

## Students' Ability to Understand Concepts in Solving Problems of Similarity and Congruence

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### Abstrak

Penelitian ini menggunakan pendekatan deskriptif kualitatif yang bertujuan untuk mengevaluasi kemampuan pemahaman konsep siswa dalam menyelesaikan soal-soal mengenai kesebangunan dan kekongruenan di SMP Negeri Oelneke. Subjek dalam penelitian ini adalah siswa kelas IX. Hasil dari tes kemampuan pemahaman konsep menunjukkan bahwa 29,4% peserta didik berada pada kategori kemampuan rendah, 41,1% pada kategori kemampuan sedang, dan 29,4% pada kategori kemampuan tinggi. Hasil ini mengindikasikan bahwa sebagian besar peserta didik di SMP Negeri Oelneke memiliki kemampuan pemahaman konsep pada tingkat sedang. Peserta didik mengalami kesulitan dalam menyelesaikan soal-soal dikarenakan kurangnya pemahaman terhadap permasalahan yang diberikan, yang mengakibatkan mereka tidak dapat memberikan jawaban secara optimal.

### Abstract

*This study employs a qualitative descriptive approach aimed at evaluating students' conceptual understanding in solving similarity and congruence problems at SMP Negeri Oelneke. The subjects of the study were ninth-grade students. The results of the conceptual understanding test show that 29.4% of the students fall into the low ability category, 41.1% into the moderate ability category, and 29.4% into the high ability category. These results indicate that the majority of students at SMP Negeri Oelneke demonstrate a moderate level of conceptual understanding. The students face difficulties in solving the problems due to a lack of understanding of the given problems, which prevents them from providing optimal responses.*

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### Introduction

Education serves as a fundamental determinant of success in enhancing human resources. It also acts as a medium for character and behavioral transformation, facilitating the realization of human resource objectives. Education provides both theoretical knowledge and practical experience, which reshape shallow thinking patterns. It has a significant influence on individuals, fostering advanced character development and progressive thinking. Educators and learners are two essential components of education. Education is an interactive process between teachers and students aimed at achieving predetermined educational goals (Rafsanjani et al., 2024). The factors influencing education, as examined in systematic educational studies, include objectives, educators, learners, instructional tools, and the surrounding environment (Lidu et al., 2023; Simarmata & Hijriani, 2020).

Learning is a process of teaching and learning activities that plays a crucial role in determining students' academic success. Herliana states that learning is any deliberate effort made by educators to impart knowledge, organize, and create a systematic learning environment using various methods, enabling students to engage in learning activities effectively and efficiently while achieving optimal outcomes (Herliana et al., 2021). Learning involves the organization and arrangement of the environment in the best possible way, linking it to students to facilitate the learning process. It requires creative ideas from teachers to design engaging learning experiences, ensuring students remain motivated in their studies. Teachers must employ teaching methods that stimulate students' enthusiasm and encourage continuous learning. Additionally, learning becomes more engaging when the material taught is connected to students' daily lives (Bait Bifel et al., 2025; Simarmata & Chrisinta, 2024; Simarmata & Sirait, 2020).

Mathematics is a subject that stimulates students' thinking patterns to be analytical, critical, and well-organized. It is a universal discipline that plays a crucial role in various fields of study and contributes to the development of human cognitive abilities (Mashuri, 2019). Therefore, mathematics should be taught to all students from elementary school to higher education. Problem-solving requires an analytical and structured way of thinking, making mathematics essential in finding effective solutions and addressing complex problems.

There are various perspectives on mathematics among individuals; some find it enjoyable and develop an interest in it, while others perceive it as a difficult subject, leading to a lack of enthusiasm. Patih states that one of the obstacles in learning mathematics is students' lack of interest, as many struggle with mathematical problems and feel pressured when faced with them (Patih, 2016). Consequently, this can result in significantly lower academic achievement in mathematics compared to other subjects.

Based on field observations at SMP Negeri Oelneke, Musi District, North Central Timor Regency, the researcher identified issues during discussions and Q&A sessions with mathematics teachers. One of the most challenging topics for ninth-grade students to understand is similarity and congruence. Students struggle to express their ideas, reinterpret concepts, and articulate their understanding of the material. For instance, when teachers ask students to explain the concepts of similarity and congruence, many remain silent and hesitant to respond. Instead of formulating their own answers, students tend to rely on their notes. This challenge is further reflected in their academic performance, as the results of daily assessments show that the average student score is below the Minimum Mastery Criteria (KKM) of 65. This issue has motivated the researcher to further examine and analyze students' conceptual understanding in solving problems related to similarity and congruence.

One of the primary objectives of mathematics education is to develop students' conceptual understanding. This ability serves as the foundation for learning mathematics in a more meaningful

way. Conceptual understanding refers to the skill of interpreting and translating mathematical ideas, both globally and functionally. Translating a mathematical concept requires students to have a solid grasp of the concepts they are learning (Refleksi Pembelajaran Inovatif, 2020). Dwi Pratiwi state that mathematical conceptual understanding remains low among students at both elementary and secondary levels. However, students who have a strong grasp of mathematical concepts find it easier to solve subsequent mathematical problems, as these concepts serve as the foundation for further learning (Dwi Pratiwi et al., 2020).

The importance of conceptual understanding in students lies in their ability to connect concepts freely and accurately to solve problems. According to the National Council of Teachers of Mathematics (NCTM), there are five standard competencies that elementary school students must possess, one of which is conceptual understanding. This includes understanding mathematical concepts, explaining the relationships between concepts, and applying them to problem-solving. So far, teachers have primarily emphasized mathematical knowledge without fully considering students' conceptual understanding. Many view mathematics as a fixed body of knowledge to be taught and learned, rather than an evolving field requiring deep comprehension. Conceptual understanding is often likened to the foundation of a building—before constructing pillars, floors, and other structures, the base must be strong. If a student has a solid grasp of a concept, they will find it easier to understand subsequent material. In this regard, teachers play a crucial role in fostering students' conceptual understanding. They must dedicate time to lesson planning to effectively build cognitive bridges that help students grasp concepts during the learning process. One important example is the concept of similarity and congruence. These topics help students understand relationships between shapes, sizes, and proportions, which are essential for both geometry and real-life problem solving. A good conceptual grasp of similarity and congruence supports students in developing logical reasoning and spatial awareness.

## Method

This study employs a qualitative descriptive research method. Qualitative descriptive research is a method used by researchers to explore and discover knowledge or theories relevant to a particular phenomenon at a specific point in time (Arofa & Ismail, 2022). This approach allows for an in-depth analysis of the subject matter by examining real-world conditions and interpreting data based on observed patterns and interactions.

The study was conducted at SMP Negeri Oelneke, with the research subjects being seventeen ninth-grade students. The selection of participants was based on their involvement in the learning process and their experiences in understanding the concepts of similarity and congruence. Through this approach, the study seeks to obtain a comprehensive understanding of students' conceptual understanding specifically related to the concepts of similarity and congruence, as well as to identify the difficulties they experience in learning and applying these concepts. This is in accordance with the

research objective, which is to investigate how students comprehend, relate, and utilize the concepts of similarity and congruence within mathematical problem-solving contexts.

## Results and Discussion

### Results

#### Description of Implementation

This study is a qualitative descriptive research aimed at investigating students' conceptual understanding in solving problems related to similarity and congruence at SMP Negeri Oelneke. The subjects of this study are ninth-grade students. Prior to conducting the research, the researcher delivered a research permission letter from the university to the school administration on Monday, February 12, 2023, and also held consultations with the school principal, subject teachers, and the school operator. The implementation of the research activities included the following steps:

#### 1. Implementation of Conceptual Understanding Ability Test

The test was administered at the school on Monday, February 19, 2023, from 09:30 AM until completion. In this study, 17 students were selected by the school to participate in the test. The test consisted of 3 open-ended questions. Prior to the test, the researcher provided the participants with several instructions: they were expected to complete the test diligently, the allotted time for answering the questions was 45 minutes, and the procedure for filling out the provided answer sheet was explained. Subsequently, the researcher distributed the test questions to the students for completion. After the test, the researcher conducted interviews with 6 students who were chosen based on their demonstrated ability level.

**Table 1.** The categories of student scores used as subjects in this study

No	Categories of Ability	Value Interval
1	High	76 – 100
2	Middle	51 – 75
3	Low	0 – 50

**Table 2.** The Results of Students' Ability Test in Solving Similarity and Congruence Problems

No	Student's Name	Score	Student's Test Score
1.	OE	5	31,25
2.	FYB	13	81,25
3.	GKP	12	75
4.	MB	12	75
5.	PN	13	62,5
6.	LS	15	100
7.	RS	14	66,6
8.	MJS	14	87,5
9.	KAK	14	87,5
10.	AGTW	15	100

11. EZA	10	62,5
12. MPN	8	50
13. VGB	10	62,5
14. FOT	10	62,5
15. FO	8	31,25
16. YCA	7	50
17. YAO	8	50

The results of the Conceptual Understanding Ability Test indicate that 29.4% of students fall into the low-ability category, 41.1% into the moderate-ability category, and 29.4% into the high-ability category. These findings suggest that the majority of students at SMP Negeri Oelneke demonstrate a moderate level of ability. Students experienced difficulties in solving the problems due to a lack of understanding of the questions and an inability to provide optimal responses.

## 2. Interview Implementation

The interview was conducted on February 21, 2023. The selection of students for the interview included two high-ability students, two moderate-ability students, and two low-ability students. The selection process was also assisted by recommendations from the mathematics teacher to ensure that the chosen students had good communication skills. The purpose of this selection was to obtain more comprehensive and insightful responses regarding students' conceptual understanding and problem-solving abilities.

**Table 3.** Students interviewed

Ability Categories	Student Name	Test Scores
High	ST1	100
	ST2	100
Middle	SS1	66,6
	SS2	62,5
Low	SR1	31,25
	SR2	50

In this stage, several data collected from SMP Negeri Oelneke are presented. Two types of data are described: the results of the similarity and congruence test and the interview findings. These two data sources serve as benchmarks for assessing students' conceptual understanding in solving similarity and congruence problems. The researcher selected a sample of 6 students from the 17 students who participated in the test for interviews. The following is a description of the 6 students who were chosen as subjects in completing the conceptual understanding ability test on similarity and congruence problems.

## 3. Description of ST1 Student Test and Interview Results

- The following is a picture of the results of answer number 1 of ST1 students.

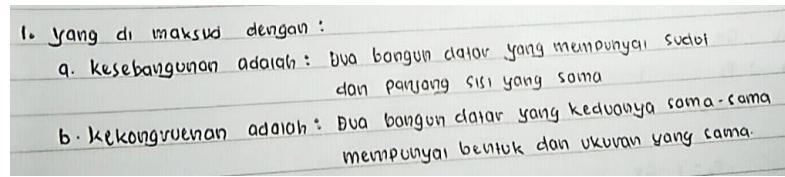


Figure 1. ST1 students' answers to question number 1

Furthermore, interviews were conducted with ST1 students to get confirmation regarding the student's answer to question number 1. The following is an excerpt of the results of the interview conducted with ST1 students:

P : After reading question number 1, what do you understand from the question?  
 ST1 : After I read question number 1, I remembered the material of coexistence and congruence that have differences.  
 P : good sister. What is consensus?  
 ST1 : Congruences are two flat shapes that have the same angle and length of sides  
 P : From the rectangle image above, how many angles are there?  
 ST1 : There are 4 corners Sir.  
 P : The same angle and length of the sides mean that everything in the picture must be the same?  
 ST1 : Yes, Sir

From the results of answers and interviews related to question number 1 that ST1 students did, when asked about the difference from congruence, ST1 students answered "*congruence is two flat shapes that have the same angle and length of sides*." This answer shows that ST1 students are able to define concepts using their own words.

b) The following is a picture of the results of answer number 2 of ST1 students.

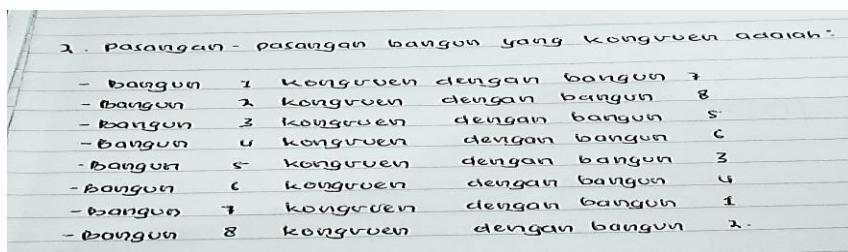


Figure 2. ST1 students' answers to question number 2

Next, interviews were conducted with ST1 students to get confirmation regarding the students' answers to question number 2. The following is an excerpt of the results of interviews conducted with ST1 students:

P : Notice Figure 1 and Figure 7 which say the same. Why is it the same?  
 ST1 : from figures 1 and 7 have four corners and the same side  
 P : good thank you  
 ST1 : you're welcome Sir

From the results of the answers and interviews related to question number 2 worked on by ST1 students, when asked about why the two pictures are the same? It can be seen that ST1 students answered the question by saying that "*from pictures 1 and 7 have four angles and the same side*." This answer shows that ST1 students are able to distinguish between example of concept and example of non-concept.

c) The following is a picture of the results of answer number 3 of ST1 students.

3.  $\frac{\text{tinggi tiang bendera}}{\text{tinggi pohon}} = \frac{\text{Panjang bayangan tiang bendera}}{\text{Panjang bayangan pohon}}$

$$\frac{8 \text{ cm}}{t} = \frac{16}{12}$$

$$\text{tinggi pohon} = \frac{12 \text{ cm} \times 8 \text{ cm}}{16 \text{ cm}}$$

$$\text{tinggi pohon} = \frac{96 \text{ cm}}{16 \text{ cm}} \quad \text{Tinggi Pohon} = 6 \text{ m}$$

Figure 3. ST1 students' answers to question number 3

Furthermore, interviews were conducted with ST1 students to get confirmation regarding the students' answers to question number 3. The following is an excerpt of the results of interviews conducted with ST1 students:

P : What formula is used to work on question number 3?  
 ST1 : I used the ratio of the height of the flagpole to the height of the tree equal to the ratio of the length of the shadow of the flagpole to the length of the tree shadow.  
 P : After that  
 ST1 : From that comparison I crossed

From the results of the answers and interviews related to question number 3 worked on by ST1 students, it can be seen that ST1 students answered the question by saying that "*I used the ratio of the height of the flagpole to the height of the tree equal to the ratio of the length of the shadow of the flagpole to the length of the tree.*" This answer shows that ST1 students are able to use the concept in solving the problems contained in the questions. And from the results of the overall interviews carried out on ST1 students, it can be seen that ST1 students are able to define concepts, distinguish examples of concepts and non-concepts and use concepts in solving problems so that ST1 students are included in high-ability students.

#### Description of ST2 Student Test and Interview Results

a) The following is a picture of the results of answer number 1 of ST2 students.

Nama : Anggelina G-T Wuwur  
 Kelas : 1-KB

Jawab :

1. - Kesebangunan adalah dua bangun datar dengan sudut-sudut yang sama besar.  
 - Kekongruenan adalah dua bangun datar yang memiliki bentuk dan ukuran yang sama.

Figure 4. ST2 students' answers to question number 1

Furthermore, interviews were conducted with ST2 students to get confirmation regarding the students' answers to question number 1. The following is an excerpt of the results of interviews conducted with ST2 students:

P : After reading question number 1, what do you understand from the question about conscription?

ST2 : Congruence is two flat shapes that have the same shape and size

P : What are the similarities between the two pictures in question number 2, namely picture 2 and picture 8?

ST2 : the same sides and corners

P : How many sides are there on each image?

ST2 : There are 4 sides sir

P : good thank you

From the results of the answers and interviews number 1 of ST2 students when asked what is confederation? How many sides are there in each picture? ST2 students replied "congruence is two flat buildings that have the same shape and size. There are 4 sides." This answer shows that ST2 students are able to define concepts using their own words.

b) The following is a picture of the results of answer number 2 of ST2 students.

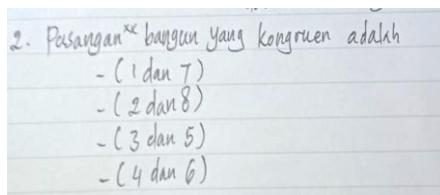


Figure 5. ST2 students' answers to question number 2

Furthermore, interviews were conducted with ST2 students to get confirmation regarding the students' answers to question number 2. The following is an excerpt of the results of interviews conducted with ST2 students:

P : Notice Figure 1 and Figure 7 which are said to be congruent. Why congruent?

ST2 : have the same sides and angles because

P : How many angles and sides are there of each image

ST2 : There are 4 corners and 4 sides

P : good thank you

From the results of answers and interviews number 2 conducted by ST2 students, it can be seen that Shiva's answer during the interview related to why did you say that the two images were congruent? ST2 students' answer "because they have the same side and angle" this answer shows that ST2 students are already able to distinguish examples of concepts and examples of non-concepts.

c) The following is a picture of the results of answer number 3 of ST2 students.

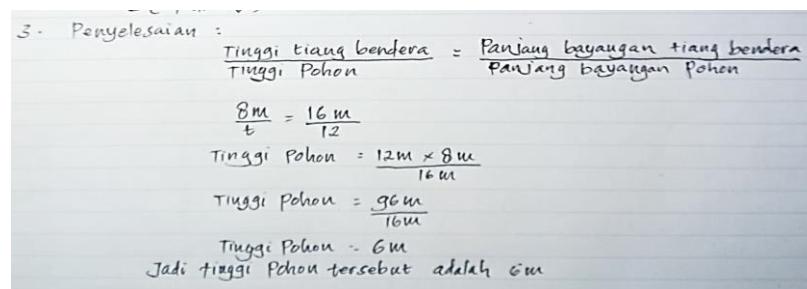


Figure 6. ST2 students' answers to question number 3

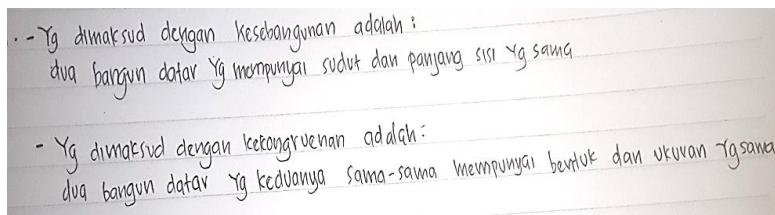
Furthermore, interviews were conducted with ST2 students to get confirmation related to the students' answers to question number 3. The following is an excerpt of the results of interviews conducted with ST2 students:

P : *What is the formula used in working on question number 3?*  
 ST2 : *I searched for the height of the tree using the ratio between the height of the flagpole and the height of the tree equal to the ratio of the length of the shadow of the flagpole to the length of the shadow of the tree. After that, it is cross-multiplied*

From the results of the answers and interviews for question number 3 done by ST2 students, when interviewed, what is the formula used in working on question number 3? Student answer "*I searched for the height of the tree using the ratio between the height of the flagpole and the height of the tree equal to the ratio of the length of the shadow of the flagpole to the length of the shadow of the tree. After that, it is cross-multiplied.*" From this answer, it can be seen that ST2 students are able to use concepts in solving problems. The above description can be concluded that all indicators, ST2 students can complete them correctly and correctly. So that ST2 students are included in the high-ability students.

#### Description of SS1 Student Test and Interview Results

a) The following is a picture of the results of answer number 1 of SS1 students.



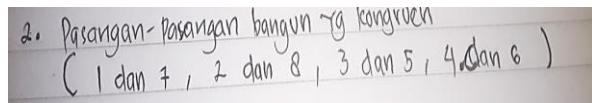
**Figure 7.** SS1 students' answers to question number 1

Furthermore, interviews were conducted with SS1 students to get confirmation regarding the student's answer to question number 1. The following is an excerpt of the results of interviews conducted with SS1 students:

P : *After reading question number 1, what do you understand from the question about conscription?*  
 SS1 : *build a flat of the same shape and size*  
 P : *Is there only one flat build we can say congruent ?*  
 SS1 : *Must be two Sir*  
 P : *Thank you very much*

From the results of the answers and interviews of question number 1 of SS1 students, when interviewed, what do you understand about consensus? Students' answer is "*build a flat that is the same shape and size.*" Can we only say one flat build congruent brother? The student's answer "*It must be two packs.*" The SS1 students' answers above can be concluded that SS1 students are able to define concepts by using sendritic words.

b) The following is a picture of the results of answer number 2 of SS1 students.



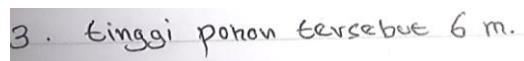
**Figure 8.** SS1 students' answers to question number 2

Next, interviews were conducted with SS1 students to get confirmation regarding the student's answers to question number 2. The following is an excerpt of the results of interviews conducted with SS1 students:

P : Notice Figure 1 and Figure 7 which are said to be congruent. Why congruent?  
 SS1 : The picture is the same  
 P : What do the two pictures have in common?  
 SS1 : There are 4 sides and 4 corners  
 P : good thank you

From the results of the answers and interviews of question number 2 done by SS1 students, at the time of the interview about why picture 1 and picture 7 are said to be congruent? The answer from the SS1 student "the picture is the same. What do the two images have in common? Student answer "there are 4 sides and 4 corners." From the student's answer above, it shows that SS1 students are able to distinguish examples of concepts and examples of non-concepts.

c) The following is a picture of the results of answer number 3 of SS1 students



**Figure 9.** SS1 students' answers to question number 3

Next, an interview was conducted with SS1 students to get confirmation regarding the student's answer to question number 3. The following is an excerpt of the results of interviews conducted with SS1 students

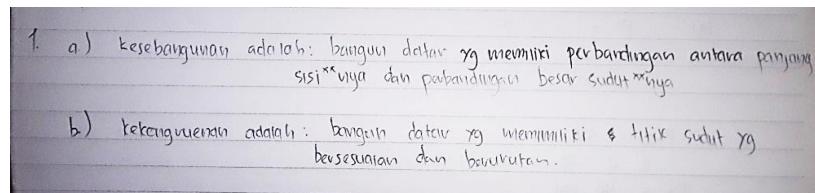
P : What to know from question number 3 ?  
 SS1 : From the results I worked: the shadow length of a flagpole 16, the shadow length of a tree 12, if the height of the flag is 8m and the height of the tree is 6

From the results of answer number 3 done by SS1 students, it can be seen that students do not work on the problem with the completion process, the students are directly on the results. When interviewed about what is known about the number 3 question? The answer is "from the results I worked: the shadow length of a flagpole is 16, the shadow length of a tree is 12, if the height of the flag is 8m and the height of the tree is 6." The results of the answers and interviews above can be concluded that SS1 students are not able to use the concept in solving problems.

From the results of the answers and interviews of questions number 1, 2 and 3, it can be concluded that SS1 students are able to define concepts using their own words, are able to distinguish examples of concepts and examples that are not concepts but are not yet able to use concepts in solving problems. So that SS1 students are classified as students with moderate abilities.

#### Description of SS2 Student Test and Interview Results

a) The following is a picture of the answer results of SS2 student number 1



**Figure 10.** SS2 students' answers to question number 1

Furthermore, interviews were conducted with SS2 students to get confirmation regarding the student's answer to question number 1. The following is an excerpt of the results of interviews conducted with PN students:

P : After reading question number 1, what do you understand from the question about conscription?

SS2 : congruence is a flat building that has corresponding and sequential angular points

P : How is it appropriate?

SS2 : Same

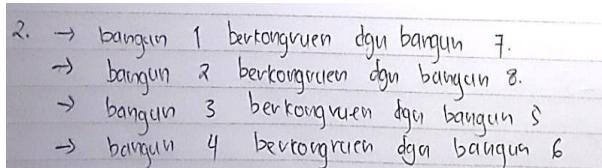
P : Try to pay attention to Figure 2 and Figure 8 in question number 2. What do they have in common?

SS2 : Same sides and angles

P : good

From the results of the answers and interviews of question number 1, it can be seen that SS2 students' answers when asked about what is the meaning of conformity? Student answer "Same" This answer shows that SS2 students are able to define concepts in their own words.

b) The following is a picture of the results of answer number 2 of SS2 students



**Figure 11.** SS2 students' answers to question number 2

Furthermore, interviews were conducted with SS2 students to get confirmation related to the students' answers to question number 2. The following is an excerpt of the results of interviews conducted with SS2 students:

P : Notice Figure 4 and Figure 6 which say congruent. Why congruent?

SS2 : The picture is the same

P : What are the similarities between the two images?

SS2 : There are 4 sides and 4 corners

P : good thank you

From the results of the answers and interviews of question number 2, the answer of SS2 students when interviewed about why pictures 4 and 6 are consequential? The student's answer is "the picture is the same." This answer shows that SS2 students are able to distinguish between example concepts and examples that are not concepts.

c) The following is a picture of the answer results of SS2 student number 3.

3. pernyataan =

$$\frac{\text{tinggi tiang bendera}}{\text{tinggi pohon}} = \frac{\text{panjang bayangan tiang bendera}}{\text{panjang bayangan pohon}}$$

$$\frac{8 \text{ cm}}{t} = \frac{16}{12 \text{ cm}}$$

$$\text{tinggi pohon} = \frac{12 \text{ cm} \times 8 \text{ cm}}{16 \text{ cm}}$$

$$\text{tinggi pohon} = \frac{96 \text{ cm}}{16 \text{ cm}}$$

$$\text{tinggi pohon} = 6,55 \text{ m.}$$

Figure 12. SS2 students' answers to question number 3

Next, interviews were conducted with SS2 students to get confirmation related to the students' answers to question number 3. The following is an excerpt of the results of interviews conducted with SS2 students:

P : What do you know from question number 3?  
 SS2 : From the results I worked: the height of the flagpole divided by the height of the tree is equal to the length of the shadow of the flagpole divided by the length of the shadow of the tree, after that it is cross-multiplied which I get the final result of the height of the tree is 6.55 meters.  
 P : Problem number 3 difficult?  
 SS2 : It's hard enough sir  
 P : good thank you

From the results of answer number 3 that was done, it can be seen that SS2 students are still wrong in the final result, not very careful in the division operation. So it can be concluded that SS2 students are less able to use the concept in solving problems. From the results of the answers and interviews of the overall questions, it can be concluded that SS2 students are able to define concepts using their own words, are able to distinguish examples of concepts and examples that are not concepts but are less able to use concepts in solving problems.

#### Description of SR1 Student Test and Interview Results

a) The following is a picture of the results of answer number 1 of SR1 students.

1. - kesebangunan adalah: dua bangun datar yg mempunyai sudut dan panjang sisi yg sama  
 simbol clari kesebangunan  
 - ketongruenan adalah: dua bangun datar yg keduanya sama<sup>tp</sup> mempunyai to  
 bentuk dan ukuran yg sama

Figure 13. SR1 students' answers to question number 1

Furthermore, interviews were conducted with SR1 students to get confirmation regarding the students' answers to question number 1. The following is an excerpt of the results of the interview conducted with SR1 students:

P : After reading question number 1, what do you understand from the question about development?  
 SR1 : Harmony is two flat shapes that have the same angle and length of sides  
 P : Does that mean everything in the picture has to be the same?  
 SR1 : "Yes, sir.  
 P : Same as congruent?  
 SR1 : Yes, sir.  
 P : good

From the results of answer number 1, it can be seen that SR1 students are not yet able to define concepts. It can be seen from the student's answer that "*the resurrection is two flat buildings that have the same angle and length of the sides.*" This answer refers to the notion of congruence should be.

b) The following is a picture of the results of answer number 2 of SR1 students.

2. pasangan bangun yang kongruen disebut kongruen (1) dan kongruen (4)

**Figure 14.** SR1 students' answers to question number 2

Furthermore, interviews were conducted with SR1 students to get confirmation regarding the students' answers to question number 2. The following is an excerpt of the results of the interview conducted with SR1 students:

P : Notice Figure 4 and Figure 6. Why congruent?  
 SR1 : -

From the results of answer number 2 done by SR1 students, it can be seen that SR1 students also did not respond when interviewed regarding why pictures 4 and 6 are congruent. It can be concluded that SR1 students have not been able to distinguish examples of concepts and examples of non-concepts contained in the question so that they are wrong in solving the problem.

c) The following is a picture of the results of answer number 3 of SR1 students

3. Panjang x Tinggi  
 maka Tinggi Pohon adalah 10

**Figure 15.** SR1 students' answers to question number 3

Next, interviews were conducted with SR1 students to get confirmation regarding the students' answers to question number 3. The following is an excerpt of the results of the interview conducted with SR1 students:

P : What do you know from question number 3?  
 SR1 : From the result I worked: 10 meters tree height.  
 P : Derived from?  
 SR1 : length multiplied by height  
 P : good thank you

From the results of answer number 3 that was done, it can be seen that SR1 students were quite short in solving the problem, there was no completion process, and when interviewed regarding the results obtained from which the students answered that the length was multiplied by height. The answers and results of this interview can be concluded that SR1 students are not able to use the concept in solving the problems contained in the questions so that they are not able to solve the problems correctly. From the results of the interviews carried out, SR1 students still do not understand interview questions number 1, 2 and 3. Where the answers from SR1 students are short and non-standard. Number 3 has no reason for completion and is wrong.

#### Description of Test and Interview Results

1. The following is a picture of the results of answer number 1 of SR2 students.

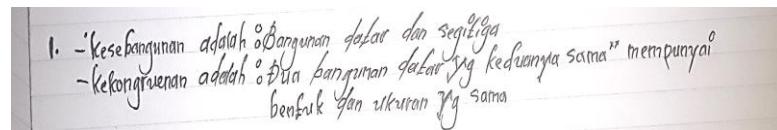


Figure 16. SR2 students' answers to question number 1

Furthermore, interviews were conducted with SR2 students to get confirmation regarding the student's answer to question number 1. The following is an excerpt of the results of the interview conducted with SR2 students:

P : After reading question number 1, what do you understand from the question about development?  
 SR2 : Flat and triangular builds  
 P : Try to name one example of a flat build  
 SR2 : Don't know sir

From the results of answer number 1, it can be seen that SR2 students have not been able to define concepts by using their own words contained in the questions so that they cannot solve problems related to the definition of coexistence correctly.

2. The following is a picture of the results of answer number 2 of SR2 students.

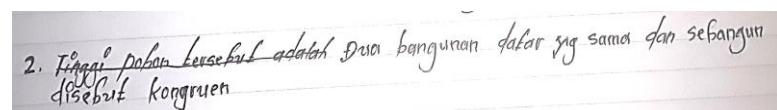


Figure 17. SR2 students' answers to question number 2

Next, interviews were conducted with SR2 students to get confirmation related to the students' answers to question number 2. The following is an excerpt of the results of the interview conducted with SR2 students:

P : Try to pay attention to question number 2. What to ask  
 SR2 : Congruent couple sir  
 P : Then what is the answer?  
 SR2 : Two buildings of the same flat and the same building are called congruent  
 P : good thank you

From the results of answer number 2 done by SR2 students, it can be seen that SR2 students have not been able to distinguish examples of concepts and examples of non-concepts contained in the question so that they cannot solve the problem correctly.

3. The following is a picture of the results of answer number 3 of SR2 students.

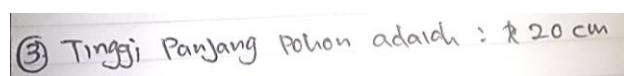


Figure 18. SR2 students' answers to question number 3

Furthermore, interviews were conducted with SR2 students to get confirmation regarding the students' answers to question number 3. The following is an excerpt of the results of the interview conducted with SR2 students:

P : *What do you know from question number 3?*  
 SR2 : *From the result I worked: 20 meters high tree.*  
 P : *Where did it come from?*  
 SR2 : -

From the results of answer number 3 that was done, it can be seen that SR2 students are less able to use the concept in solving the problems contained in the questions so that they are less able to solve the problems correctly. From the results of the interviews carried out by SR2 students, they were still wrong on interview questions number 1, 2 and 3. Where answer number 1 is still wrong in the definition of regeneration which says regeneration is a flat and triangular building, answer number 2 is wrong, and answer number 3 is wrong and has no reason.

## Discussion

Based on the analysis of test results and interview data presented above, the discussion regarding students' conceptual understanding in solving similarity and congruence problems is outlined as follows:

### 1. Highly Capable Students

The first student categorized as having a high level of ability, referred to as ST1, demonstrated strong conceptual understanding based on both test results and interview responses. ST1 can be classified as a high-ability student due to their problem-solving process and the high score obtained. The student was able to define the concepts of similarity and congruence in their own words, differentiate between examples and non-examples of these concepts, and effectively apply the concepts to solve problems. The findings indicate that ST1 successfully met all the specified indicators.

The second student categorized as having a high level of ability, referred to as ST2, also exhibited strong conceptual understanding. Based on the test and interview results, ST2 was able to solve all problems related to the given indicators, including defining the concepts of similarity and congruence in their own words, distinguishing between examples and non-examples, and applying the concepts to problem-solving. As a result, ST2 was classified as a high-ability student. These findings align with (Fadlurreja et al., 2020), who stated that individuals differ in their ability to receive and process information, as well as in problem-solving skills. This variation is influenced by several factors, one of which is differences in mathematical ability.

### 2. Moderately Capable Students

The first student categorized as having a moderate level of ability, referred to as SS1, demonstrated partial conceptual understanding in both the test and interview. SS1 was able to define the concepts of similarity and congruence in their own words and distinguish between examples and non-examples. However, the student struggled to apply these concepts effectively in problem-solving.

Similarly, the second student classified as having a moderate level of ability, referred to as SS2, exhibited the same pattern of understanding. SS2 was able to define the concepts of similarity and

congruence and differentiate between examples and non-examples but faced difficulties in applying the concepts to solve problems. During the interview, when asked about the difficulties encountered while solving similarity and congruence problems, SS2 mentioned struggling with question 3 due to an inability to recall the necessary formulas, leading to difficulties in performing calculations. Based on the test and interview results, SS2 was categorized as having a moderate level of ability, as they were able to complete the conceptual understanding tasks within their capability.

These findings align with (Ulfa & Kartini, 2021), who stated that students with high, moderate, and low mathematical abilities exhibit differences in mathematical problem-solving. These differences are evident in various stages, including understanding the problem, planning, implementing, and reviewing the solution.

### 3. Low-Ability Students

Based on the test results and interviews, the first student categorized as having low ability, referred to as SR1, was unable to solve problems related to key conceptual understanding indicators of similarity and congruence. SR1 struggled to define concepts in their own words, differentiate between examples and non-examples, and apply the concepts to problem-solving. The test results clearly indicated that SR1 fell into the low-ability category, as the student had difficulties solving all three test questions. Specifically, SR1 was unable to distinguish between examples and non-examples in question 2 and failed to elaborate on the solution for question 3 due to not recalling the relevant formulas. Furthermore, during the interview, SR1 expressed difficulty in answering the given questions, confirming that the student belongs to the low-ability category.

Similarly, the second student categorized as having low ability, SR2, also demonstrated significant difficulties in solving the test problems across all indicators. SR2 struggled to comprehend the meaning of statements in question 1, leading to incorrect answers, and faced challenges in question 3 due to an inability to recall the necessary formulas, resulting in computational errors. These findings reinforce the conclusion that SR2 also belongs to the low-ability category.

From the above explanations, it can be concluded that high-ability students were able to successfully solve the conceptual understanding problems related to similarity and congruence, achieving highly satisfactory results. Likewise, moderate-ability students performed well in solving the given problems, obtaining satisfactory outcomes. However, some errors were observed among these students, as they tended to perform calculations immediately without carefully considering the appropriate formulas, leading to mistakes. This aligns with the findings of Patta, who stated that individuals with an impulsive cognitive style tend to work hastily, lack accuracy, and fail to engage in deep thinking, resulting in incorrect answers.

On the other hand, low-ability students exhibited a strong tendency to make mistakes when solving conceptual understanding problems. Their errors were primarily due to an impulsive approach, where they attempted to solve problems without first identifying the correct formulas. This observation

is consistent with (Cintamulya & Mawartiningsih, 2023), who argued that individuals with an impulsive cognitive style tend to be less meticulous, rush into problem-solving, and ultimately produce a high number of incorrect answers.

## Conclusion

Based on the research findings and discussion, it can be concluded that the conceptual understanding ability of students at SMPN Oelneke in solving similarity and congruence problems varies across different ability levels. High-ability students are capable of solving problems across all given indicators, demonstrating a comprehensive understanding of the concepts. Moderate-ability students can successfully comprehend and differentiate between examples and non-examples of concepts; however, they still face difficulties in applying these concepts to problem-solving. Meanwhile, low-ability students struggle to solve the given problems, indicating that they have not yet achieved the required indicators. These findings highlight the varying levels of conceptual understanding among students and emphasize the need for targeted instructional strategies to enhance their learning outcomes.

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