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Creative thinking profile of students in the completion of the area of 2D-shapes reviewed from the type of personality of Myer-Briggs dimension

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Abstract. Creativity is a 21st Century skill that is needed by everyone. Creativity is born from the ability to think creatively. But, no one has connected creativity with personality. Personality The Myer Briggs' dimension consists of 4 types of guardians personality students like coherent and systematic learning. Artisans' students like active learning. Rationals students love the knowledge that uses logic. This study aims to determine students' creative thinking abilities in solving mathematical problems in terms of the personality type dimensions of Myer-Briggs. The method used in this research is to use qualitative methods. Data collection was carried out in three stages, using questionnaires, written tests, and interviews. The survey was distributed throughout grade VII, and then one student was taken from each personality. The results showed the Guardian subject solves mathematical problems by arranging one or two ways, and the resulting method is fluent and flexible. Artisan's subject solves mathematical problems by arranging one or two ways, and the resulting method is fluent and flexible, but still, there are misconceptions. Rational and Idealist subject solves mathematical problems by arranging one or two ways, the resulting method is fluent and flexible, but some answers are not new.

1. Introduction

The era of the industrial revolution 4.0 is an era where the quality of human resources is needed in everyday life. The challenges faced in the age of the industrial revolution are improving the quality of human resources who can compete in that era and the need to strengthen the nation's character [1]. In the period of the industrial revolution 4.0 had several challenges, namely: 1) information technology security targeting the world of education; 2) the reliability and stability of increasingly sophisticated production machines; 3) lack of adequate skills; 4) there will be a loss of automation work; 5) the use of increasingly sophisticated technology; 6) curriculum changes, method models, strategies, approaches, and teachers in learning that reinforce new uneven literacy. The development of the industrial revolution era 4.0 is marked by the development of digital technology, artificial intelligence, big data, robotic [2]. The rapid growth of technology for the past two decades has dramatically influenced the mathematic learning system [3].

In the era of the industrial revolution, 4.0 mathematical skills are needed to develop student character, which is often referred to as 4C (Communication, Collaboration, Critical Thinking, and Problem Solving, Creativity, and Innovation). Student character development which is commonly referred to as

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4C as follows: Communication is learning that can not be separated from the form of communication between students and students, students and teachers, which includes, elaboration of what concepts are learned, an explanation of arguments or opinions in solving a mathematical problem, proof which is logical towards solving a problem. Collaboration is student learning always packaged in groups. Critical thinking and problem-solving are the formation of critical thinking skills, creative and innovative, as well as the ability to solve problems [4]. Mathematical problems can be related to issues in everyday life. Creativity and innovation are the formations of a creative and innovative mindset. Students will get used to thinking to solve a problem [5]. An act of creative thinking can occur if the thinker reaches a sudden conclusion that is new to him, which can be artistic, mechanical, or administrative production. Productive thinking can occur or be owned by anyone, even though what has been produced by someone else [6].

In everyday life, related to solving mathematical problems poured in the form of flat wake problems. Mathematical thinking is essential for teaching mathematics. The thinking process is an activity occurring in the human brain [7]. The plane shape material is sturdy for students to understand, primarily material about the plane area of a combination of plane shape. The plane shape material is challenging for students to understand, mostly substantial about the plane area of a mix of plane shape. Finding area or circumference without understanding how the area or circumference formula is obtained, which causes a lack of student knowledge about concepts and procedures in solving problems about the plane area [8]. Issues are things that students encounter in learning. One crucial aspect that needs to be known by the teacher in the success of education is to understand the students' ability to solve a problem [7].

Based on the results of observations and interviews with one of the mathematics subjects in SMP N 8 Semarang, students often experience difficulties in solving mathematical problems. Students tend to use formulas or by using quick methods rather than using procedural steps for accurate completion. In the process of learning mathematics, students must be guided and accustomed to doing activities in finding and gaining understanding. Student-centered learning will undoubtedly allow students to seek knowledge and solutions in working on a problem that can improve students' creative thinking abilities [9]. The ability to think creatively is something that is possessed from birth. Innovative thinking must be developed to have a great mindset [10]. Someone in facing the progress and development of the times needs the ability to think creatively. In the event of technology and information, it cannot be denied that it is the result of students' creative thinking abilities [11]. Mathematics is a science that is used as a tool to foster mathematical skills and student activity [12].

Researches related to mathematical creative thinking skills have been carried out. Silvana linked the ability to think creatively with anxiety [13]. Students with minimal anxiety can come up with better creative ideas. In contrast, Hasan saw students' creative thinking abilities form their adversity quotients [14]. Students who have more resilience to problems can show more effort to produce more answers. Of the two studies, no reserach links the ability to think creative mathematically with personality.

Personality comes from the English "personality." The figure is an intricate component of self-formation that consists of ego, personal unconscious, the collective unconscious. Personality is a unique adjustment to the environment determined by the dynamic organization of psychophysical systems in the individual. Isabel Brigg Myers and her mother, Katharine C. Briggs, developed a personality model based on Carl Jung's theory of 16 dimensions and taken four personality types from the combination of each of the four aspects. David Keirsey named the Keirsey temperament sorter (KTS). There are four personality types, namely, guardians' types like the traditional class model. Artisans' students are always active in all circumstances and still want to be considered by the teacher and his friends. Objective type students like explanations that were based on logic, and they can capture abstractions and material that requires high intellect. Idealists type students prefer to complete assignments individually rather than doing tasks in groups [15]. Based on this, researchers are interested in examining more deeply how students think creatively in solving a problem. Besides, researchers also want to explore whether personality factors influence the level of students' creative thinking abilities.

2. Methods

The research was conducted at SMP Negeri 8 Semarang in class VII students. This type of research is descriptive qualitative. Taking the subject using sampling techniques and using time triangulation. The instrument used by researchers was the Myer-Briggs dimension personality questionnaire, creative thinking tests, and interviews. The personality questionnaire used consisted of 70 items of a statement; the first thinking test consisted of 3 items. First, the researcher distributed 256 Myer-Briggs personality questionnaires to grade VII students. Each personality is taken one subject that represents that personality. In the second stage, the researcher gave a test of creative thinking to the chosen theme. And the next step in this researcher interviewed to believe the results that have been obtained.

3. Result and discussion

3.1. Student personality questionnaire

Determination of the subjects in this study was the first to distribute questionnaires to all class VII, which consisted of 256 students in SMP Negeri 8 Semarang. The questionnaire result was used as an initial stage to classify the personality into Guardians, Artisans, Rationals, and Idealists. Student's personality questionnaire results at SMP Negeri 8 Semarang can be seen in figure 1.

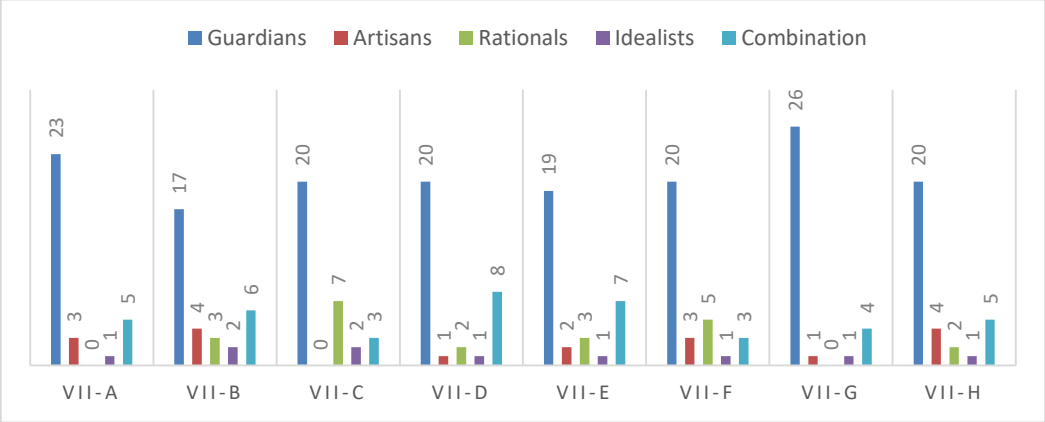

Figure 1. Student personality questionnaire results.

The percentage of personality results was made for each category with the results that can be seen in figure 2. Data is obtained that explains that the Guardian personality type is more dominant in SMP N 8 Semarang. That is because the teacher is more prevalent in teaching mathematics using a nice, ordered, and systematic way with conventional learning methods. Artisans' personality type is caused by a lack of dialogue between students who lack understanding and the teacher related to the lesson so that only students who master the material being taught can play an active role in the teaching and learning process.

In the Rational Personality type, this was caused by problems given by the teacher lacking variety, so students can work on the issue following the example problems that have been discussed. It causes students to have a low ability to solve problems using logic. In the Idealist personality type caused by the K13 curriculum, students are required to solve problems in groups. It causes students to prefer to resolve issues of discussion and lack of trust held to solve these problems individually.

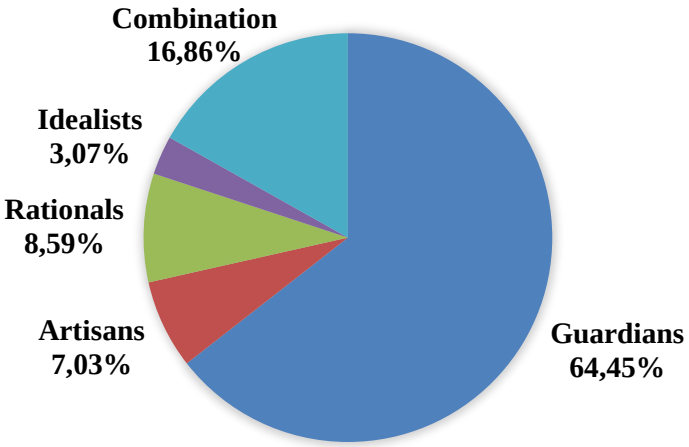

Figure 2. Personality percentage of middle school students.

3.2. Creative thinking test

Creative thinking is a mathematical ability that includes fluency, authenticity, and elaboration. Fluency is the ability students have to answer math problems correctly. Flexibility is the ability students have to solve mathematical problems in non-standard ways. Authenticity is the ability students have to answer mathematical questions using their ideas or their language. Elaboration is the ability of students to expand answers to mathematical problems and bring up new issues or new ideas [16]. The ability to think creatively is the ability to produce or develop something new from designs that have been provided by others [9]. Creative thinking, according to the Guardians, Artisans, Rationals, and Idealists personalities, namely:

3.2.1. Students with guardian personality. This Guardian type student likes traditional classes along with regular procedures. Students with this type prefer instructors by explaining the material clearly, giving real and precise instructions. Students are more likely to complete assignments on time because students choose to make plans before solving a problem. In this study, a researcher found something new, namely, in the first problem, students worked on the issues with a detailed and systematic formula, but students did not write down the description of the equation. Students write how to solve it by substituting what has been known in the problem. Subjects work with steps and calculations that are precise and sequential. If the matter has not found an idea to solve the problem, the issue will tend to be silent; after the view appears, the subject immediately works following what has been seen. Students are more likely to complete assignments on time because students prefer to make plans before solving a problem [15]. Based on the creative thinking solving problem and interview, the guardian students can only work on question number 1 by finding a new answer fluently, but not being able to come up with more than one alternative solution or not being able to come up with several unique ways. So students in working on question number 1 are categorized as having a level of creative thinking that is level 3, which means creative [17], shown in figure 3. In question number 2 and number 3, Guardian students can work on an interview a mathematical problem by having more than one answer. The resulting solution is an easy and flexible answer. So students in working on questions numbers 2 and 3 are categorized as having a level of creative thinking, which is level 4, which means very creative [17], shown in figure 4 and figure 5.

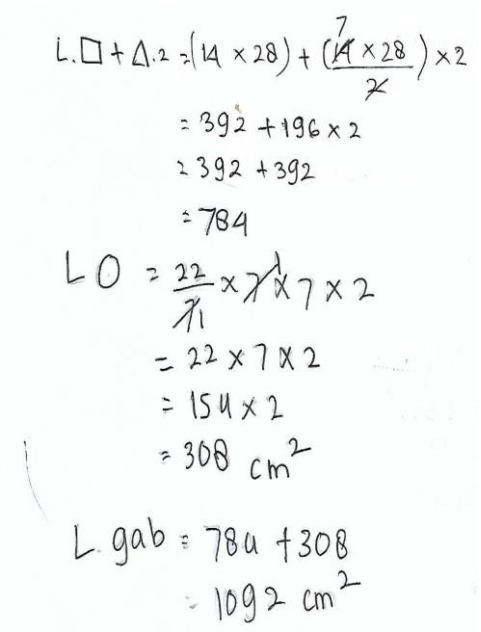

Figure 3. Guardian student answer number 1.

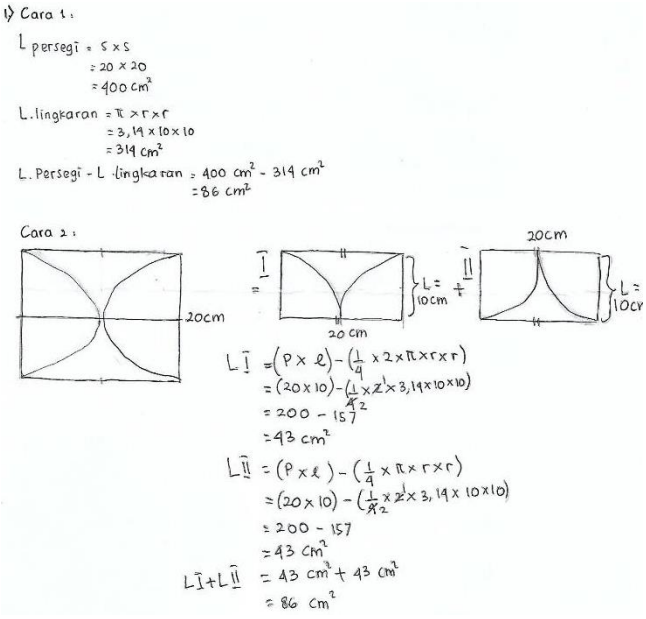

Figure 4. Guardian student answer number 2.

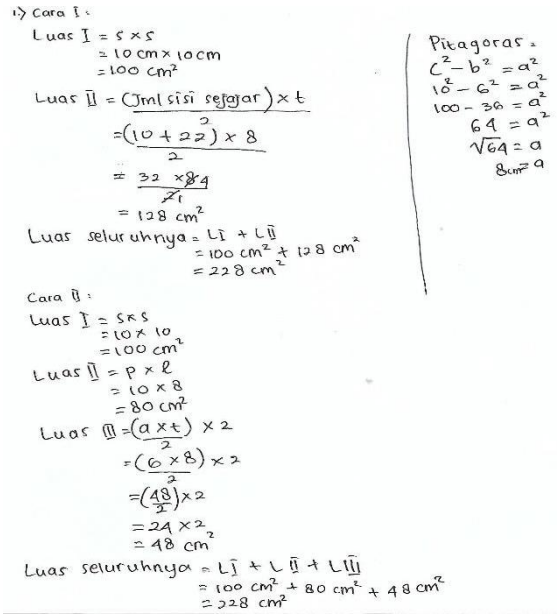

Figure 5. Guardian student answer number 3.

3.2.2. Students with artisan personality. Students with the type of Artisan prefer change do not like stability. Students with this type are always active wherever they are and still want to be the attention of everyone, both friends and teachers. The class form they like is classes that are demonstrations, presentations, and discussions because then students can show Artisan's abilities. In this study, researchers found something new, namely in the first problem, the students working on the difficulty experienced a concept error. They incorrectly substituted what was known in the issue. So it can be seen that these students do not like the concepts that have existed in mathematics learning, and it can be assumed these students do not like stability or hurry. Students in doing something want to be done in a hurry and get bored quickly in monotonous teaching techniques [18]. Based on the creative thinking

solving problem and interview, the Artisan students in question number 1 students experience errors in solving a problem caused by concepts related to the problem, not understood or remembered correctly. Then students are categorized as level 0 is not creative [16], shown in figure 6. In question number 2, Artisan students have the level 4 category or very creative because students work using two different shown in figure 7. In question number 3, Artisan student is fluent ti fid new answer but unable to come up with more than one alternative solution or unable to come up with several unique ways. So students in working on question number 3 have a level of creative thinking that is level 3, which means creative [17], shown in figure 8.

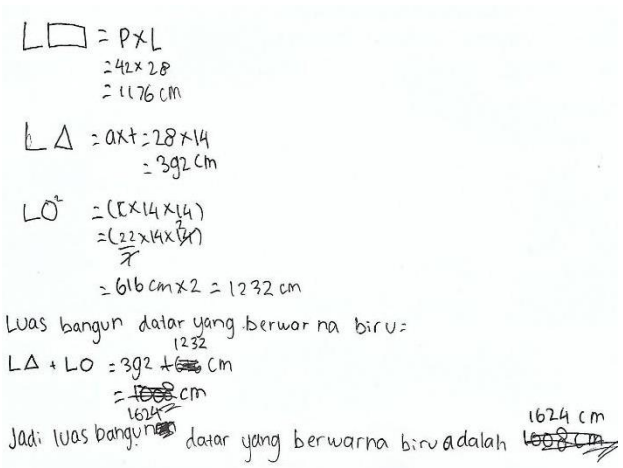

Figure 6. Artisan student answer number 1.

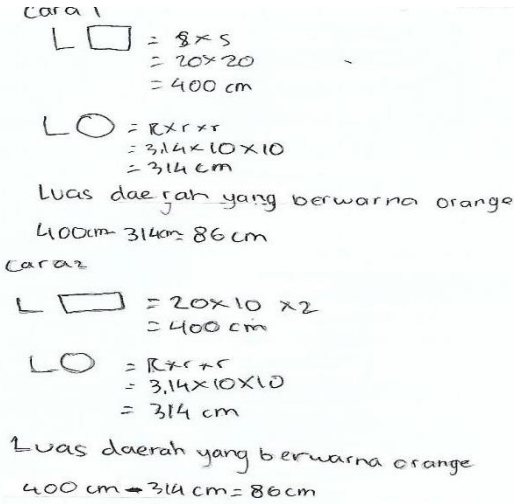

Figure 7. Artisan student answer number 2.

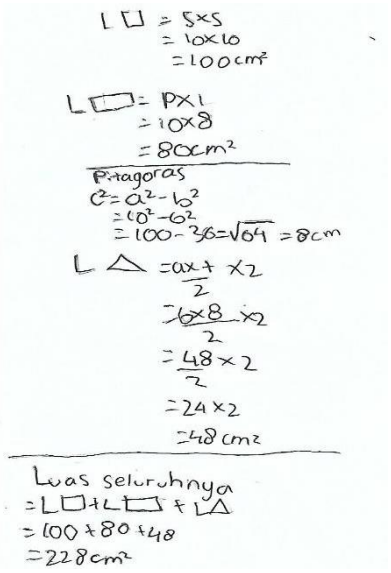

Figure 8. Artisan student answer number 3.

3.2.3. Students with Rational personality. Rational students like learning that is based on logic. Students catch the material faster, observe problems, students run the strategies given by the teacher systematically; students always look for additional equipment from various sources related to the content. Objective type students prefer giving individual assignments; the most preferred subjects are science, mathematics, philosophy. In this study, researchers found something new, namely a problem

presented by students able to solve using logic and strategies taught by the teacher systematically. So this student is categorized as having a rational personality. It is consistent with an expert that rational types like learning that was based on logic. Students catch the material faster, observe problems, students run the strategies given by the teacher systematically [18]. Based on the creative thinking solving problem and interview, the rational students in problem number 1 students can find a new answer, but unable to come up with more than one alternative solution or unable to come up with more than one alternative way of answering or unable to come up with several new ideas. Then the students are categorized as level 3, namely creative [17], shown in figure 9. In question number 2, students can devise different (flexible) ways to get different answers, even though the solutions are not new. Then the students are categorized as level 3, namely creative [17], shown in figure 10. In question number 3, students can solve a problem with more than one alternative answer or can come up with several new ways to find answers fluently and flexibly. Then the students are categorized as level 4 that is very creative [17], shown in figure 11.

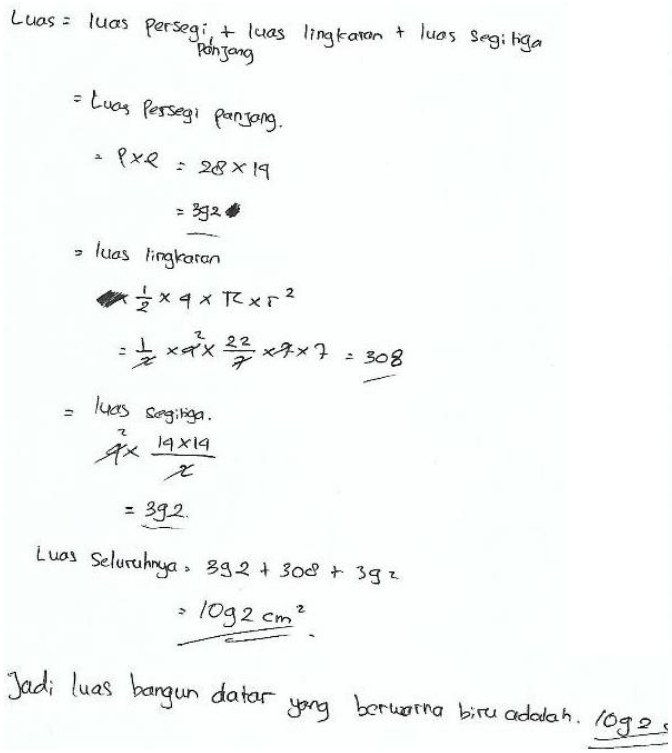

Figure 9. Rational student answer number 1.

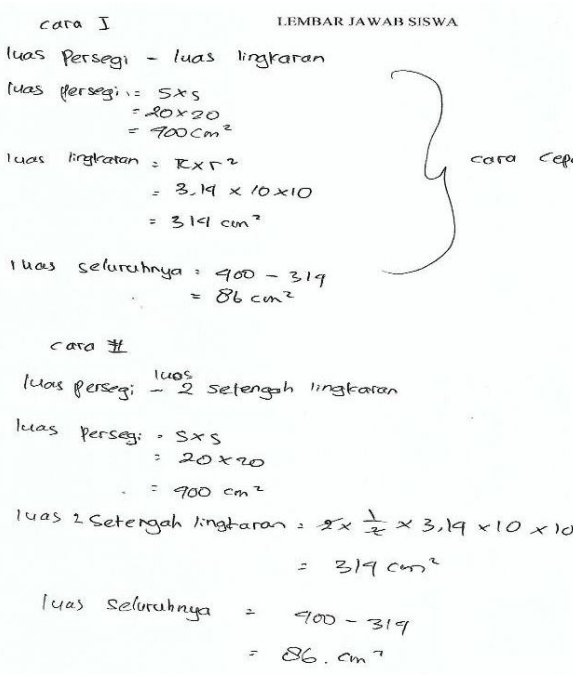

Figure 10. Rational student answer number 2.

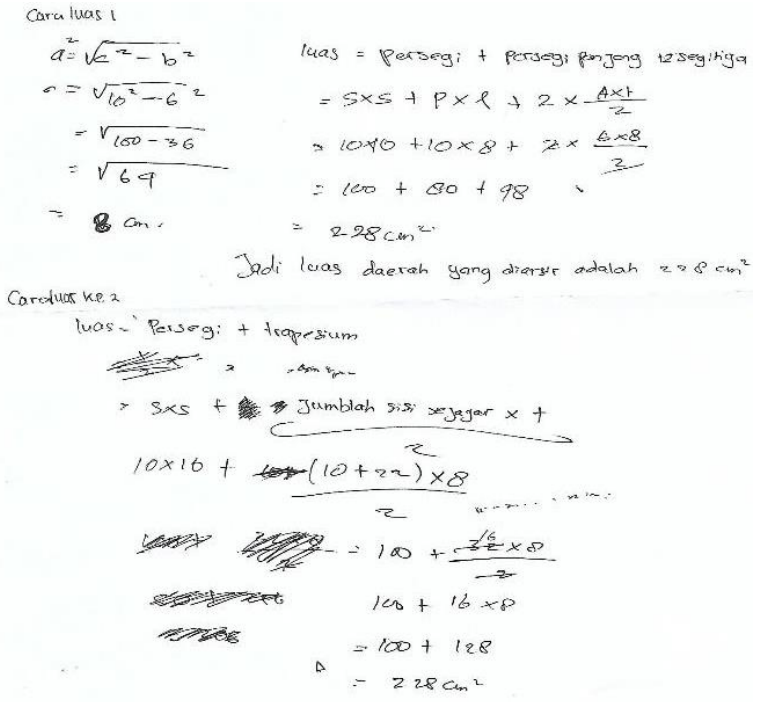

Figure 11. Rational student answer number 3.

3.2.4. Students with idealist personalities. Idealist types prefer material about ideas and values. Idealist students like to complete assignments individually rather than groups. Creativity is an essential part of an idealist because he prefers a small class where each member knows each other. In this study, researchers found something new, namely a problem given by these students make observations first before solving the given problem. Solving these problems, students have high confidence in what students do without regard to the opinions of others. It is supported by this student who has an elevated mind and spirit when solving problems. So students assume that the answer is the right answer [18]. Based on the creative thinking solving problem and interview, the Idealist student number 1 students can find an answer with new, but unable to come up with more than one alternative solution or unable to come up with more than one alternative way of explanation or unable to come up with several new techniques. Then the students are categorized as level 3, namely creative [17], shown in figure 12. In question number 2, students can devise different (flexible) ways to get different answers even though the solutions are not new. Then the students are categorized as level 3, namely creative [17], shown in figure 13. In problem number 3, students can solve a problem with more than one alternative answer or be able to come up with several new ways to find answers fluently and flexibly. Then the students are categorized as level 4 that is very creative [17], shown in figure 14.

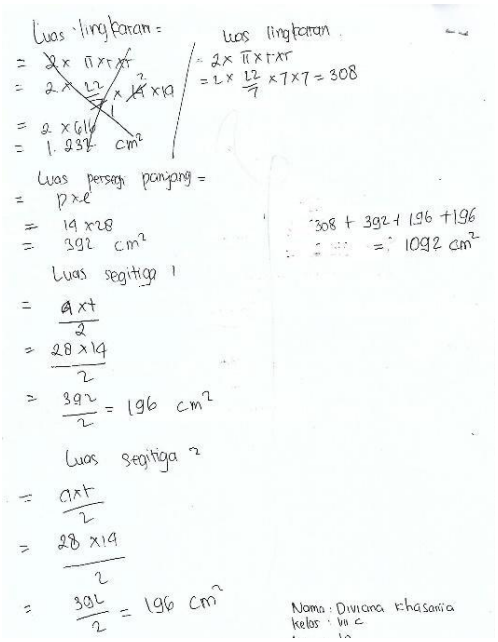

Figure 12. Idealist student answer number 1.

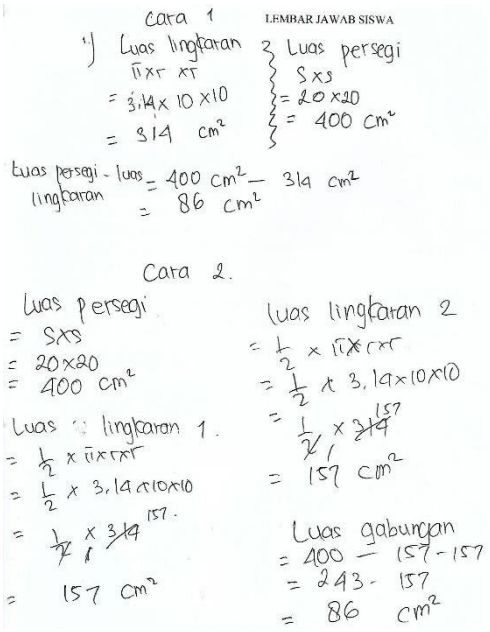

Figure 13. Idealist student answer number 2.

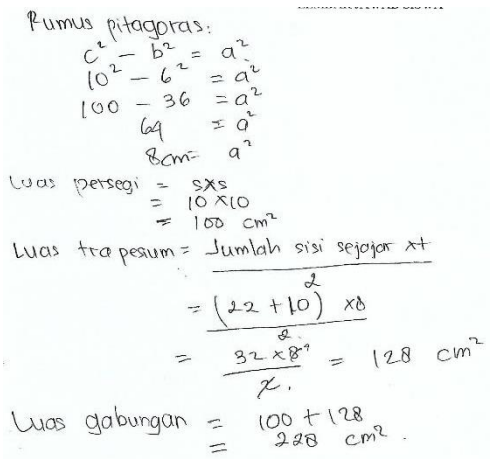

Figure 14. Idealist student answer number 3.

4. Conclusions

The results of the research and discussion conclude that: Based on the Myer-Briggs dimension personality questionnaire, 165 Guardian personality types were obtained with a percentage of 64.45%. It is caused by learning in the dominant school using this personality. Artisan's personality is 18 students, with a rate of 7.03%. It is caused by the lack of communication between students related to classroom learning. Rational personality numbered 22 students with a portion of 8.59%. It is caused by the problems given lacking variance. Idealist Personality is only ten students with a percentage of 3.90%. It is because the K13 curriculum is demanded to solve problems in groups. The profile of the Guardian subject solves mathematical problems by arranging one or two ways, and the resulting method is fluent and flexible. The issue worked on the problem in detail and systematically. So the subject of Guardian in question number 1 is categorized as level 3, namely creative. In questions number 2 and 3, level 4 is classified as being very creative. The profile of Artisan's subject solves mathematical problems by arranging one or two ways, the resulting method is fluent and flexible, but there are misconceptions

made by Artisan's subject. Students cause this tends to be in a hurry and get bored quickly in solving these problems. So the item Artisan in question number 1 is categorized as level 0, which is not creative. In question number 2, level 4 is classified as being very creative. In question number 3, level 3 is categorized as creative. The profile of the Rational subject solves mathematical problems by arranging one or two ways, the resulting method is fluent and flexible, but some answers are not new. That is caused by the Rational subject using his logic to solve the problem. So the Rational issue is number 1, and level 3 is categorized as creative. In question number 3, level 4 is classified as being very creative. Profiles of the Idealist subject solve mathematical problems by arranging one or two ways; the methods produced are fluent and flexible, but some answers are not new. So the Idealist subject in question number 1, 2 are categorized as level 3, namely creative. In question number 3, level 4 is classified as being very creative.

Based on the results of the research that has been obtained, the researchers advise the school should facilitate students in the Myer-Briggs dimension personality test to create teaching and learning activities that can be adjusted based on the personality of each student. We recommend that teachers often provide math problems that can develop creative thinking, and students are asked to do following the personality they have. So, it's not limited to the use of ways to solve mathematical problems; and 3) To the academic community, the need for further research on personality test personality dimensions Myer-Briggs.

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The 5th Seminar Nasional Matematika dan Pendidikan Matematika (SENATIK) 2020

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Preface

The fifth Seminar Nasional Matematika dan Pendidikan Matematika (SENATIK) was held by Mathematics Education Study Program, Universitas PGRI Semarang, Indonesia, in 2020. This seminar has objectives to improve mathematics teaching, to solve the mathematics problem, and to expand mathematics contribution to society.

Freedom learning is a new policy of the Ministry of Education and Culture of the Republic of Indonesia to improve the national education system that seems monotonous. Through freedom learning, it is expected that it can create happiness and a joyful learning atmosphere for both students and teachers. Learning activities will be effective if the learning atmosphere is enjoyable. By having a joyful learning environment and adequate learning facilities, students are expected to be able to construct knowledge and support in generating motivation to learn actively. Also, by giving freedom in carrying out learning through their learning will train and instill a democratic attitude for students and also shape students' creativity to explore their potential. As technology develops, teachers are expected to use technology for joyful learning. Through the integration of technology in the freedom of learning, it is expected that effective and efficient learning will be created. Therefore, teachers are required to be able to do innovative learning. In view of that, the Mathematics Education Study Program of Universitas PGRI Semarang invites researchers, practitioners, and educators to participate in and contribute to the fifth SENATIK 2020 under the theme "Freedom of Learning: Integration Technology in Mathematics Learning."

The keynote presentations are provided to show the contribution of mathematics educators in mathematics education towards research and knowledge sharing. We have three keynote speakers, that's are Prof. Dr. Ratu Ilma Indra Putri, M.Si. (Universitas Sriwijaya, Indonesia). Dr. Irwan Endrayanto Aluiciues, S.Si., M.Sc. (Universitas Gajah Mada, Indonesia), and Dr. Achmad Buchori, M.Pd. (Universitas PGRI Semarang, Indonesia). We also have two speakers in the workshop session that are Dr. Rully Charitas Indra Prahmana (Universitas Ahmad Dahlan, Indonesia) and Dr. Muhtarom (Universitas PGRI Semarang).

On this seminar implementation, from one hundred and thirty-one full paper registers, there are sixty-nine presenters declared to be qualified. Our wish all the participants would enjoy the seminar, so they involve valuable and rewarding, and improve the knowledge and experiences.

Publishing Team

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