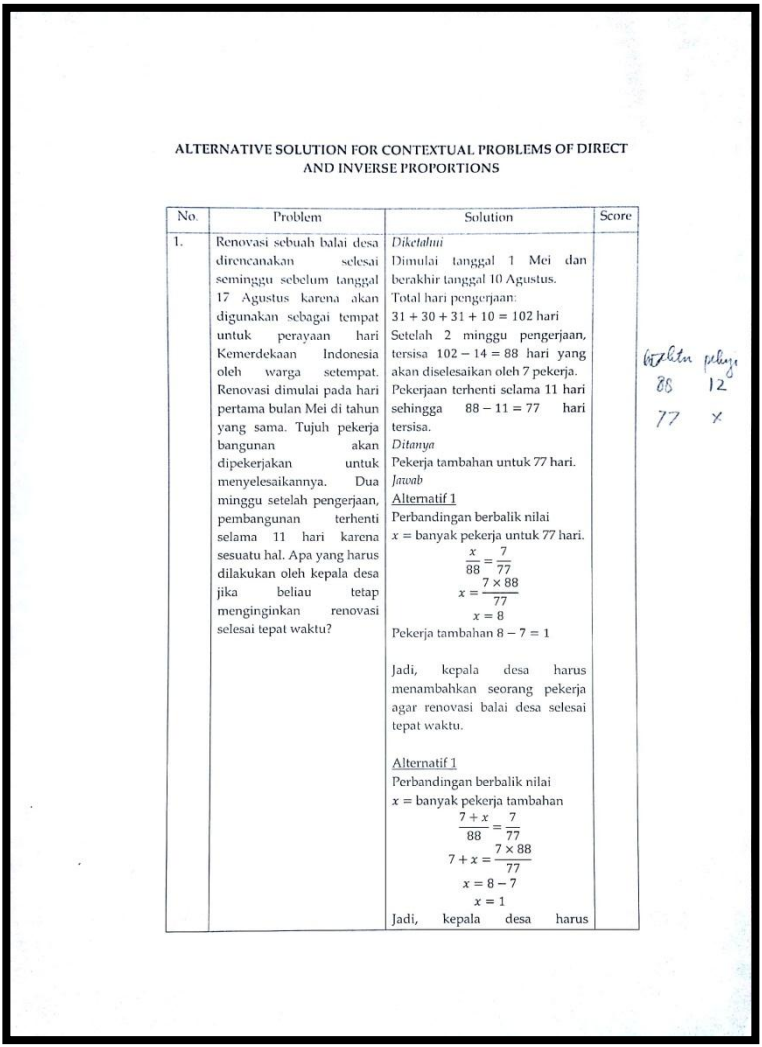
Layak digunakan dengan revisi kecil
No 1 dan 2 perlu di sampaikan dalam bentuk
tabel untuk proses penyelesaian agar lebih
mudah dipahami oleh siswa.
No 3. mohon di berikan kesimpulan dan
proses menjawab tersebut yg berupa jawaban
sama seperti bentuk sebelumnya.

Sidoarjo, 26 Maret 2018

Validator

(Asnati)
197105022010122002

APPENDIX 9
ALTERNATIVE SOLUTIONS FROM 3RD VALIDATION



ALTERNATIVE SOLUTION FOR CONTEXTUAL PROBLEMS OF DIRECT AND INVERSE PROPORTIONS

No.	Problem	Solution	Score
1.	Renovasi sebuah balai desa direncanakan selesai seminggu sebelum tanggal 17 Agustus karena akan digunakan sebagai tempat untuk perayaan hari Kemerdekaan Indonesia oleh warga setempat. Renovasi dimulai pada hari pertama bulan Mei di tahun yang sama. Tujuh pekerja bangunan akan dipekerjakan untuk menyelesaikannya. Dua minggu setelah pengerjaan, pembangunan terhenti selama 11 hari karena sesuatu hal. Apa yang harus dilakukan oleh kepala desa jika beliau tetap menginginkan renovasi selesai tepat waktu?	*Diketahui* Dimulai tanggal 1 Mei dan berakhir tanggal 10 Agustus. Total hari pengerjaan: $31 + 30 + 31 + 10 = 102$ hari Setelah 2 minggu pengerjaan, tersisa $102 - 14 = 88$ hari yang akan diselesaikan oleh 7 pekerja. Pekerjaan terhenti selama 11 hari sehingga $88 - 11 = 77$ hari tersisa. *Ditanya* Pekerja tambahan untuk 77 hari. *Jawab* Alternatif 1 Perbandingan berbalik nilai x = banyak pekerja untuk 77 hari. $\frac{x}{88} = \frac{7}{77}$ $x = \frac{7 \times 88}{77}$ $x = 8$ Pekerja tambahan $8 - 7 = 1$ Jadi, kepala desa harus menambahkan seorang pekerja agar renovasi balai desa selesai tepat waktu. Alternatif 1 Perbandingan berbalik nilai x = banyak pekerja tambahan $\frac{7 + x}{88} = \frac{7}{77}$ $7 + x = \frac{7 \times 88}{77}$ $x = 8 - 7$ $x = 1$ Jadi, kepala desa harus	

		menambahkan seorang pekerja agar renovasi balai desa selesai tepat waktu.	
2.	Sebuah industri rumah tangga memberdayakan 12 orang warga setempat untuk bekerja membuat tas. Para karyawan bekerja pada hari Senin sampai Jumat dari jam 8 pagi sampai 5 sore dengan waktu istirahat 1 jam. Dalam lima hari kerja, 32 tas mampu dihasilkan. Berapa hari yang dibutuhkan untuk menyelesaikan 48 buah tas dengan karyawan yang ada?	*Diketahui* Pekerja = 12 orang Waktu = $9 - 1 = 8 \times 5 = 40$ jam Produk = 32 tas Pekerja = 12 Waktu = x jam Produk = $4 \times 12 = 48$ tas *Ditanya* x (jam) = waktu yang dibutuhkan untuk memproduksi 48 tas = ⋯ hari *Jawab* $\frac{12}{12} = \frac{x}{40} = \frac{48}{32}$ $\frac{x}{40} = \frac{48}{32}$ $x = \frac{48 \times 40}{32}$ $x = 60$ jam Jadi, waktu yang dibutuhkan untuk memproduksi 48 tas dengan karyawan yang ada adalah 60 jam atau 7,5 = 8 hari kerja.	
3.	Bu Larasati memiliki usaha puding yaitu "Puding Cup Larasati". Untuk mempertahankan cita rasa puding buatannya, Bu Larasati berpedoman pada resep berikut. **Puding Coklat** 1 bungkus agar-agar rasa coklat	*Diketahui* Bahan-bahan yang diperlukan untuk membuat 5 cup puding dengan cup ukuran 450 ml: 1 bungkus agar-agar rasa coklat 4 gelas air 6 sdm gula 6 sdm susu kental manis ½ sdt garam *Ditanya* Bahan-bahan yang diperlukan	

4 gelas air
6 sdm gula
6 sdm susu kental manis
½ sdt garam

Resep di atas adalah resep untuk 5 cup puding berukuran 450 ml. Puding tersebut dijual dengan harga Rp 7.000,00 per cup. Bantulah Bu Larasati menentukan komposisi bahan-bahan puding coklat jika ia menerima pesanan 60 cup puding berukuran 150 ml dengan harga Rp 2.500,00 per cup.

untuk membuat 60 cup puding dengan cup ukuran 150 ml:
a = banyak agar-agar (bungkus)
b = banyak air (gelas)
c = banyak gula (sdm)
d = banyak susu kental manis (sdm)
e = banyak garam (sdt)

Jawab

Agar-agar (bungkus)

$\frac{x}{60} = \frac{1}{5}$ $\quad x = 12$ $\qquad$ $\frac{a}{150} = \frac{12}{450}$ $\quad a = 4$

Air (gelas)

$\frac{x}{60} = \frac{4}{5}$ $\quad x = 48$ $\qquad$ $\frac{b}{150} = \frac{48}{450}$ $\quad b = 16$

Gula (sdm)

$\frac{x}{60} = \frac{6}{5}$ $\quad x = 72$ $\qquad$ $\frac{c}{150} = \frac{72}{450}$ $\quad c = 24$

Susu kental manis (sdm)

$\frac{x}{60} = \frac{6}{5}$ $\quad x = 72$ $\qquad$ $\frac{d}{150} = \frac{72}{450}$ $\quad d = 24$

Garam (sdt)

$\frac{x}{60} = \frac{1/2}{5}$ $\quad x = 6$ $\qquad$ $\frac{e}{150} = \frac{6}{450}$ $\quad c = 2$

Komposisi akhir ?
... bungkus agar?
... gelas air.
... sdm gula
... sdm

APPENDIX 10
PROOFREADING TEST FOR CONTEXTUAL PROBLEMS
(BY 1ST STUDENT)

Nama : Aulia Hasrining Lestari
Kelas : 7 6
Sekolah : SMP AL Falah Deltasari

No.	Indikator	Skor Penilaian				Keterangan
	Masalah 1					
1.	Soal dapat terbaca dengan baik.	1	2	3	4	Tulisannya jelas
2.	Saya dapat memahami pertanyaan pada soal dengan baik.	1	2	3	4	Soal kurang saya paham
3.	Saya dapat mengungkapkan kembali isi soal dengan bahasa saya sendiri.	1	2	3	4	saya belum bisa mengungkapkan kembali soalnya karena saya masih bingung
	Masalah 2					
1.	Soal dapat terbaca dengan baik.	1	2	3	4	Tulisannya jelas
2.	Saya dapat memahami pertanyaan pada soal dengan baik.	1	2	3	4	Soal kurang saya paham
3.	Saya dapat mengungkapkan kembali isi soal dengan bahasa saya sendiri.	1	2	3	4	Soal saya belum bisa mengungkapkan kembali soalnya

Sidoarjo, ...

Tanda Tangan

Aulia Hasrining L.

APPENDIX 11
PROOFREADING TEST FOR CONTEXTUAL PROBLEMS (BY 2ND STUDENT)

Nama : Vania Huwaida Zahirah B.P

Kelas : 7

Sekolah : SMP - AL-FALAH DELTASARI

No.	Indikator	Skor Penilaian				Keterangan
	Masalah 1					
1.	Soal dapat terbaca dengan baik.	1	2	3	4	kata-katanya mudah di mengerti
2.	Saya dapat memahami pertanyaan pada soal dengan baik.	1	2	3	4	soal tidak menggunakan bahasa yg sulit sehingga mudah dipahami
3.	Saya dapat mengungkapkan kembali isi soal dengan bahasa saya sendiri.	1	2	3	4	soal mudah dipahami sehingga tidak sulit untuk dijelaskan dgn bahasa sendiri.
	Masalah 2					
1.	Soal dapat terbaca dengan baik.	1	2	3	4	bahasanya tidak rumit jadi mudah terbacanya.
2.	Saya dapat memahami pertanyaan pada soal dengan baik.	1	2	3	4	karena bahasanya tdk rumit
3.	Saya dapat mengungkapkan kembali isi soal dengan bahasa saya sendiri.	1	2	3	4	soalnya tidak rumit sehingga untuk diceritakan kembali juga tdk susah.

Sidoarjo, ...

Tanda Tangan

Vania Huwaida Zahirah

APPENDIX 12
INSTRUMENT OF CONTEXTUAL PROBLEMS OF DIRECT AND INVERSE PROPORTIONS

SOAL PERBANDINGAN SENILAI DAN BERBALIK NILAI

Petunjuk Umum:
1. Jawablah soal dengan sungguh-sungguh dalam waktu 45 menit.
2. Semua soal harus dijawab.
3. Dahulukan menjawab soal yang kamu anggap mudah.

---

1. Sebuah balai desa direnovasi untuk digunakan sebagai tempat perayaan Hari Kemerdekaan Indonesia oleh warga setempat. Kepala Desa mempekerjakan sekelompok tukang borongan yang terdiri dari 7 orang pekerja untuk menyelesaikannya dengan bayaran yang cukup besar. Karena darurat, para pekerja tersebut sepakat untuk bekerja setiap hari dan tanpa libur. Renovasi harus selesai paling lambat tanggal 10 Agustus 2018. Para pekerja memulai renovasi pada tanggal 1 Mei 2018. Dua minggu setelah pengerjaan, di luar rencana, pekerjaan renovasi harus terhenti selama 11 hari karena sesuatu hal, dan dilanjutkan kembali pada tanggal 26 Mei 2018. Apa yang harus dilakukan oleh Kepala Desa dan ketua pemborong jika diinginkan renovasi selesai tepat waktu pada 10 Agustus 2018?

2. Bu Larasati memiliki usaha puding yaitu "Puding Larasati".

Untuk menekan harga, puding coklat dibuat tanpa vla. Namun, Bu Larasati tetap mempertahankan cita rasa puding buatannya dengan komposisi bahan-bahan berikut.

Bahan Puding Coklat
1 bungkus agar-agar rasa coklat
4 gelas air
6 sdm gula
6 sdm susu kental manis
½ sdt garam

Resep di atas untuk 5 cup puding berukuran 450 ml. Puding tersebut dijual dengan harga Rp 7.000,00 per cup. Bantulah Bu Larasati untuk menentukan komposisi bahan-bahan puding coklat yang dibutuhkan jika ia menerima pesanan 60 cup puding berukuran 150 ml dengan harga Rp 2.500 per cup.

APPENDIX 13
ALTERNATIVE SOLUTIONS FOR CONTEXTUAL PROBLEMS OF DIRECT AND INVERSE PROPORTIONS

<table>
<tr><th>No.</th><th>Problem</th><th>Solution</th></tr>
<tr><td>1.</td><td>Renovasi sebuah balai desa direncanakan selesai seminggu sebelum tanggal 17 Agustus karena akan digunakan sebagai tempat perayaan hari Kemerdekaan Indonesia oleh warga setempat. Renovasi dimulai pada hari pertama bulan Mei di tahun yang sama. Tujuh pekerja bangunan akan dipekerjakan untuk menyelesaikannya. Dua minggu setelah pengerjaan, pembangunan terhenti selama 11 hari karena sesuatu hal. Apa yang harus dilakukan oleh kepala desa jika beliau tetap menginginkan renovasi selesai tepat waktu?</td><td>Diketahui
Dimulai tanggal 1 Mei dan berakhir tanggal 10 Austus.
Total hari pengerjaan:
$31 + 30 + 31 + 10 = 102$ hari
Setelah 2 minggu pengerjaan, tersisa $102 - 14 = 88$ hari yang akan diselesaikan oleh 7 pekerja.
Pekerjaan terhenti selama 11 hari sehingga $98 - 11 = 77$ hari tersisa.
<table><tr><th>Waktu</th><th>Pekerja</th></tr><tr><td>88</td><td>7</td></tr><tr><td>77</td><td>x</td></tr></table>
Ditanya
Pekerja tambahan untuk 77 hari.
Jawab
<u>Alternatif 1</u>
Perbandingan berbalik nilai
x = banyak pekerja untuk 77 hari.
$\frac{x}{88} = \frac{7}{77}$</td></tr>
</table>

		$x = \frac{7 \times 88}{77}$ $x = 8$ Pekerja tambahan $8 - 7 = 1$ Jadi, seorang pekerja harus ditambahkan agar renovasi balai desa selesai tepat waktu. <u>Alternatif 1</u> Perbandingan berbalik nilai $x =$ banyak pekerja tambahan $\frac{7 + x}{88} = \frac{7}{77}$ $7 + x = \frac{7 \times 88}{77}$ $x = 8 - 7$ $x = 1$ Jadi, seorang pekerja harus ditambahkan agar renovasi balai desa selesai tepat waktu.

<table>
<tr>
<td>2.</td>
<td>Bu Larasati memiliki usaha puding yaitu “Puding Cup Larasati”. Untuk mempertahankan cita rasa puding buatannya, Bu Larasati berpedoman pada resep berikut.
<table>
<tr><th>Puding Coklat</th></tr>
<tr><td>1 bungkus agar-agar rasa coklat</td></tr>
<tr><td>4 gelas air</td></tr>
<tr><td>6 sdm gula</td></tr>
<tr><td>6 sdm susu kental manis</td></tr>
<tr><td>½ sdt garam</td></tr>
</table>
Resep di atas adalah resep untuk 5 cup peding berukuran 450 ml. Puding tersebut dijual dengan harga Rp 7.000,00 per cup. Bantulah Bu Larasatimenentukan komposisi bahan-bahan puding coklat jika ia menerima pesanan 60 cup puding berukuran 150 ml dengan harga Rp 2.500,00 per cup.</td>
<td>Diketahui
Bahan-bahan yang diperlukan untuk membuat 5 cup puding dengan cup ukuran 450 ml:
1 bungkus agar-agar rasa coklat
4 gelas air
6 sdm gula
6 sdm susu kental manis
½ sdt garam

Ditanya
Bahan-bahan yang diperlukan untuk membuat 60 cup puding dengan cup ukuran 150 ml:
a = banyak agar-agar (bungkus)
b = banyak air (gelas)
c = banyak gula (sdm)
d = banyak susu kental manis (sdm)
e = banyak garam (sdt)

Jawab
Agar-agar (bungkus)
$\frac{x}{60} = \frac{1}{5}$ $\quad$ $\frac{a}{150} = \frac{12}{450}$
$x = 12$ $\quad$ $a = 4$
Air (gelas)
$\frac{x}{60} = \frac{4}{5}$ $\quad$ $\frac{b}{150} = \frac{48}{450}$
$x = 48$ $\quad$ $b = 16$</td>
</tr>
</table>

Gula (sdm)

$\frac{x}{60} = \frac{6}{5}$ $\quad$ $\frac{c}{150} = \frac{72}{450}$

$x = 72$ $\quad$ $c = 24$

Susu kental manis (sdm)

$\frac{x}{60} = \frac{6}{5}$ $\quad$ $\frac{d}{150} = \frac{72}{450}$

$x = 72$ $\quad$ $d = 24$

Garam (sdt)

$\frac{x}{60} = \frac{1/2}{5}$ $\quad$ $\frac{e}{150} = \frac{6}{450}$

$x = 6$ $\quad$ $e = 2$

Jadi, komposisi puding coklat sesuai pesanan adalah sebagai berikut:

Puding Coklat
4 bungkus ag□r-agar rasa coklat
16 gelas air
24 sdm gula
24 sdm susu kental manis
2 sdt garam

APPENDIX 14
VALIDATION FORM OF INTERVIEW GUIDANCE (BY LECTURER)

LEMBAR VALIDASI
PEDOMAN WAWANCARA

Nama Validator : Ahd. Haris R

Pekerjaan : Ptm

Peneliti meminta kesediaan Bapak untuk mengisi lembar validasi pedoman wawancara yang terlampir. Hal ini bertujuan untuk memperoleh data tentang kevalidan pedoman tersebut. Pedoman wawancara ini digunakan untuk menggali informasi yang lebih dalam mengenai proses berpikir kritis siswa SMP dalam menyelesaikan masalah kontekstual yang berkaitan dengan perbandingan senilai dan berbalik nilai. Peneliti mengucapkan terima kasih atas kesediaan Bapak untuk mengisi lembar validasi ini.

Petunjuk Pengisian

1. Mohon Bapak memberikan penilaian (validasi) untuk pedoman wawancara yang terlampir.
2. Berilah tanda centang (√) pada kolom penilaian yang telah disediakan sesuai dengan penilaian Bapak untuk setiap kategori.
3. Jika ada yang perlu direvisi, mohon Bapak menuliskannya pada naskah pedoman wawancara.
4. Jika ada komentar atau saran untuk perbaikan pedoman wawancara ini, mohon Bapak menuliskannya pada bagian yang telah disediakan.
5. Skala penilaian untuk setiap kategori, yaitu:
   1= tidak setuju; 2 = kurang setuju; 3 = setuju; 4 = sangat setuju

Tabel Penilaian

No.	Uraian	Skala Penilaian			
		1	2	3	4
1.	Tujuan wawancara jelas.				✓
2.	Urutan pertanyaan dalam tiap bagian jelas dan terurut secara sistematis.			✓	
3.	Butir-butir pertanyaan yang digunakan dapat mengungkapkan proses berpikir kritis siswa dalam menyelesaikan soal masalah kontekstual perbandingan senilai dan berbalik nilai.				✓
4.	Rumusan butir pertanyaan menggunakan kata tanya atau perintah yang mengarah pada penjelasan tentang jawaban subjek penelitian.			✓	
5.	Rumusan butir pertanyaan menggambarkan arah tujuan yang dilakukan peneliti.				✓
6.	Rumusan butir pertanyaan **tidak** mendorong atau mengarahkan subjek penelitian pada kesimpulan tertentu.				✓
7.	Rumusan butir pertanyaan menggunakan kata/kalimat yang **tidak** menimbulkan penafsiran ganda.				✓
Kesimpulan					(*)

(*) Keterangan

Untuk baris kesimpulan mohon diisi salah satu dari:

A : Layak digunakan tanpa revisi

B : Layak digunakan dengan revisi kecil

C : Layak digunakan dengan revisi besar

D : Tidak layak digunakan

Komentar/ Saran

- teks operasional, tugas "hanya" "menjawab/mengerjakan" saja.
- cek di naskah

Surabaya, 19 Maret 2018

Validator

(A. Hais R.)

APPENDIX 15
INTERVIEW GIDANCE FROM 1ST VALIDATION

Skill	Questions
Interpretation	• *Soal tersebut bercerita tentang apa?* • *Masalah apa yang ada pada soal tersebut?* • *Apa yang diketahui pada soal?* • *Apa yang ditanyakan oleh soal tersebut dan menjadi masalah?*
Analysis	• *Apa hubungan antara yang diketahui dan yang ditanya?* • *Apa yang pertama harus dilakukan untuk menyelesaikan masalah tersebut dan menemukan jawaban yang diminta?* • *Strategi atau cara apa yang kamu gunakan untuk menyelesaikannya?* • *Mengapa kamu memilih strategi atau cara tersebut?*
Inference	• *Apakah keterangan/informasi yang ada pada soal membantu kamu untuk menentukan penyelesaian?* • *Adakah hal-hal yang diketahui namun tidak berkaitan dengan yang diminta atau ditanyakan?* • *Dugaan apa yang terpikirkan berdasarkan masalah yang ada?* • *Kesimpulan apa yang kamu dapatkan dari informasi penting yang diketahui pada soal?* • *Apakah strategi yang kamu gunakan bisa untuk menyelesaikan permasalahan yang ada?* • *Adakah pernyataan-pernyataan yang tidak tertulis tetapi kamu bisa mendapatkannya pada soal? Apakah itu?* • *Kesimpulan akhir apa yang kamu dapatkan setelah menyelesaikan masalah tersebut?*

Skill	Questions
Situation	• *Apakah kamu yakin dengan argumenmu dalam memahami soal tersebut?* • *Apakah kamu yakin saat kamu menceritakan kembali permasalahan tersebut? Seberapa yakinkah kamu dengan pernyataan-pernyataan yang kamu buat dalam menginterpretasikan masalah pada soal?* • *Apakah alasanmu logis? Apakah hubungan yang kamu sampaikan benar? Apakah itu hubungannya?* • *Apakah kamu yakin bahwa informasi tersebut benar-benar tidak berguna? Dan tidak ada hubungannyadengan yang ditanyakan?*
Explanation	• *Jelaskan informasi –informasi yang kamu dapatkan dari soal tersebut!* • *Jelaskan apa yang menjadi masalah dan ditanyakan pada soal!* • *Sebutkan informasi-informasi penting yang kamu butuhkan untuk menyelesaiakan masalah tersebut? Jelaskan mengapa informasi tersebut penting!* • *Jelaskan hubungan antara yang diketahui dan ditanyakan!*
Self-Regulation	• *Apakah kamu yakin bahwa tidak ada informasi yang terlewat? Dan mencoba memeriksanya?* • *Apakah kamu memeriksa hubungan pernyataan-*

Skill	Questions
	pernyataan atau informasi-informasi pada soal? • *Apakah kamu mengecek kembali setiap langkah yang kamu gunakan untuk menyelesaikan masalah tersebut?* • *Apakah kamu melihat kembali dan meninjau kesimpulan atau solusi yang kamu dapatkan untuk memastikannya benar?*

APPENDIX 16
VALIDATION FORM FO INTERVIEW GUIDANCE (BY TEACHER)

LEMBAR VALIDASI
PEDOMAN WAWANCARA

Nama Validator : ISYYATI, S.Pd., M.Pd.

Pekerjaan : GURU.

Peneliti meminta kesediaan Ibu untuk mengisi lembar validasi pedoman wawancara yang terlampir. Hal ini bertujuan untuk memperoleh data tentang kevalidan tes tersebut. Pedoman wawancara ini digunakan untuk menggali informasi mengenai proses berpikir kritis siswa SMP dalam menyelesaikan masalah kontekstual yang berkaitan dengan perbandingan senilai dan berbalik nilai. Peneliti mengucapkan terima kasih atas kesediaan Ibu untuk mengisi lembar validasi ini.

Petunjuk Pengisian

1. Mohon Ibu memberikan penilaian (validasi) untuk pedoman wawancara yang terlampir.
2. Berilah tanda centang (√) pada kolom penilaian yang telah disediakan sesuai dengan penilaian Ibu untuk setiap kategori.
3. Jika ada yang perlu direvisi, mohon Ibu menuliskannya pada naskah pedoman wawancara.
4. Jika ada komentar atau saran untuk perbaikan pedoman wawancara ini, mohon Ibu menuliskannya pada bagian yang telah disediakan.
5. Skala penilaian untuk setiap kategori, yaitu:
   1= tidak setuju; 2 = kurang setuju, 3 = setuju, 4 = sangat setuju

APPENDIX 17
INTERVIEW GUIDANCE

1. Ceritakan kembali masalah yang ada pada soal tersebut?
2. Apa yang diketahui pada soal?
3. Apa yang ditanyakan pada soal?
4. Apa hubungan antara informasi-informasi yang terdapat pada soal?
5. Apa hubungan antara yang diketahui dan yang ditanya?
6. Apakah informasi tersebut cukup untuk menyelesaikan masalah? Jika tidak, apa yang kurang?
7. Apakah semua informasi pada soal berkaitan dengan apa yang ditanyakan?
8. Kesimpulan apa yang kamu dapatkan dari informasi pada soal?
9. Jawaban apa yang terpikirkan berdasarkan masalah yang ada?Apakah ada penambahan atau pengurangan kuantitas?
10. Ide/strategi (awal) apa yang terpikir untuk menyelesaikan permasalahan yang ada? Apakah kamu pernah menyelesaikan soal serupa sebelumnya?
11. Kesimpulan akhir apa yang kamu dapatkan setelah menyelesaikan masalah tersebut?
12. Apakah kamu yakin bahwa pemahamanmu mengenai soal tersebut benar?
13. Apakah kamu menghubungkan informasi-informasi pada soal dengan tepat? Apakah hubungan itu masuk akal?

14. Apakah kamu yakin bahwa beberapa informasi tersebut benar-benar tidak berguna? Dan tidak ada hubungannya dengan yang ditanyakan?
15. Apakah kamu yakin dengan strategi yang kamu gunakan?
16. Sudah tepatkah langkah-langkah penyelesaian tersebut?
17. Apakah kamu yakin bahwa kesimpulan akhirmu benar?
18. Jelaskan apa yang menjadi masalah pada soal!
19. Bagaimana kamu bisa mengatakan bahwa hubungan yang terbentuk adalah demikian (seperti yang kamu katakan)?
20. Mengapa beberapa informasi tersebut tidak penting atau tidak relevan?
21. Jelaskan langkah-langkah strategi apa yang kamu gunakan untuk menyelesaikan masalah pada soal? Mengapa kamu berpikir bahwa (strategi) itu bisa digunakan?Atau mengapa kamu memutuskan untuk menggunakannya?
22. Bagaimana kamu bisa menyimpulkan demikian?
23. Apakah kamu yakin bahwa tidak ada informasi yang terlewat? Dan mencoba memeriksanya?
24. Apakah kamu memeriksa hubungan pernyataan-pernyataan atau informasi-informasi pada soal?
25. Apakah kamu mengecek kembali setiap langkah yang kamu gunakan untuk menyelesaikan masalah tersebut?
26. Apakah kamu melihat kembali dan meninjau kesimpulan atau solusi yang kamu dapatkan untuk memastikannya benar?

APPENDIX 18
SR'S MFFT RESULT

Name : Friska Mei Maghfiroh

Class : VII - 8 /08

No.	Item (Figure)	Time (seconds)	Answer(s)								Frequency of errors
			1	2	3	4	5	6	7	8	
1.	Ship	59 dtk	G								0
2.	Telephone	1.00 mnt	H								0
3.	Bird	53 dtk	D								0
4.	Man	1.09	A								0
5.	Lion	1.00	E	B							1
6.	Apple	33	E								0
7.	Pen	43	B								0
8.	Shoe	1.11	E	D							1
9.	Fish	51	F								0
10.	Watch	1.39	C								0
11.	Bottle	1.00	G								0
12.	Tree	2.02	A								0
13.	Car	45	F								0
14.	Map	02.02	C								0
15.	Face	1.13	H	D							1
16.	Hair brush	1.01	A								0
17.	Camera	1.01	G								0
18.	Flower	1.18	H								0
19	Spider	1.02	D								0
20.	Television	1.35	E								0
Total		t = 1.577									f = 3

APPENDIX 19
SI'S MFFT RESULT

Name : Yuçida Petrie P

Class : 78

No.	Item (Figure)	Time (seconds)	Answer(s)								Frequency of errors
			1	2	3	4	5	6	7	8	
1.	Ship	18	F	G							1
2.	Telephone	39	D	H							1
3.	Bird	29	D								0
4.	Man	31	A								0
5.	Lion	25	B								0
6.	Apple	8	E								0
7.	Pen	30	H	B							1
8.	Shoe	32	D								0
9.	Fish	15	C	A	F						2
10.	Watch	21	A	B	F	C					3
11.	Bottle	35	F	G							1
12.	Tree	93	A								0
13.	Car	29	C	F							1
14.	Map	31	A	C							1
15.	Face	19	B	D							1
16.	Hair brush	29	C	A							1
17.	Camera	17	D	C	G						2
18.	Flower	27	E	G	H						2
19	Spider	30	B	D							1
20.	Television	99	C	E							1
Total		$t = 5.49$									$f = 19$

APPENDIX 20
SR'S TEST RESULT

Nama : Frisca Mei M
kelas : VII-B /08

diket : Renovasi balai desa direncanakan pada tanggal 10 Agustus
- di mulai pada bulan 1 mei
- dengan 7 pekerja

1\.
- Setelah 2 minggu pekerjaan terhenti 11 hari
- harus di selesaikan dalam waktu 102 hari

(Mei 31 hari, Juni 30 hari, Juli 31 hari, Agustus 10 hari)

dit : apa yang harus dilakukan kepala desa agar renovasi selesai tepat waktu

dij : 102 hari
14
———
88
11 → terhenti
———
77 → tersisa 77 hari

7 → 102
x → 77

$= \frac{7}{x} \times \frac{77}{102}$

$x = \frac{7 \times 77}{102}$

$\frac{539}{102} = 5,28 = 5$ pekerja

Jadi, yang harus dilakukan oleh kepala desa adalah menambah 5 pekerja lagi dan menjadi 12 pekerja agar renovasi selesai tepat waktu

2.

Diket 1 bungkus agar** coklat
4 gelas air
6 sdm gula
6 sdm susu kental manis
$\frac{1}{2}$ sdt garam

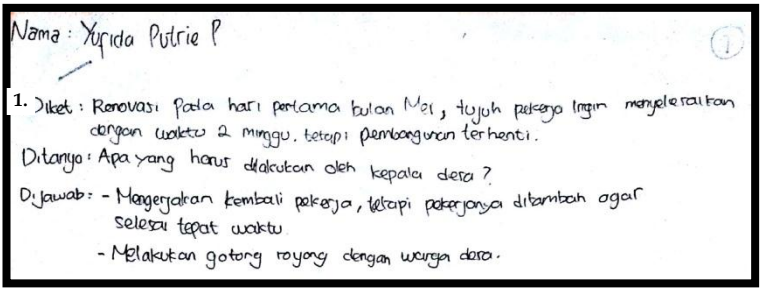
= 5 cup 450 ml
5 cup 450 ml : 15 cup 150 ml
= 60 : 15
= 4

1 bungkus x4 = 4 bungkus agar** coklat
4 gelas air x4 = 16 gelas air
6 sdm gula x4 = 24 sdm gula
6 sdm susu x4 = 24 sdm susu kental manis
$\frac{1}{2}$ sdt garam x4 = 2 sdt garam

= dijawab

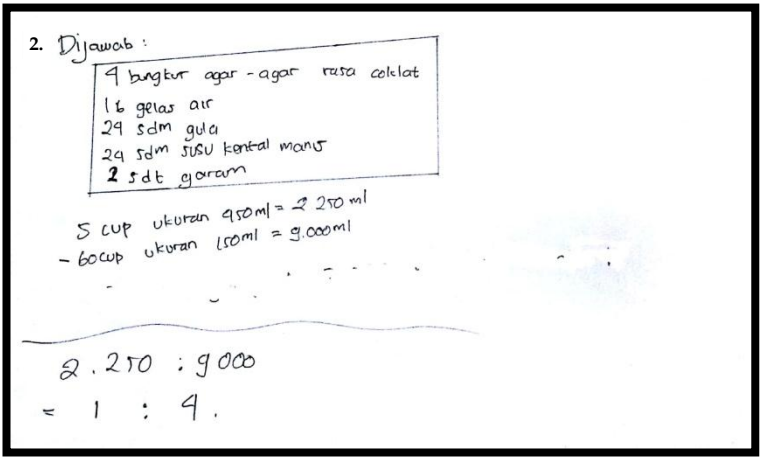
Jadi komposisi untuk membuat 60 cup 150 ml
adalah : 4 bungkus agar** coklat
16 gelas air
24 sdm gula
24 sdm susu kental manis
2 sdt garam

APPENDIX 21
SI'S TEST RESULT



Nama : Yufida Putrie P

1. Diket : Renovasi pada hari pertama bulan Mei, tujuh pekerja ingin menyelesaikan dengan waktu 2 minggu. tetapi pembangunan terhenti.
Ditanya : Apa yang harus dilakukan oleh kepala desa ?
Dijawab : - Mengerjakan kembali pekerja, tetapi pekerjanya ditambah agar selesai tepat waktu
- Melakukan gotong royong dengan warga desa.



2. Dijawab :

4 bungkus agar - agar rasa coklat
16 gelas air
24 sdm gula
24 sdm susu kental manis
2 sdt garam

5 cup ukuran 450ml = 2.250 ml
- 60 cup ukuran 150ml = 9.000 ml

2.250 : 9000
= 1 : 4.

APPENDIX 22
SR'S INTERVIEW RESULT FOR PROBLEM 1

Label	*Transkrip*	*Kode*
R1-01W	*Coba dibaca ulang soalnya.*	
SR1-01W	*Sudah.*	
R1-02W	*Sekarang coba ceritakan kembali menggunakan bahasamu sendiri apa yang sebenarnya ada pada soal tersebut.*	
SR1-02W	*Ceritanya itu kan ada renovasi balai desa. Waktunya itu kalo nggak salah 102 hari. Dari bulan Mei, Juni, Juli, sampai Agustus. Mei itu kan 31 hari, Juni 30, Juli 31, sama Agustus 10 hari. Jadi ini kan ditanyakan apa yang harus dilakukan kepala desa untuk selesai tepat waktu. Jadi ini nanti dihitung harinya agar bisa tau berapa jumlah pekerja yang ditambahkan supaya selesai tepat waktu.*	IT02 AN01
R1-03W	*Yakin soalnya kayak gitu? Kemaren baca soal berapa kali sampe paham maksudnya?*	
SR1-03W	*3 kali.*	EV01
R1-04W	*Dibaca semua atau informasi-informasi penting aja?*	
SR1-04W	*Yang ini kayak tanggal-tanggalnya, terus yang ditanyakan.*	EV01
R1-05W	*Kalimat ini paham ya? "Dua minggu setelah pengerjaan, pembangunan terhenti selama 11 hari." Maksud kalimatnya gimana?*	
SR1-05W	*Oh iya. Ini terhenti 11 hari, jadi nanti dikurangi, 102 hari-11 hari. Jadi total 102 hari. Udah dikerjakan 14 hari , terus terhenti 11 hari. Jadi totalnya itu 77. Jadi selesainya nggak tepat waktu. Harus menambah pekerja sehingga selesai sesuai yang ditargetkan.*	AN02 IF03
R1-06W	*Jadi masalah itu muncul karena ada apa?*	

Label	*Transkrip*	*Kode*
SR1-06W	*Terhenti selama 11 hari.*	
R1-07W	*Misal nggak terhenti. Setelah dikerjakan selama 14 hari, sisanya x hari. Nah untuk mengerjakan x hari itu butuh berapa pekerja? Pekerjanya tetep, nambah, atau berkurang?*	
SR1-07W	*Tetep.*	
R1-08W	*Apa aja yang diketahui?*	
SR1-08W	*Yang diketahui itu ada 7 pekerja, harus diselesaikan dalam 102 hari, sudah dikerjakan selama 2 minggu, terhenti selama 11 hari. Terus yang ditanyakan itu apa yang harus dilakukan supaya selesai dalam 102 hari ini.*	IT01
R1-09W	*Informasinya sudah kamu sebutin semua? Yakin nggak ada yang terlewat?*	
SR1-09W	*Yakin, nggak.*	SL01
R1-10W	*Hubungan dari poin 1, 2, dan 4? Apa yang bisa kamu dapatkan dari informasi-informasi itu?*	
SR1-10W	*Ini kan target penyelesaian (menunjuk pada poin 1 dan 2), sedangkan ini waktu pengerjaannya (menunjuk pada poin 4). Pekerjaannya 102 hari, udah dikerjain 2 minggu, terus terhenti selama 11 hari. Sebelas hari ini kan harusnya buat dikerjakan, tapi terhenti.*	AN02 EX01
R1-11W	*Terus 7 pekerja ini adalah pekerja untuk apa? (merujuk pada poin 3)*	
SR1-11W	*Untuk mengerjakan renovasi balai desa dengan 102 hari.*	
R1-12W	*Kemaren waktu ngerjain, setelah nulis diketahui dan ditanya, kamu koreksi lagi nggak?*	
SR1-12W	*Enggak.*	
R1-13W	*Kenapa enggak? Kenapa kamu yakin itu bener?*	
SR1-13W	*Soalnya tiap nulis satu poin, lihat soal lagi.*	EV01 SL01
R1-14W	*Jadi dari informasi yang diketahui, menurut kamu sudah cukup atau belum untuk menjawab*	

Label	*Transkrip*	*Kode*
	apa yang ditanya?	
SR1-14W	*Udah.*	
R1-15W	*Sekarang dibalik, informasinya berlebihan nggak? Ada informasi yang nggak penting nggak? Yang nggak berhubungan sama yang ditanyakan?*	
SR1-15W	*Nggak ada, Kak. Semuanya penting.*	IF01
R1-16W	*Jawaban di awal, sebelum ngitung, apa yang terlintas di pikiran kamu? Apa dugaanmu?*	
SR1-16W	*Waktu itu tak pikir nggak ada hitung-hitungan. Cuma apa yang harus dilakukan (oleh kepala desa). Jadi waktu itu mau cuma jawab nambah pekerja aja soalnya waktunya (waktu renovasi) nggak cukup.*	IF02
R1-17W	*Nah kemudian kenapa kamu memutuskan untuk melakukan penghitungan ini, padahal sebetulnya ngga ditanyakan.*	
SR1-17W	*Kalo misalnya nggak dihitung, nanti kan bisa aja kurang, bisa aja kelebihan.*	EV01
R1-18W	*Ini kan konsep perbandingan, ada strategi lain nggak buat menyelesaikan soal?*	
SR1-18W	*Nggak ada. Yang terpikirkan cuman ini.*	
R1-19W	*Terus kenapa kamu yakin kalo strategi ini bisa untuk (mencari pekerja yang dibutuhkan) menyelesaikan masalah ini?*	
SR1-19W	*Udah diajarin. Udah dapet dari pengalaman sebelumnya.*	AN03
R1-20W	*Ini perbandingan senilai atau berbalik nilai?*	
SR1-20W	*Berbalik nilai karena ini kan harinya menurun tapi pekerjanya meningkat.*	EX01
R1-21W	*Sebelumnya pernah menyelesaikan soal yang kayak gini?*	
SR1-21W	*Pernah. Caranya juga pakai cara kayak gini. (menunjuk pada langkah penyelesaian perbandingan berbalik nilai yang ia tuliskan di*	

Label	*Transkrip*	*Kode*
	kertas)	
R1-22W	*Coba jelaskan langkah-langkah yang kamu tulis.*	
SR1-22W	*Ini 7 pekerja menyelesaikan dalam 102 hari. Ini harus diselesaikan dalam 77 hari karena terhenti dan udah diselesaikan selama 2 minggu. Kita kan nyari pekerjanya, jadi ini pekerja awal sama pekerja yang belum diketahui dikali jumlah hari yang tersisa sama hari yang udah ditargetkan. Terus untuk nyari pekerja yang belum diketahui itu pekerja yang tetap dikali sama sisa harinya dibagi total yang ditargetkan. Akhirnya dapet 5,28 pekerja, dibulatkan jadi 5 pekerja.*	EX02
R1-23W	*Kalo ini dicek lagi per langkah?*	
SR1-23W	*Iya, waktu pembagian.*	EV02
R1-24W	*Seberapa yakin kalo jawabanmu bener?*	
SR1-24W	*Yakin. Udah ngitung beberapa kali soalnya.*	EV02
R1-25W	*Kesimpulan apa yang bisa kamu tarik sebagai jawaban dari soal itu?*	
SR1-25W	*Bahwa 5,28 pekerja ini bisa menyelesaikan renovasi balai desa dalam waktu 77 hari. Yang harus dilakukan kepala desa adalah menambah pekerja sebanyak 5.*	EX01
R1-26W	*Yakin dengan jawabanmu?*	
SR1-26W	*Yakin sih, Kak. Yakin.*	EV01
R1-27W	*Kemaren sebelum lanjut ke soal no. 2, kamu mikir nggak ini masuk akal nggak kalo nambah 5 pekerja?*	
SR1-27W	*Iya mikir kayak gitu. Masuk akal.*	EV01
R1-28W	*Ini 5 pekerja yang harus ditambahkan atau apa 5 pekerja untuk menyelesaikan dalam 77 hari?*	
SR-128W	*Lima pekerja untuk menyelesaikan dalam 77 hari. Jadi 7 pekerja ditambah 5 pekerja.*	EX01
R1-29W	*Tujuh pekerja untuk 102 hari, x pekerja untuk 77 hari.Berarti ini pekerja untuk 77 hari, gitu dong?*	

Label	*Transkrip*	*Kode*
	Karena x itu adalah total pekerja untuk 77 hari. Berarti 5 pekerja adalah total pekerja, bukan tambahan pekerja. Gimana?	
SR-129W	*Tapi waktu itu yang terlintas pengen nyari tambahan.*	
R1-30W	*Kalo sekarang mikirnya gimana? "Oh, aku salah atau aku tetep bertahan dengan jawabanku?"*	
SR1-30W	*Salah. (sambil tertawa kecil)*	SL02

APPENDIX 23
SR'S INTERVIEW RESULT FOR PROBLEM 2

Label	*Transkrip*	*Kode*
R2-01W	*Dibaca ulang. Coba ceritakan kembali.*	
SR2-01W	*Ini kan ada resep buat 5 puding ukuran 450 ml, terus itu ada orang yang pesan 60 cup puding ukuran 150 ml.*	IT02
R2-02W	*Sudah? Masalahnya dimana memangnya?*	
SR2-02W	*Menentukan komposisi bahan-bahan untuk 60 cup puding ukuran 150 ml.*	IT01
R2-03W	*Apakah akan berbeda dengan komposisi yang tertulis di soal?*	
SR2-03W	*Berbeda.*	IF02
R2-04W	*Tau darimana?*	
SR2-04W	*Ini 5 cup 450 ml itu sama dengan 15 cup 150 ml.*	IF03
R2-05W	*Kenapa kamu jadikan 150 ml?*	
SR2-05W	*Karena yang dipesen ukuran 150 ml.*	EX02
R2-06W	*Oke, kan kamu bilang kalau 5 cup 450 ml itu sama dengan 15 cup 450 ml. Berarti kalau 15 cup 150 ml itu komposisinya gimana?*	
SR2-06W	*Sama kayak ini (yang tertulis di soal).*	IF03
R2-07W	*Kenapa 5 cup 450 ml itu sama dengan 15 cup 450 ml?*	
SR2-07W	*450 ml dibagi 150 ml itu kan 3, terus 5 dikali 3 itu 15.*	EX02
R2-08W	*Kenapa kok nggak 5 dibagi 3, padahal 450 kamu bagi 3. Kok malah dikali, kenapa?*	
SR2-08W	*Soalnya ini perbandingan tak senilai (berbalik nilai).*	EX01
R2-09W	*Semakin besar cupnya, maka semakin?*	
SR2-09W	*Banyaknya puding semakin sedikit.*	EX01
R2-10W	*Informasi yang ada pada soal bermanfaat semua kah?*	

Label	*Transkrip*	*Kode*
SR2-10W	*Harganya.*	IF01
R2-11W	*Kenapa harganya?*	
SR2-11W	*Menurutku sih, nggak berpengaruh, Kak. Soalnya yang ditanyakan cuma komposisinya aja, nggak ditanyakan harganya.* *. . .* *Berarti harga jualnya nggak berpengaruh.*	AN02 IF01
R2-12W	*Dari awal kamu baca informasi tentang harga, tau nggak kalo informasi itu nggak bakal kamu pake?*	
SR2-12W	*Tau.*	IF01
R2-13W	*Di strategi penyelesaian masalah yang kamu tulis, aku nggak melihat konsep perbandingan. Sedangkan di no 1 dan 2 kamu pake perbandingan. Kenapa kok nggak pake strategi perbandingan? Kepikiran nggak?*	
SR2-13W	*Nggak kepikiran tentang (mengaplikasikan) konsep perbandingan.*	AN03
R2-14W	*Kenapa kok kamu cuman mengali dan membagi?*	
SR2-14W	*Karena aku bisanya pake cara itu. Soalnya ribet.*	AN03
R2-15W	*Langkah pertama, kamu merubah cup ukuran 450 ml menjadi 150 ml. Langkah kedua apa?*	
SR2-15W	*Jumlah pesanannya dibagi 15 cup.*	EX02
R2-16W	*Berarti dari ukuran cup, kemudian jumlah atau banyaknya cup puding?*	
SR2-16W	*Iya, baru nanti komposisinya dikali 4.*	EX02
R2-17W	*Dikali 4 dari?*	
SR2-17W	*Dari 60 dibagi 15.*	EX02
R2-18W	*Kenapa?*	
SR2-18W	*Soalnya 60 itu jumlah pesanannya, 15 itu (banyak puding yang bisa dibuat dengan) komposisi yang diketahui.*	EX03
R2-19W	*Kenapa kok nggak dibagi 4?*	
SR2-19W	*Soalnya jumlah pesanannya lebih banyak. Maka dikalikan 4.*	EX03

Label	*Transkrip*	*Kode*
R2-20W	*Sekarang pertanyaannya kenapa kok nggak ditambah 4? Ketika ditambah 4, jumlah pesanannya juga lebih banyak kan?*	
SR2-20W	*Kalo ditambah 4 itu untuk kasus jika ada yang kurang. Kalau untuk menentukan komposisi baru, maka dikali. Kalo ditambah 4, komposisinya nggak sesuai. Nggak jadi.*	AN02 EX03
R2-21W	*Oke, kan kamu tadi mengubah ukuran cupnya dulu baru menghitung jumlahnya? Bisa nggak kalau langkah-langkahnya dibalik?*	
SR2-21W	*Nggak bisa. (Mulai menghitung). . . .* *Tarnyata bisa, hasilnya sama.*	EV02
R2-22W	*No 3 ini kan double, ukuran cup yang diminta semakin kecil tapi jumlah yang dipesan semakin banyak. Kamu di awal bisa memprediksi nggak bahwa komposisi yang baru akan lebih banyak atau lebih sedikit dari komposisi semula.*	
SR2-22W	*Kepikiran gitu. Komposisi yang baru akan lebih banyak.*	IF02
R2-23W	*Kenapa? Padahal ukurannya lebih kecil.*	
SR2-23W	*Soalnya kalo dijadikan 150 ml, jumlahnya lebih banyak. Aku lihat dari hitunganku ini, Kak. Kalau 450 ml bisa jadi 5 cup, sedangakan untuk cup 150 ml bisa jam 15. Jadi nanti seterusnya akan lebih banyak.*	IF02 IF03
R2-24W	*Sebelum ngitung itu, sudah bisa memprediksi.*	
SR2-24W	*Sudah kak, tapi pake logika, nggak bisa dijelasin.*	IF02 SL01
R2-25W	*Yakin ya?*	
SR2-25W	*Iya.*	EV01
R2-26W	*Berarti kesimpulannya apa?*	
SR2-26W	*Kesimpulannya itu komposisinya lebih banyak 4 kali.*	EX03

APPENDIX 24
SI'S INTERVIEW RESULT FOR PROBLEM 1

Label	*Transkrip*	*Kode*
R1-01W	*Coba dibaca ulang soal nomor satu dan dipahami lagi.*	
SI1-01W	*Ini kan yang ditanyain apa yang harus dilakukan oleh kepala desa jika menginginkan renovasi selesai tepat waktu.*	IT02
R1-02W	*Sekarang coba ceritakan kembali pakai bahasamu sendiri apa yang sebenarnya dimaksudkan pada soal. Masalah apa yang ada pada soal?*	
SI1-02W	*Kepala desa pengen merenovasi balai desanya. Pengennya itu selesai seminggu sebelum 17 agustus karena digunakan untuk perayaan hari kemerdekaan . Renovasi dimulai bulan Mei awal dan dikerjakan oleh 7 pekerja. Dua minggu setelah pengerjaan, pembangunan terhenti selama 11 hari. Apa yang harus dilakukan kepala desa agar renovasi selesai pas yang direncanakan.*	IT02
R1-03W	*Kalimat ini paham maksudnya? "Setelah 2 minggu pengerjaan, pembangunan terhenti selama 11 hari".*	
SI1-03W	*Berarti kan udah tinggal beberapa hari.*	AN01
R1-04W	*Yakin dengan pehamanmu yang kayak gitu? Berapa kali baca soal sampai kamu paham maksudnya soal?*	
SI1-04W	*Nggak tau, sering pokoknya.*	SL02
R1-05W	*Dibaca semua gitu dari awal sampai akhir?*	
SI1-05W	*Iya.*	SL02
RI-06W	*Coba sebutkan apa yang diketahui dan ditanya.*	
SI1-06W	*Diketahui balai desa direnovasi hari pertama bulan Mei. Terus ada 7 orang pekerja yang mengerjakan balai desa tersebut. Dua minggu setelah pengerjaan, pembangunan terhenti 11 hari.*	IT01

Label	*Transkrip*	*Kode*
R1-07W	*Sudah? Cuman tiga itu aja? Yakin?*	
SI1-07W	*Iya.*	SL02
R1-08W	*"Direncanakan selesai seminggu sebelum 17 Agustus", kemudian ada kalimat "Renovasi dimulai pada awal bulan Mei". Nah, dua kalimat itu hubungannya apa sebenernya?.*	
SI1-08W	*Itu jangka waktu selesainya.*	AN02
R1-09W	*Berapa hari?*	
SI1-09W	*Lima minggu berarti.* *Iya, Kak. Meinya 31, terus Agustusnya 10.* *Oh iya ya. Mei, Juni, Juli, Agustus.* *. . . (Dengan bimbingan)* *Eh 102.*	AN01 SL01
R1-10W	*Bener. Berarti normalnya kan 102 hari, rencananya. Di situ kendalanya apa?*	
SI1-10W	*Setelah 2 minggu pengerjaan, terhenti selama 11 hari.*	IT02
R1-11W	*Kalo kita hubungkan dengan informasi 102 hari apa berarti?*	
SI1-11W	*Berkurang. Tambah lama.*	AN02 IF03
R1-12W	*Yakin?*	
SI1-12W	*Terhenti. Tambah lama kan ya?*	IF03 EV01
R1-13W	*Jadi yang tambah lama apa?*	
SI1-13W	*Tambah lama harinya. Soalnya kan nggak ada yang kerja.*	IF03 EX03
R1-14W	*Jadi waktunya berkurang atau bertambah?*	
SI1-14W	*Berkurang aslinya. Kan pembangunan itu nggak bakal selesai-selesai kalo nggak dikerjakan selama 11 hari.*	IF03 EX03
R1-15W	*Oke. Apa hubungan antara informasi tujuh pekerja dan informasi hari? Ada hubungannya nggak dengan jangka waktu yang ada?*	
SI1-15W	*Tujuh pekerja ini kan bisa menyelesaikan selama*	AN02

Label	*Transkrip*	*Kode*
	102 (hari). 102 dikurangi 11, iya nggak sih? 91.	EV02
R1-16W	*Yakin kayak gini?*	
SI1-16W	*Kayaknya.*	EV02
R1-17W	*Dari informasi yang ada, sudah cukup belum untuk menentukan jawaban? Dari yang diketahui udah cukup belum untuk jawab yang ditanya? Atau sebenernya ada informasi yang hilang atau kurang yang dibutuhkan tapi tidak ada di soal?*	
SI1-17W	*Enggak deh kayaknya.*	IF01 EV01
R1-18W	*Cukup? Atau malah ada informasi yang nggak relevan? Jadi ada informasi yang berlebihan, nggak berhubungan tapi ada di soal.*	
SI1-18W	*Cuman mbuletin aja.*	IF01
R1-19W	*Tapi semuanya penting?*	
SI1-19W	*Lumayan.*	IF01 EV01
R1-20W	*Misalkan gini, kalo informasi 7 pekerja tak hilangkan, kamu masih bisa jawab soal nggak?*	
SI1-20W	*Nggak. Kan nggak tau yang ngerjain berapa.*	IF01
R1-21W	*Kalo kamu waktu di awal, setelah baca soal, apa yang kamu pikirkan sebagai jawaban? Dugaan apa?*	
SI1-21W	*Kemaren aku cuman mikir kayak gini. Tujuh pekerja bisa nyelesaikan beberapa hari dari ini (1 Mei) ke ini (10 Agustus). Tapi kena ini. Terus pokoknya dihitung berapa pekerja yang harus ditambah agar selesai tepat waktu karena udah kebuang selama 11 hari.*	IF02
R1-22W	*Tapi kenapa nggak dihitung?*	
SI1-22W	*Nah itu. Bingungi, Kak.*	IF02
R1-23W	*Apa karena soal cuman tanya apa yang harus dilakukan tanpa ada pertanyaan selanjutnya "berapa pekerja yang harus ditambahkan"? Jadi kamu cuman jawab apa yang harus dilakukan,*	

Label	*Transkrip*	*Kode*
	menambah pekerja. Gitu?	
SI1-23W	*Iya. (Ragu)*	IF02
R1-24W	*Tapi gimana kamu yakin bahwa ada pekerja yang harus ditambahkan agar selesai tepat waktu padahal kamu nggak tau pekerjanya berkurang atau bertambah? Atau mungkin kita nggak butuh tambahan pekerja untuk menyelesaikannya.*	
SI1-24W	*Pastinya kan butuh pekerja soalnya dari waktu yang ditargetkan, pembangunannya terhenti selama 11 hari. Artinya waktunya kebuang selama 11 hari. Nah kalo misal pekerjanya tetap 7 , pembangunannya nggak bakal selesai tepat waktu. Jadi kita pasti nambah pekerja.*	IF03 EX01
R1-25W	*Kamu punya estimasi ngga? Kira-kira berapa pekerja yang harus ditambahkan?*	
SI1-25W	*Emm... Gatau, 4 mungkin. Empat kalo nggak 5.*	IF02
R1-26W	*Oke, jangka waktu pengerjaan sudah kamu temukan saat ngerjain kemaren atau baru dapet ini?*	
SI1-26W	*Kemaren sudah mikir, tapi nggak sebanyak ini.*	
R1-27W	*Sebelumnya pernah ngerjain soal serupa? Soal yang mirip.*	
SI1-27W	*Nggak serumit ini.*	
R1-28W	*Terus kamu pake cara apa waktu itu?*	
SI1-28W	*Perbandingan berbalik nilai kan?* *Pas harinya turun, ininya (pekerjanya) tuh nambah.*	AN03 EV02 EX02
R1-29W	*Terus di sini nggak bisa diaplikasikan?*	
SI1-29W	*Bingungi, kak.*	
R1-30W	*Jadi kesimpulan apa yang bisa kamu dapatkan?*	
SI1-30W	*Kalo kepala desanya mau selesai tepat waktu, salah satu cara yang harus dilakukan adalah mempekerjakan kembali 7 pekerja tapi ditambah beberapa pekerja lain.*	EX01
R1-31W	*Berapa presentase keyakinanmu?*	

Label	*Transkrip*	*Kode*
SI1-31W	*50%an lah. Bingungin.*	EV01
R1-32W	*Nah kalo kamu lagi bingung kayak gini, apa yang kamu lakukan? Mengecek soalnya lagi kah? Mengecek diketahui dan ditanya lagi kah? Atau apa yang kamu cek?*	
SI1-32W	*Soalnya dulu.*	SL02

APPENDIX 25
SI'S INTERVIEW RESULT FOR PROBLEM 2

Label	*Transkrip*	*Kode*
R2-01W	*Coba ceritakan kembali.*	
SI2-01W	*Pokoknya yang diketahui ini kan resepnya -menunjuk resep pada soal- untuk 5 puding ukuran cup 450 ml. Sedangkan yang dibutuhin 60 puding ukuran cup 150 ml.*	IT02
R2-02W	*Jadi apa aja yang diketahui?*	
SI2-02W	*Ya kita butuhkan 60 cup puding berukuran 150 ml dengan harga Rp 2.500 per cup. Berapa resepnya (komposisinya). Dari resep ini berapa yang dihasilkan. Dijual dengan harga Rp 7.000. Terus yang kita butuhin segini dengan harga segitu. Ya pokoknya gitu.*	IT01
R2-03W	*Oke. Dari soal ada yang dibingungin nggak?*	
SI2-03W	*Fungsi dari harganya.*	AN02 IF01
R2-04W	*Ketika kamu baca dan ingin memastikan pemahamanmu, kamu baca ulang semuanya atau cuman angka-angkanya?* *Misal nulis yang diketahui dan ditanya, kamu cek tiap poinnya atau nulis semua dulu baru dicek?*	
SI2-04W	*Intinya doang.* *Nulis semua dulu, baru dicek.*	SL01 SL02
R2-05W	*Ada cara lain nggak? Kepikirang nggak?*	
SI2-05W	*Enggak, soalnya bingung. Ukuran cupnya beda. Pokoknya kemaren mikir resep ini berapa ml dan yang kita butuhkan berapa ml.*	AN03 EX01
R2-06W	*Nggak ada hubungannya sama harga?*	
SI2-06W	*Enggak, menurutku.*	AN02 IF01 EX03

Label	*Transkrip*	*Kode*
R2-07W	*Coba kita lihat jawabanmu. Pada akhirnya komposisi yang dibutuhkan itu bertambah banyak atau sedikit dari komposisi awal?*	
SI2-07W	*Bertambah banyak.*	IF03
R2-08W	*Sebelum kamu ngitung totalnya, kepikiran nggak apakah bertambah banyak atau sedikit?*	
SI2-08W	*Bertambah banyak lah. Kan jumlahnya tambah banyak. Pokoknya pas dikaliin, bertambah banyak.*	IF03
R2-09W	*Berarti dugaanmu itu muncul setelah kamu menghitung totalnya?*	
SI2-09W	*Iyaa.*	IF02
R2-10W	*Kalo tepat setelah baca, sudah kepikiran nggak?*	
SI2-10W	*Waktu itu kepikirannya banyak yang komposisi awal karena cupnya ukuran 450 ml, tapi setelah ngitung ternyata banyak komposisi yang baru karena 60 cup puding.*	IF02
R2-11W	*Kalo soal sejenis ini, pernah nemuin nggak?*	
SI2-11W	*Enggak.*	AN03
R2-12W	*Makanya kamu nggak pake konsep perbandingan?*	
SI2-12W	*Iyaa.*	AN03
R2-13W	*Empat di sini artinya apa?*	
SI2-13W	*Empat kali lipat.*	EX02
R2-14W	*Kok nggak ditambah 4.*	
SI2-14W	*Nanti beda, komposisinya.*	EX02
R2-15W	*Kalo dikali empat kan nanti juga beda?*	
SI2-15W	*Tapi nggak merubah resepnya.*	EX02
R2-16W	*Dari 2 soal, mana yang kamu paling yakin bener?*	
SI2-16W	*No 2. Soalnya yang no 1, tak kira matematika, lha kok komentar.*	EV01
R2-17W	*Kamu cek lagi nggak? Kira-kira masuk akal nggak ya?*	
SI2-17W	*Iyaa, mikir lagi dan masuk akal.*	EV02 SL02

APPENDIX 26
VALIDATOR FOR INSTRUMENTS

KEMENTERIAN RISET, TEKNOLOGI DAN PENDIDIKAN TINGGI
UNIVERSITAS NEGERI SURABAYA
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
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Surabaya, 07 Maret 2018

Yth. Abdul Haris Rosyidi, M.Pd.
di tempat

Bersama ini kami mohon kesediaan Bapak untuk menjadi validator instrumen penelitian, dalam rangka penelitian skripsi mahasiswa berikut:

Nama : Nindya Waspaning Dyah
NIM : 14030174103
Judul Skripsi : Critical Thinking Processes of High School Students in Solving Contextual Problem of Direct and Inverse Proportions Based on Reflective-Impulsive Style

Terlampir kami sertakan instrumen yang akan divalidasi dan lembar validasi yang harus diisi. Atas bantuan dan kerja sama Bapak, kami berterima kasih.

Mengetahui,
Kaprodi Pendidikan Matematika,

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APPENDIX 27
DOCUMENTATION

Interviewing Reflective Subject

Interviewing Impulsive Subject

Giving MFFT (Section 1)

Giving MFFT (Section 2)

Giving MFFT (Section 1)

Giving MFFT (Section 2)

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