

Education Quality and
Accountability Office



Assessment of Reading, Writing and Mathematics:
Junior Division

Released 2008 Assessment: Mathematics
Item-Specific Rubrics and
Sample Student Responses with Annotations

Scoring Guide for Mathematics Open-Response Question 7

Code	Descriptor
B	<ul style="list-style-type: none"> blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> <i>Illegible: cannot be read; completely crossed out/erased; not written in English</i> <i>Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”)</i> <i>Off topic: no relationship of written work to the question</i>
10	<p>Application of knowledge and skills to apply transformations to move the gym mat on the grid shows limited effectiveness due to</p> <ul style="list-style-type: none"> misunderstanding of concepts incorrect selection or misuse of procedures
20	<p>Application of knowledge and skills to apply transformations to move the gym mat on the grid shows some effectiveness due to</p> <ul style="list-style-type: none"> partial understanding of the concepts errors and/or omissions in the application of the procedures
30	<p>Application of knowledge and skills to apply transformations to move the gym mat on the grid shows considerable effectiveness due to</p> <ul style="list-style-type: none"> an understanding of most of the concepts minor errors and/or omissions in the application of the procedures
40	<p>Application of knowledge and skills to apply transformations to move the gym mat on the grid shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> a thorough understanding of the concepts an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding)

Scoring Guide for Mathematics Open-Response Question 7

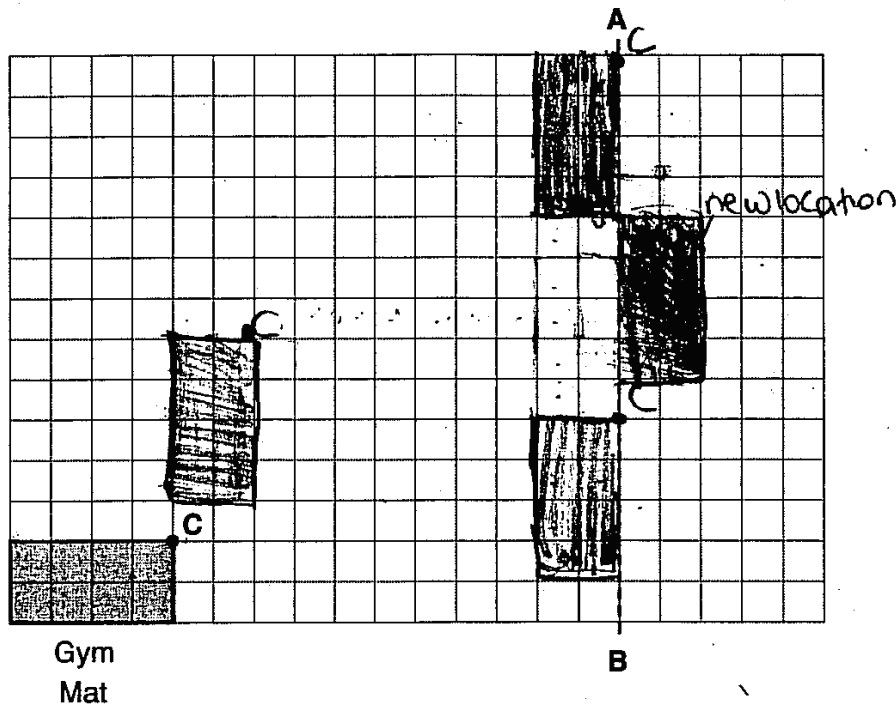
Code
10

Mr. Lee moves a gym mat using the following four transformations.

1. Rotate the gym mat 90° clockwise about Point C.
2. Translate the gym mat 8 units to the right.
3. Translate the gym mat 6 units up.
4. Reflect the gym mat over line AB.

On the grid below, show the new location of the gym mat after Mr. Lee makes the four transformations.

Show all your work.



Annotation:

Student demonstrates a misunderstanding of the concepts; transformations do not resemble the required transformations; rotation is not about point C, the first translation is over and up, the second translation is not connected to the first one and is not the required number of units and reflection is reflected as well as translated down.

Scoring Guide for Mathematics Open-Response Question 7

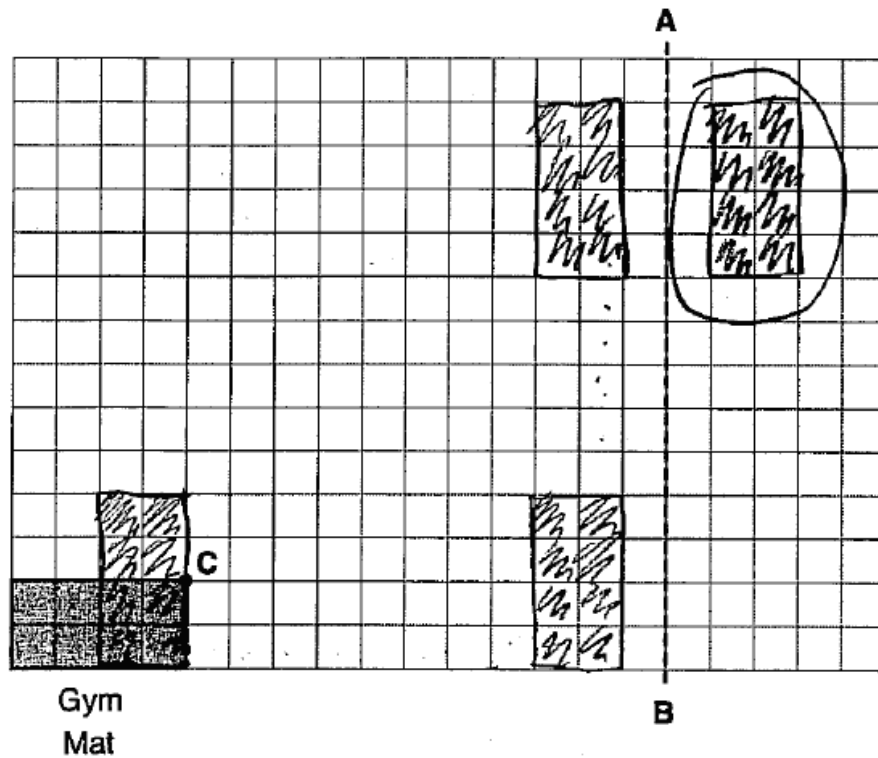
Code
20

Mr. Lee moves a gym mat using the following four transformations.

1. Rotate the gym mat 90° clockwise about Point C.
2. Translate the gym mat 8 units to the right.
3. Translate the gym mat 6 units up.
4. Reflect the gym mat over line AB.

On the grid below, show the new location of the gym mat after Mr. Lee makes the four transformations.

Show all your work.



Annotation:

Student makes errors in the application of the procedures; rotation is not about point C, translations are not the required number of units, but reflection is accurate based on the location of the mat after the second translation.

Scoring Guide for Mathematics Open-Response Question 7

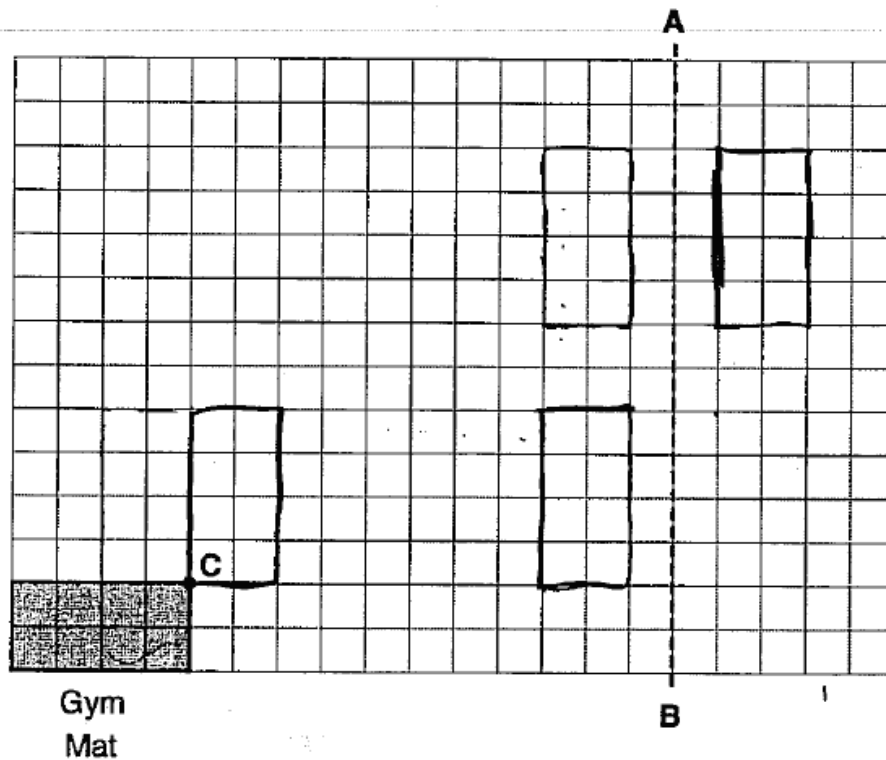
**Code
30**

Mr. Lee moves a gym mat using the following four transformations.

1. Rotate the gym mat 90° clockwise about Point C.
2. Translate the gym mat 8 units to the right.
3. Translate the gym mat 6 units up.
4. Reflect the gym mat over line AB.

On the grid below, show the new location of the gym mat after Mr. Lee makes the four transformations.

Show all your work.



Annotation:

Student makes a minor error in the application of the procedures; rotation is inaccurate (image is flipped), all other transformations are correct.

Scoring Guide for Mathematics Open-Response Question 7

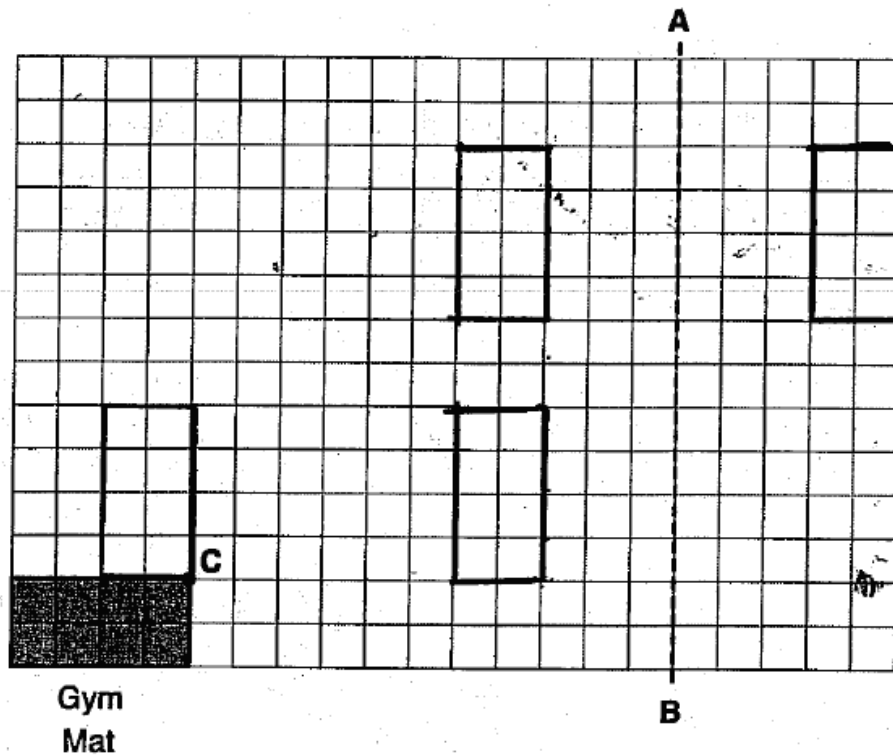
Code
40

Mr. Lee moves a gym mat using the following four transformations.

1. Rotate the gym mat 90° clockwise about Point C.
2. Translate the gym mat 8 units to the right.
3. Translate the gym mat 6 units up.
4. Reflect the gym mat over line AB.

On the grid below, show the new location of the gym mat after Mr. Lee makes the four transformations.

Show all your work.



Annotation:

Student demonstrates accurate application of the procedures; all transformations are correct.

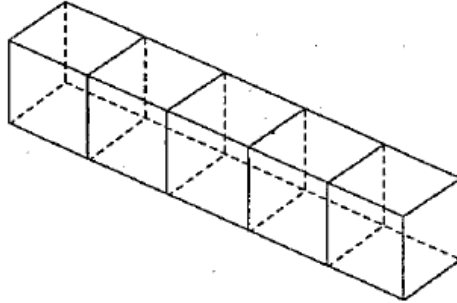
Scoring Guide for Mathematics Open-Response Question 8

Code	Descriptor
B	<ul style="list-style-type: none"> blank: nothing written or drawn in the space provided
I	<ul style="list-style-type: none"> <i>Illegible: cannot be read; completely crossed out/erased; not written in English</i> <i>Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”)</i> <i>Off topic: no relationship of written work to the question</i>
10	<p>Problem-solving process to solve a problem involving the calculation of the surface area of a rectangular prism shows limited effectiveness due to</p> <ul style="list-style-type: none"> minimal evidence of a solution process limited identification of important elements of the problem too much emphasis on unimportant elements of the problem no conclusions presented conclusion presented without supporting evidence
20	<p>Problem-solving process to solve a problem involving the calculation of the surface area of a rectangular prism shows some effectiveness due to</p> <ul style="list-style-type: none"> an incomplete solution process identification of some of the important elements of the problem some understanding of the relationships between important elements of the problem simple conclusions with little supporting evidence
30	<p>Problem-solving process to solve a problem involving the calculation of the surface area of a rectangular prism shows considerable effectiveness due to</p> <ul style="list-style-type: none"> a solution process that is nearly complete identification of most of the important elements of the problem a considerable understanding of the relationships between important elements of the problem appropriate conclusions with supporting evidence
40	<p>Problem-solving process to solve a problem involving the calculation of the surface area of a rectangular prism shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> a complete solution process identification of all important elements of the problem a thorough understanding of the relationships between all of the important elements of the problem appropriate conclusions with thorough and insightful supporting evidence

Scoring Guide for Mathematics Open-Response
Question 8

Code
10

Daneen builds a model train with 5 cubes as shown below. The dimensions of each cube are $2\text{ cm} \times 2\text{ cm} \times 2\text{ cm}$.



Daneen wants to paint the outside of the model train with red paint. The cost to paint 1 cm^2 of the train is $\$0.75$. How much will it cost to paint the outside of the model train?

Show your work.

All you have to do is times
 $\$0.75 \times 5$.

$$0.75 \times 5 = 3.75$$

it would cost him 3.75
to paint his model
train

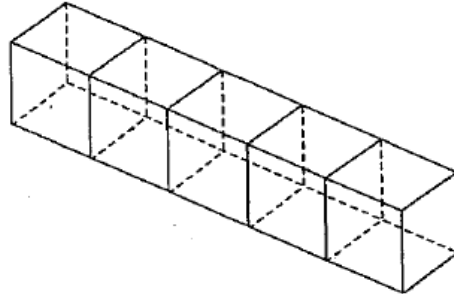
Annotation:

Student demonstrates minimal evidence of a solution process; multiplies the number of cubes by the cost per cm^2 .

Scoring Guide for Mathematics Open-Response Question 8

Code
20

Daneen builds a model train with 5 cubes as shown below. The dimensions of each cube are $2\text{ cm} \times 2\text{ cm} \times 2\text{ cm}$.



Daneen wants to paint the outside of the model train with red paint. The cost to paint 1 cm^2 of the train is $\$0.75$. How much will it cost to paint the outside of the model train?

Show your work.

$$2 \times 2 \times 2 = 8\text{cm}$$

$$\begin{array}{r} 8 \\ \times 5 \text{ blocks} \\ \hline 40\text{cm}^2 \end{array}$$

$$\begin{array}{r} 40 \\ \times .75 \\ \hline 200 \\ 2800 \\ \hline 3000 \end{array}$$

$\$30.00$ to buy paint.

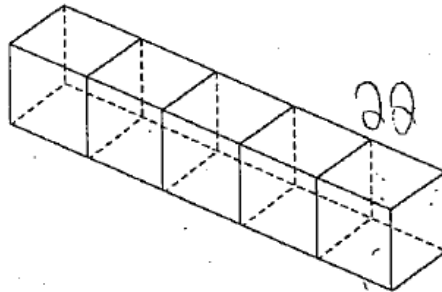
Annotation:

Student demonstrates some understanding of the relationships between important elements of the problem; uses volume instead of surface area - determines volume of one block times 5 blocks times $\$.75$.

Scoring Guide for Mathematics Open-Response Question 8

Code
30

Daneen builds a model train with 5 cubes as shown below. The dimensions of each cube are $2\text{ cm} \times 2\text{ cm} \times 2\text{ cm}$.



Daneen wants to paint the outside of the model train with red paint. The cost to paint 1 cm^2 of the train is \$0.75. How much will it cost to paint the outside of the model train?

Show your work.

22 sides show

$$\begin{array}{r} \overset{1}{\times} 22 \\ \cdot 75 \\ \hline 110 \\ 1540 \\ \hline \$16.50 \end{array}$$

Total cost = \$16.50

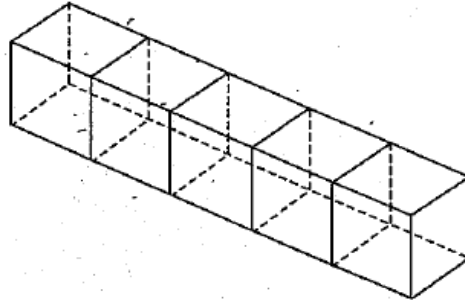
Annotation:

Student identifies most of the important elements of the problem; correctly counts the number of squares to give evidence of the need for surface area but omits multiplying by the area of each *side*; multiplies total *sides* by the cost.

Scoring Guide for Mathematics Open-Response
Question 8

Code
40

Daneen builds a model train with 5 cubes as shown below. The dimensions of each cube are $2\text{ cm} \times 2\text{ cm} \times 2\text{ cm}$.



Daneen wants to paint the outside of the model train with red paint. The cost to paint 1 cm^2 of the train is $\$0.75$. How much will it cost to paint the outside of the model train?

Show your work.

$$2\text{ cm} \times 2\text{ cm} = 4\text{ cm}^2 \times 22 = 88\text{ cm}^2$$

$$88\text{ cm}^2 \times \$0.75 = 66$$

It will cost Daneen $\$66.00$

Annotation:

Student demonstrates a thorough understanding of the relationships between all of the important elements of the problem; determines the surface area of one side, the number of sides, the total surface area of the train and the cost to paint all surfaces.

Scoring Guide for Mathematics Open-Response Question 9

Code	Descriptor
B	<ul style="list-style-type: none"> blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> <i>Illegible: cannot be read; completely crossed out/erased; not written in English</i> <i>Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”)</i> <i>Off topic: no relationship of written work to the question</i>
10	<p>Application of knowledge and skills to express theoretical probability as a ratio of the number of favourable outcomes to the total number of possible outcomes, where all outcomes are equally likely shows limited effectiveness due to</p> <ul style="list-style-type: none"> misunderstanding of concepts incorrect selection or misuse of procedures
20	<p>Application of knowledge and skills to express theoretical probability as a ratio of the number of favourable outcomes to the total number of possible outcomes, where all outcomes are equally likely shows some effectiveness due to</p> <ul style="list-style-type: none"> partial understanding of the concepts errors and/or omissions in the application of the procedures
30	<p>Application of knowledge and skills to express theoretical probability as a ratio of the number of favourable outcomes to the total number of possible outcomes, where all outcomes are equally likely shows considerable effectiveness due to</p> <ul style="list-style-type: none"> an understanding of most of the concepts minor errors and/or omissions in the application of the procedures
40	<p>Application of knowledge and skills to express theoretical probability as a ratio of the number of favourable outcomes to the total number of possible outcomes, where all outcomes are equally likely shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> a thorough understanding of the concepts an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding)

**Scoring Guide for Mathematics Open-Response
Question 9**

**Code
10**

The faces of a number cube are labelled 1, 2, 2, 3, 4 and 5. The number cube is rolled 114 times.

- How many times would you expect the number 2 to appear?

Justify your answer.

$$114 \div 2 = 57$$

The number 2 will appear
57 times

Annotation:

Student demonstrates misunderstanding of the concepts; incorrectly divides 114 by 2 with no justification.

Scoring Guide for Mathematics Open-Response Question 9

Code
20

The faces of a number cube are labelled 1, 2, 2, 3, 4 and 5. The number cube is rolled 114 times.

- How many times would you expect the number 2 to appear?

Justify your answer.

$$5 \overline{) 114} \quad 23$$

you have divide 5 by 114 because there are five numbers and you make 114 so I would expect 2 to come up 23 times

Annotation:

Student demonstrates a partial understanding of the concepts; divides 114 by the number of numbers (5) instead of the number of faces on the number cube (6).

Scoring Guide for Mathematics Open-Response Question 9

Code
30



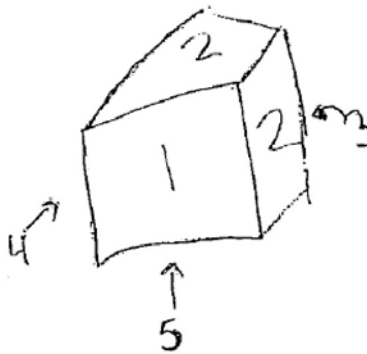
The faces of a number cube are labelled 1, 2, 2, 3, 4 and 5. The number cube is rolled 114 times.

- How many times would you expect the number 2 to appear?

Justify
Justify your answer.
I think the number 2 will appear 19 times out of 114 because $114 \text{ (times rolled)} \div 6 \text{ (number of faces on the cube)} = 19$.

$$114 \div 6 = 19$$

$$\begin{array}{r} 19 \\ \hline 114 \end{array}$$



6 faces in total

Annotation:

Student demonstrates a minor omission in the application of the procedures; correctly identifies that each face has an expected probability of $1/6$ by dividing 114 by 6, but does not double the quotient to represent that there are two faces with 2 on the number cube.

**Scoring Guide for Mathematics Open-Response
Question 9**

**Code
40**

The faces of a number cube are labelled 1, 2, 2, 3, 4 and 5. The number cube is rolled 114 times.

- How many times would you expect the number 2 to appear?

Justify your answer.

$$114 \div 6 = 19$$

$$2 \times 19 = 38$$

\therefore The number 2 would appear 38 times.

Annotation:

Student demonstrates a thorough understanding of the concepts; gives evidence of “equally likely” by correctly dividing the total number of rolls by 6 (the number of faces) and multiplying by 2 to represent two faces with 2’s.

Scoring Guide for Mathematics Open-Response Question 10

Code	Descriptor
B	<ul style="list-style-type: none"> blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> <i>Illegible: cannot be read; completely crossed out/erased; not written in English</i> <i>Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”)</i> <i>Off topic: no relationship of written work to the question</i>
10	<p>Problem-solving process to estimate quantities using benchmarks of 10%, 25%, 50%, 75%, and 100% shows limited effectiveness due to</p> <ul style="list-style-type: none"> minimal evidence of a solution process limited identification of important elements of the problem too much emphasis on unimportant elements of the problem no conclusions presented conclusion presented without supporting evidence
20	<p>Problem-solving process to estimate quantities using benchmarks of 10%, 25%, 50%, 75%, and 100% shows some effectiveness due to</p> <ul style="list-style-type: none"> an incomplete solution process identification of some of the important elements of the problem some understanding of the relationships between important elements of the problem simple conclusions with little supporting evidence
30	<p>Problem-solving process to estimate quantities using benchmarks of 10%, 25%, 50%, 75%, and 100% shows considerable effectiveness due to</p> <ul style="list-style-type: none"> a solution process that is nearly complete identification of most of the important elements of the problem a considerable understanding of the relationships between important elements of the problem appropriate conclusions with supporting evidence
40	<p>Problem-solving process to estimate quantities using benchmarks of 10%, 25%, 50%, 75%, and 100% shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> a complete solution process identification of all important elements of the problem a thorough understanding of the relationships between all of the important elements of the problem appropriate conclusions with thorough and insightful supporting evidence

Scoring Guide for Mathematics Open-Response Question 10

**Code
10**

Each of 130 students sign up for one of five activities. The table below shows some of the results.

Activity Sign-Up

Activity	Number of Students
Soccer	38
Chess	13
Band	33
Drama	
Photography	14

Susan estimates that 25% of the students signed up for drama. Jessica estimates that 50% of the students signed up for drama.

Using the benchmarks of 10%, 25%, 50%, 75% or 100%, justify which estimate is more appropriate.

$\begin{array}{r} 38 \\ 33 \\ 13 \\ + 14 \\ \hline 98 \end{array}$	<p>2 people signed up for drama because $98 + 2 = 100$.</p>
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Annotation:

Student demonstrates limited identification of important elements of the problem; correctly totals the number of participants in the table and determines the number in drama to be the difference between 98 and 100 (instead of between 98 and 130), does not make a conclusion of which estimate is more appropriate.

Scoring Guide for Mathematics Open-Response Question 10

Code
20

Each of 130 students sign up for one of five activities. The table below shows some of the results.

Activity Sign-Up

Activity	Number of Students
Soccer	38
Chess	13
Band	33
Drama	
Photography	14

Susan estimates that 25% of the students signed up for drama. Jessica estimates that 50% of the students signed up for drama.

Using the benchmarks of 10%, 25%, 50%, 75% or 100%, justify which estimate is more appropriate.

$ \begin{array}{r} 138 \\ 13 \\ 33 \\ + 14 \\ \hline 98 \end{array} $	$ \begin{array}{r} 130 \\ - 98 \\ \hline 32 \end{array} $	<p>That means 32% (32 students) signed up for drama!</p> <p>I think Susan's estimate (25%) is more appropriate because 32% of people signed up for drama and 32 is closer to 25 than 50, so 25% is the most appropriate benchmark.</p>
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Annotation:

Student demonstrates a problem solving process that is incomplete; correctly calculates the number of students in drama but confuses this value with percentage (*That means 32% (32 students) signed up for drama!*) and concludes that the number 32 is closer to 25 than 65.

Scoring Guide for Mathematics Open-Response Question 10

Code 30

Each of 130 students sign up for one of five activities. The table below shows some of the results.

Activity Sign-Up

Activity	Number of Students
Soccer	38
Chess	13
Band	33
Drama	
Photography	14

Susan estimates that 25% of the students signed up for drama. Jessica estimates that 50% of the students signed up for drama.

Using the benchmarks of 10%, 25%, 50%, 75% or 100%, justify which estimate is more appropriate.

The 25% would be more appropriate because 50% would be 65 student which is too much.

$$\begin{array}{r}
 1 \\
 38 \\
 13 \\
 33 \\
 + 14 \\
 \hline
 98 \\
 \\
 130 \\
 - 98 \\
 \hline
 32
 \end{array}$$

Annotation:

Student demonstrates a considerable understanding of relationships between important elements of the problem; correctly calculates the number of students in drama, calculates that 65 students would equal 50% (*which is too much*) so 25% is chosen without showing sufficient evidence that 32 students is closer to 25% than 50%.

Scoring Guide for Mathematics Open-Response Question 10

Code
40

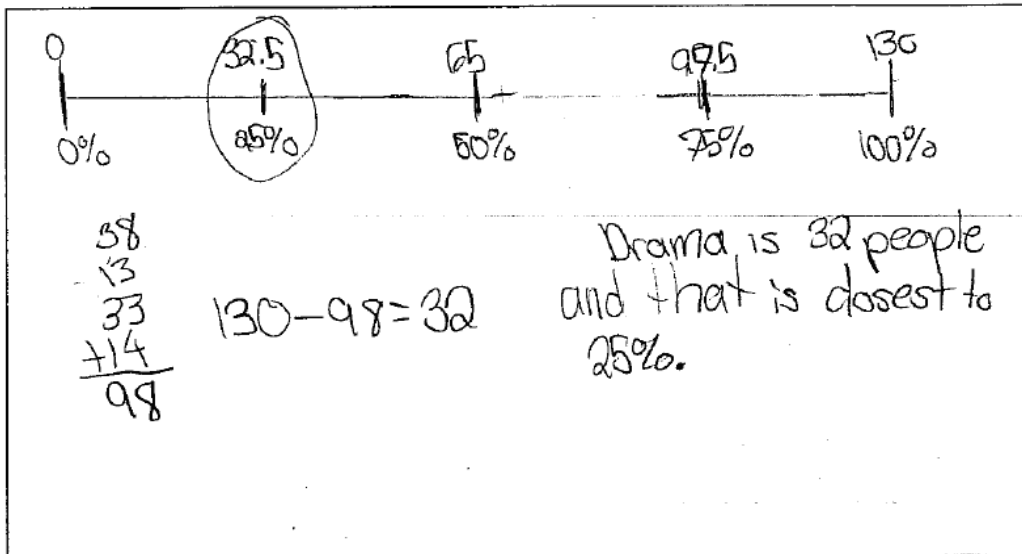
Each of 130 students sign up for one of five activities. The table below shows some of the results.

Activity Sign-Up

Activity	Number of Students
Soccer	38
Chess	13
Band	33
Drama	
Photography	14

Susan estimates that 25% of the students signed up for drama. Jessica estimates that 50% of the students signed up for drama.

Using the benchmarks of 10%, 25%, 50%, 75% or 100%, justify which estimate is more appropriate.



Annotation:

Student demonstrates a thorough understanding of the relationships between important elements of the problem; correctly determines the number of students in drama and calculates benchmarks of 25%, 50% and 75% of 130 to justify that 25% is the correct benchmark for drama.

Scoring Guide for Mathematics Open-Response Question 27

Code	Descriptor
B	<ul style="list-style-type: none"> blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> Illegible: cannot be read; completely crossed out/erased; not written in English Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”) Off topic: no relationship of written work to the question
10	<p>Problem-solving process to determine and explain the relationships among fractions, decimal numbers, and percents shows limited effectiveness due to</p> <ul style="list-style-type: none"> minimal evidence of a solution process limited identification of important elements of the problem too much emphasis on unimportant elements of the problem no conclusions presented conclusion presented without supporting evidence
20	<p>Problem-solving process to determine and explain the relationships among fractions, decimal numbers, and percents shows some effectiveness due to</p> <ul style="list-style-type: none"> an incomplete solution process identification of some of the important elements of the problem some understanding of the relationships between important elements of the problem simple conclusions with little supporting evidence
30	<p>Problem-solving process to determine and explain the relationships among fractions, decimal numbers, and percents shows considerable effectiveness due to</p> <ul style="list-style-type: none"> a solution process that is nearly complete identification of most of the important elements of the problem a considerable understanding of the relationships between important elements of the problem appropriate conclusions with supporting evidence
40	<p>Problem-solving process to determine and explain the relationships among fractions, decimal numbers, and percents shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> a complete solution process identification of all important elements of the problem a thorough understanding of the relationships between all of the important elements of the problem appropriate conclusions with thorough and insightful supporting evidence

Scoring Guide for Mathematics Open-Response
Question 27

Code
10

Josie, Christina, Audrey and Manny go shopping. Josie spends $\frac{4}{5}$ of her money, Christina spends 75% of her money, Audrey spends 0.68 of her money and Manny spends $\frac{17}{20}$ of his money.

Who has the largest percentage of their money left?

Justify your answer.

Christina "does" because
she only spent 75% of
her money, she would
have left \$25

Annotation:

Student demonstrates a minimal evidence of a solution process; does not address the relationships among fractions, decimal numbers and percents. Only deals with Christine's percentage and conclusion is inaccurate.

Scoring Guide for Mathematics Open-Response
Question 27

Code
20

Josie, Christina, Audrey and Manny go shopping. Josie spends $\frac{4}{5}$ of her money, Christina spends 75% of her money, Audrey spends 0.68 of her money and Manny spends $\frac{17}{20}$ of his money.

Who has the largest percentage of their money left?

Justify your answer.

Audrey has
the largest
percentage of
his money left!

$$\text{Christina } \frac{75}{100}$$

$$\text{Audrey } \frac{68}{100}$$

$$\text{Manny } \frac{97}{100}$$

$$\text{Josie } ?$$

Annotation:

Student identifies some of the important elements of the problem; converts 0.68 and 75% to fractions out of 100 accurately but, error converting Manny's amount and does not convert Josie's amount. Correctly concludes "Audrey" has the largest percentage of money left based on this work.

Scoring Guide for Mathematics Open-Response
Question 27

Code
30

Josie, Christina, Audrey and Manny go shopping. Josie spends $\frac{4}{5}$ of her money, Christina spends 75% of her money, Audrey spends 0.68 of her money and Manny spends $\frac{17}{20}$ of his money.

Who has the largest percentage of their money left?

Justify your answer.

Josie = $\frac{4}{5} = 80\%$
Christina = 75% = 75%
Audrey = 0.68 = 68%
Manny = $\frac{17}{20} = 85\%$

I converted the fractions and the decimals to a percent

Manny has the largest percent of Money left

Annotation:

Student demonstrates a solution process that is nearly complete; accurately represents all amounts spent as percents but chooses person with the largest amount of money spent instead of smallest which would imply the largest amount of money left.

Scoring Guide for Mathematics Open-Response Question 27

**Code
40**

Josie, Christina, Audrey and Manny go shopping. Josie spends $\frac{4}{5}$ of her money, Christina spends 75% of her money, Audrey spends 0.68 of her money and Manny spends $\frac{17}{20}$ of his money.

Who has the largest percentage of their money left?

Justify your answer.

Manny

$$\frac{17}{20} \rightarrow \frac{85}{100} \quad \times 5$$

Josie

$$\frac{4}{5} \rightarrow \frac{80}{100} \quad \times 20$$

Christina

75%

Audrey

68%

Manny - 85%
 Josie - 80%
 Christina - 75%
 Audrey - 68%

∴ (Therefore) Audrey has the largest percentage of his money left.

Annotation:

Student demonstrates a complete problem solving process; correctly represents all amounts **spent** as percents and makes a correct conclusion.

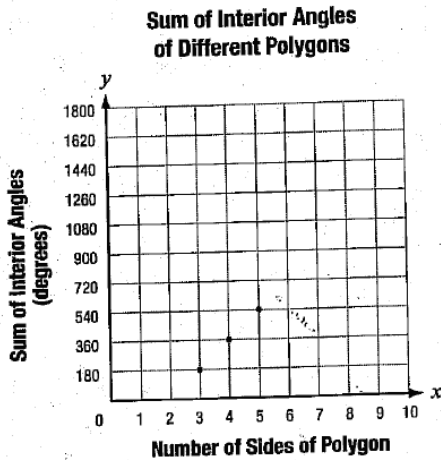
Scoring Guide for Mathematics Open-Response Question 28

Code	Descriptor
B	<ul style="list-style-type: none"> blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> <i>Illegible: cannot be read; completely crossed out/erased; not written in English</i> <i>Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”)</i> <i>Off topic: no relationship of written work to the question</i>
10	<p>Problem-solving process to make tables of values, for growing patterns given pattern rules, in words then list the ordered pairs and plot the points in the first quadrant shows limited effectiveness due to</p> <ul style="list-style-type: none"> minimal evidence of a solution process limited identification of important elements of the problem too much emphasis on unimportant elements of the problem no conclusions presented conclusion presented without supporting evidence
20	<p>Problem-solving process to make tables of values, for growing patterns given pattern rules, in words then list the ordered pairs and plot the points in the first quadrant shows some effectiveness due to</p> <ul style="list-style-type: none"> an incomplete solution process identification of some of the important elements of the problem some understanding of the relationships between important elements of the problem simple conclusions with little supporting evidence
30	<p>Problem-solving process to make tables of values, for growing patterns given pattern rules, in words then list the ordered pairs and plot the points in the first quadrant shows considerable effectiveness due to</p> <ul style="list-style-type: none"> a solution process that is nearly complete identification of most of the important elements of the problem a considerable understanding of the relationships between important elements of the problem appropriate conclusions with supporting evidence
40	<p>Problem-solving process to make tables of values, for growing patterns given pattern rules, in words then list the ordered pairs and plot the points in the first quadrant shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> a complete solution process identification of all important elements of the problem a thorough understanding of the relationships between all of the important elements of the problem appropriate conclusions with thorough and insightful supporting evidence

Scoring Guide for Mathematics Open-Response Question 28

Code
10

The graph below shows the relationship between the number of sides of a polygon and the sum of the interior angles of that polygon.



- On the grid above, extend the pattern for polygons with 6 sides, 7 sides and 8 sides.
- Sam states that the rule to determine the sum of the interior angles of a polygon is “subtract 2 from the number of sides and multiply this difference by 180.” Is Sam’s rule correct?

Justify your answer.

No she is not correct because if you subtracted 2 from one 180 and then you multiply it by 180... It won't work.

$$\begin{array}{r}
 180 \\
 - 2 \\
 \hline
 178 \\
 \times 180 \\
 \hline
 14418
 \end{array}$$

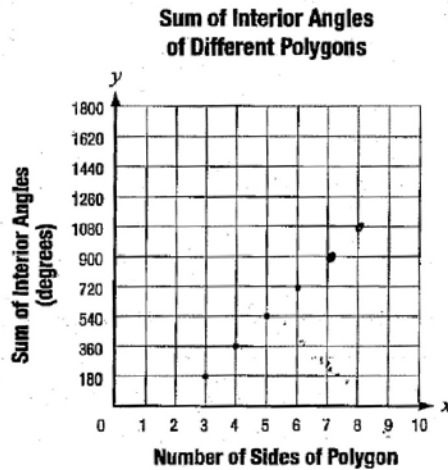
Annotation:

Student places too much emphasis on unimportant elements of the problem; does not extend the pattern and justifies conclusion by incorrectly applying the pattern rule.

Scoring Guide for Mathematics Open-Response Question 28

Code
20

The graph below shows the relationship between the number of sides of a polygon and the sum of the interior angles of that polygon.



- On the grid above, extend the pattern for polygons with 6 sides, 7 sides and 8 sides.
- Sam states that the rule to determine the sum of the interior angles of a polygon is “subtract 2 from the number of sides and multiply this difference by 180.” Is Sam’s rule correct?

Justify your answer.

Sam's rule is correct.

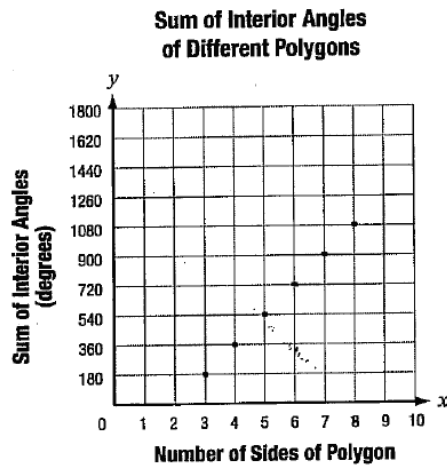
Annotation:

Student demonstrates an incomplete solution process; correctly extends the pattern by plotting points on the grid for polygons with 6, 7 and 8 sides and states a correct conclusion but does not provide evidence to justify the conclusion.

Scoring Guide for Mathematics Open-Response Question 28

Code
30

The graph below shows the relationship between the number of sides of a polygon and the sum of the interior angles of that polygon.



- On the grid above, extend the pattern for polygons with 6 sides, 7 sides and 8 sides.
- Sam states that the rule to determine the sum of the interior angles of a polygon is “subtract 2 from the number of sides and multiply this difference by 180.” Is Sam’s rule correct?

Justify your answer.

Yes, Sam's rule is correct.
Let's use an example.

$$\square \quad 4 - 2 = 2$$

$$2 \times 180 = 360$$

On the grid above, it says that quadrilaterals' interior angle sum is 360° .

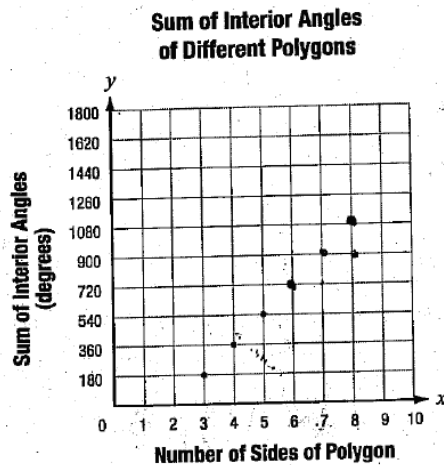
Annotation:

Student demonstrates a complete solution process; correctly extends the pattern by plotting points on the grid and conclusion is supported using Sam’s rule to determine the sum of the interior angles for more than one polygon.

Scoring Guide for Mathematics Open-Response Question 28

Code
40

The graph below shows the relationship between the number of sides of a polygon and the sum of the interior angles of that polygon.



- On the grid above, extend the pattern for polygons with 6 sides, 7 sides and 8 sides.
- Sam states that the rule to determine the sum of the interior angles of a polygon is "subtract 2 from the number of sides and multiply this difference by 180." Is Sam's rule correct?

Justify your answer.

Yes, this rule is correct:

$$\begin{aligned}3 - 2 &= 1 \times 180 = 180 \\4 - 2 &= 2 \times 180 = 360 \\5 - 2 &= 3 \times 180 = 540 \\6 - 2 &= 4 \times 180 = 720 \\7 - 2 &= 5 \times 180 = 900 \\8 - 2 &= 6 \times 180 = 1080\end{aligned}$$

Annotation:

Student demonstrates a complete solution process; correctly extends the pattern by plotting points on the grid and conclusion is supported using Sam's rule to determine the sum of the interior angles for more than one polygon.

Scoring Guide for Mathematics Open-Response Question 29

Code	Descriptor
B	<ul style="list-style-type: none"> • blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> • <i>Illegible: cannot be read; completely crossed out/erased; not written in English</i> • <i>Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”)</i> • <i>Off topic: no relationship of written work to the question</i>
10	<p>Problem-solving process to demonstrate an understanding of mean and use the mean to compare two sets of related data shows limited effectiveness due to</p> <ul style="list-style-type: none"> • minimal evidence of a solution process • limited identification of important elements of the problem • too much emphasis on unimportant elements of the problem • no conclusions presented • conclusion presented without supporting evidence
20	<p>Problem-solving process to demonstrate an understanding of mean and use the mean to compare two sets of related data shows some effectiveness due to</p> <ul style="list-style-type: none"> • an incomplete solution process • identification of some of the important elements of the problem • some understanding of the relationships between important elements of the problem • simple conclusions with little supporting evidence
30	<p>Problem-solving process to demonstrate an understanding of mean and use the mean to compare two sets of related data shows considerable effectiveness due to</p> <ul style="list-style-type: none"> • a solution process that is nearly complete • identification of most of the important elements of the problem • a considerable understanding of the relationships between important elements of the problem • appropriate conclusions with supporting evidence
40	<p>Problem-solving process to demonstrate an understanding of mean and use the mean to compare two sets of related data shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> • a complete solution process • identification of all important elements of the problem • a thorough understanding of the relationships between all of the important elements of the problem • appropriate conclusions with thorough and insightful supporting evidence

Scoring Guide for Mathematics Open-Response Question 29

**Code
10**

Jason plays on his school's basketball team. The table below shows the number of points Jason scores in the first 9 games of the season.

Jason's Points

Game	Points
1	8
2	6
3	8
4	6
5	10
6	35
7	10
8	8
9	8

Explain why the mean does not truly represent Jason's usual performance.

Explain your thinking.

The mean does not truly represent Jason's usual performance because when you add all the numbers up it equals 99. And when you divide it by 2 to get the average $\frac{99}{2} = 49.5$ % . And it is a decimal \neq 00 I would round it up to 50% , almost or about $\frac{1}{2}$ of 100. $\frac{49.5}{100}$

Annotation:

Student places too much emphasis on unimportant elements of the problem; attempts to find the mean by adding the points listed in the table but divides by 2 instead of 9. Explanation does not address why the mean does not represent Jason's usual performance

Scoring Guide for Mathematics Open-Response Question 29

**Code
20**

Jason plays on his school's basketball team. The table below shows the number of points Jason scores in the first 9 games of the season.

Jason's Points

Game	Points
1	8
2	6
3	8
4	6
5	10
6	35
7	10
8	8
9	8

Explain why the mean does not truly represent Jason's usual performance.

Explain your thinking.

$$6, 6, 8, 8, 8, 8, 10, 10, 35; n = 9 = 11$$

Annotation:

Student provides an incomplete solution process; calculates the mean (11) but does not explain why it does not represent Jason's usual performance or identify the outlier (35).

Scoring Guide for Mathematics Open-Response Question 29

Code
30

Jason plays on his school's basketball team. The table below shows the number of points Jason scores in the first 9 games of the season.

Jason's Points

Game	Points
1	8
2	6
3	8
4	6
5	10
6	35
7	10
8	8
9	8

Explain why the mean does not truly represent Jason's usual performance.

Explain your thinking.

mean=11

The mean dose not truly represent Jason's usual performance because on his sixth game he got 35 points but his avrage is only 11.

Annotation:

Student demonstrates considerable understanding of the relationships between the important elements of the problem; identifies the mean and the outlier but does not describe how the outlier impacts the mean.

Scoring Guide for Mathematics Open-Response Question 29

Code 40

Jason plays on his school's basketball team. The table below shows the number of points Jason scores in the first 9 games of the season.

Jason's Points

Game	Points
1	8
2	6
3	8
4	6
5	10
6	35
7	10
8	8
9	8

Explain why the mean does not truly represent Jason's usual performance.

Explain your thinking.

mean =

$$\begin{array}{r}
 8 \\
 6 \\
 8 \\
 + 6 \\
 \hline
 28 \\
 + 10 \\
 \hline
 38 \\
 + 10 \\
 \hline
 48 \\
 + 35 \\
 \hline
 83 \\
 + 8 \\
 \hline
 91
 \end{array}$$

$$\begin{array}{r}
 11 \\
 9 \overline{)99} \text{ R0} \\
 \underline{9 \times} \\
 09 \\
 \underline{9} \\
 0
 \end{array}$$

This mean does not truly represent Jason's usual performance because in all games except game 6 he scored less than 11 points. Because he scored 35 points in game 6 it brought the average (mean) up quite a bit. In reality although the mean isn't that far off, it's not truly correct.

Annotation:

Student demonstrates a thorough understanding of the relationships between important elements of the problem; provides an insightful explanation that identifies the outlier and its impact on the mean with justification.

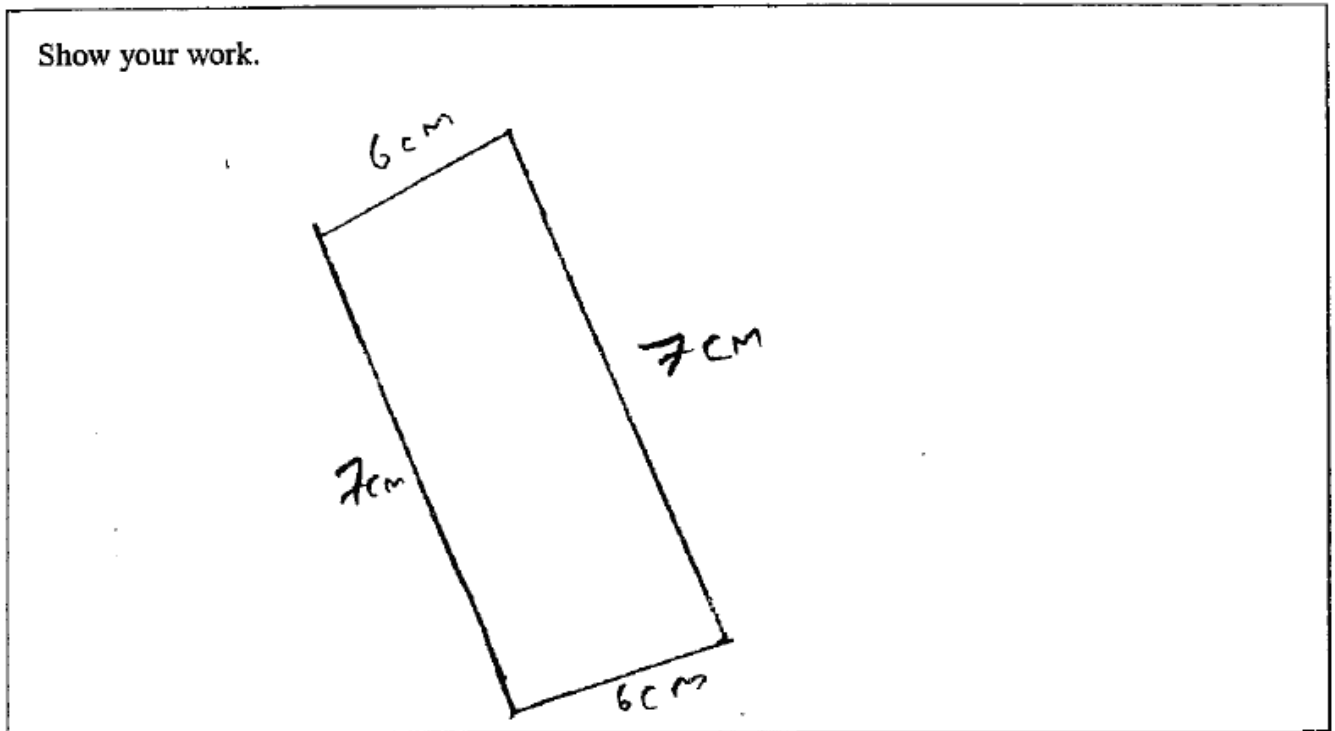
Scoring Guide for Mathematics Open-Response Question 30

Code	Descriptor
B	<ul style="list-style-type: none"> blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> <i>Illegible: cannot be read; completely crossed out/erased; not written in English</i> <i>Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”)</i> <i>Off topic: no relationship of written work to the question</i>
10	<p>Application of knowledge and skills to construct polygons using a variety of tools, given angle and side measurements shows limited effectiveness due to</p> <ul style="list-style-type: none"> misunderstanding of concepts incorrect selection or misuse of procedures
20	<p>Application of knowledge and skills to construct polygons using a variety of tools, given angle and side measurements shows some effectiveness due to</p> <ul style="list-style-type: none"> partial understanding of the concepts errors and/or omissions in the application of the procedures
30	<p>Application of knowledge and skills to construct polygons using a variety of tools, given angle and side measurements shows considerable effectiveness due to</p> <ul style="list-style-type: none"> an understanding of most of the concepts minor errors and/or omissions in the application of the procedures
40	<p>Application of knowledge and skills to construct polygons using a variety of tools, given angle and side measurements shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> a thorough understanding of the concepts an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding)

Scoring Guide for Mathematics Open-Response
Question 30

Code
10

Using a protractor and a ruler, construct a parallelogram with an angle measure of 115° and sides with lengths of 7 cm and 6 cm. Mark on the parallelogram the length of each side and the measure of all angles.



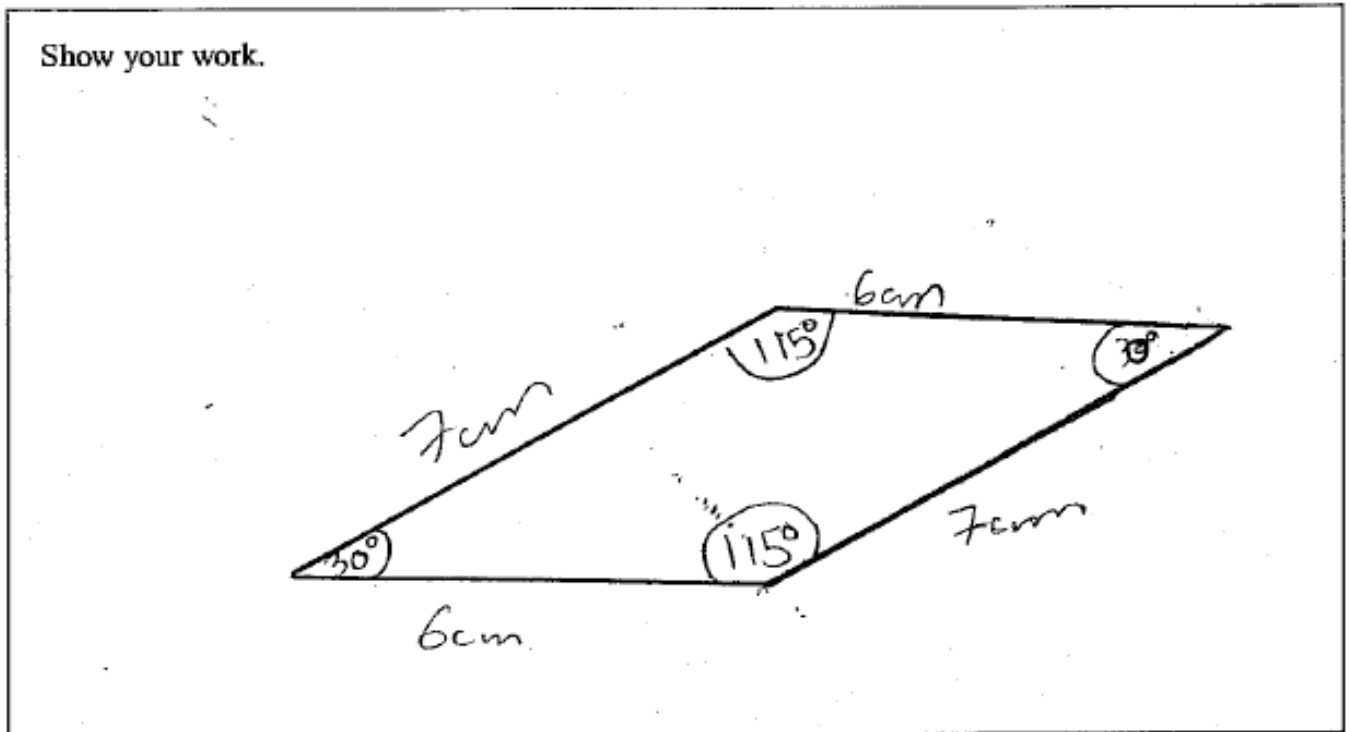
Annotation:

Student demonstrates a misunderstanding of concepts; constructs a parallelogram with 2 sides of 7 cm but the other 2 sides and none of the angles meets the required criteria.

Scoring Guide for Mathematics Open-Response
Question 30

Code
20

Using a protractor and a ruler, construct a parallelogram with an angle measure of 115° and sides with lengths of 7 cm and 6 cm. Mark on the parallelogram the length of each side and the measure of all angles.



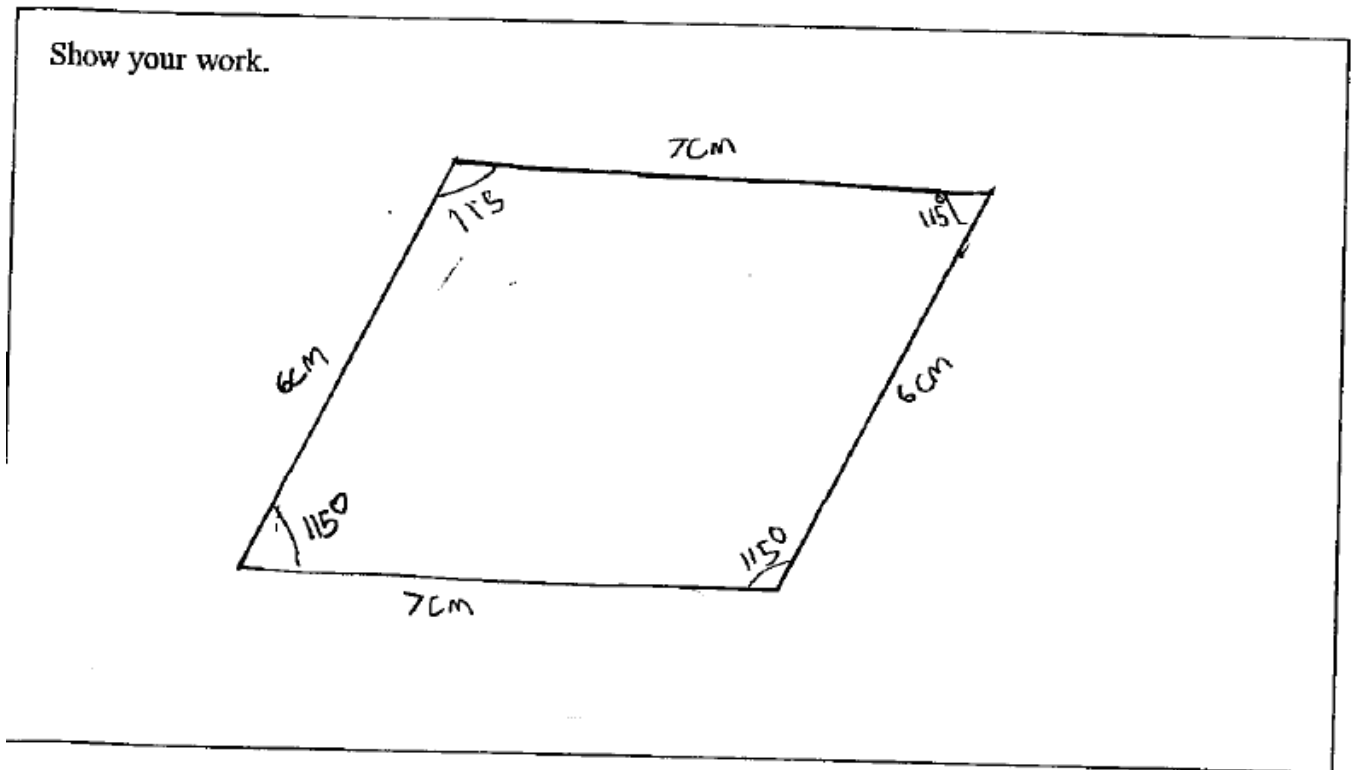
Annotation:

Student demonstrates a misunderstanding of concepts; constructs a parallelogram with two sides of about 6 cm but none of the angles meets the required criteria.

Scoring Guide for Mathematics Open-Response
Question 30

Code
30

Using a protractor and a ruler, construct a parallelogram with an angle measure of 115° and sides with lengths of 7 cm and 6 cm. Mark on the parallelogram the length of each side and the measure of all angles.



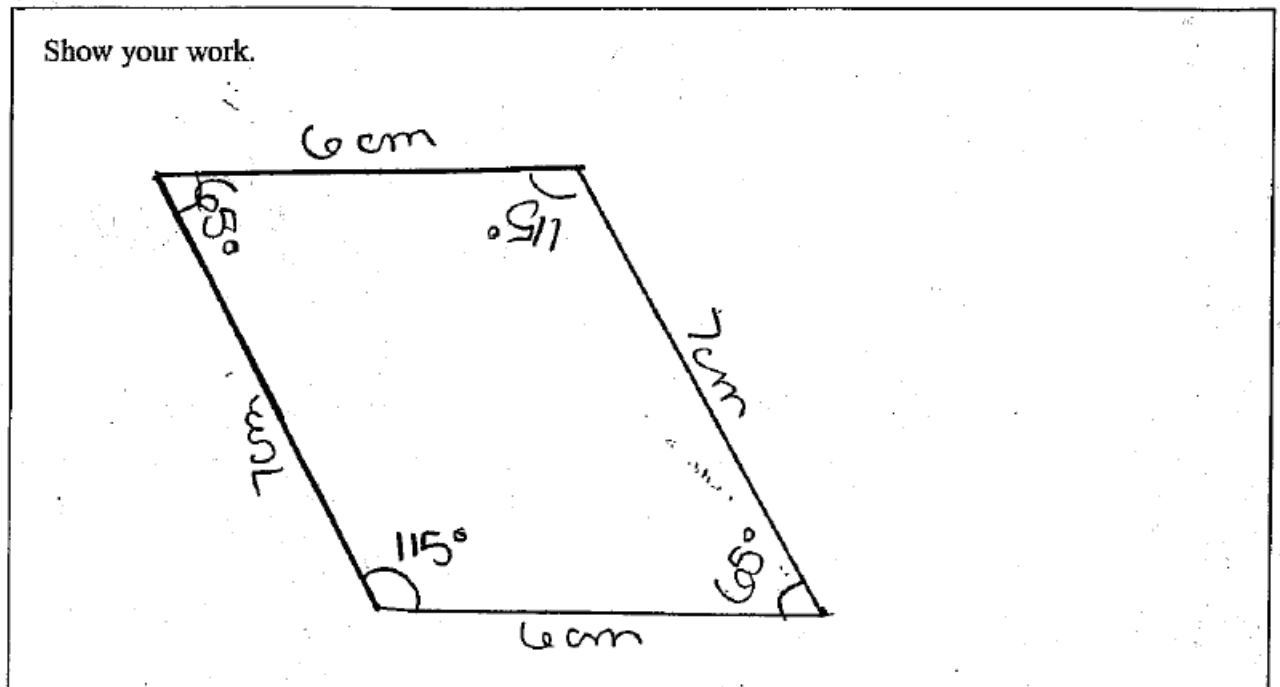
Annotation:

Student makes a minor error in the application of procedures; constructs a parallelogram meeting the required criteria, sides are labelled correctly, but acute angles are labelled with measurements of obtuse angles (may have read wrong scale on protractor).

Scoring Guide for Mathematics Open-Response
Question 30

Code
40

Using a protractor and a ruler, construct a parallelogram with an angle measure of 115° and sides with lengths of 7 cm and 6 cm. Mark on the parallelogram the length of each side and the measure of all angles.



Annotation:

Student demonstrates an accurate application of the procedures; constructs a parallelogram meeting required criteria (acceptable range: angles within $\pm 5^\circ$, sides within ± 0.5 cm), all sides and angles are labelled correctly.