Released 2013 Achievement Test

Mathematics

GRADE 9

Use the following information to answer question 1.

$\sqrt{51}$ $\sqrt{55}$ $\sqrt{61}$ $\sqrt{66}$ $\sqrt{71}$ $\sqrt{77}$ $\sqrt{81}$ $\sqrt{88}$

1. How many of the square roots shown above have a value that is between 7.8 and 8.8?

A. 2
B. 3
C. 4
D. 5

Use the following information to answer numerical-response question 1.

Members of a recreation centre pay a one-time registration fee in addition to a fixed monthly fee of $15. The following table shows the total amount paid to be a member of the centre for a certain number of months.

Number of Months	Total Amount Paid
4	$135
6	$165
12	$255

Numerical Response

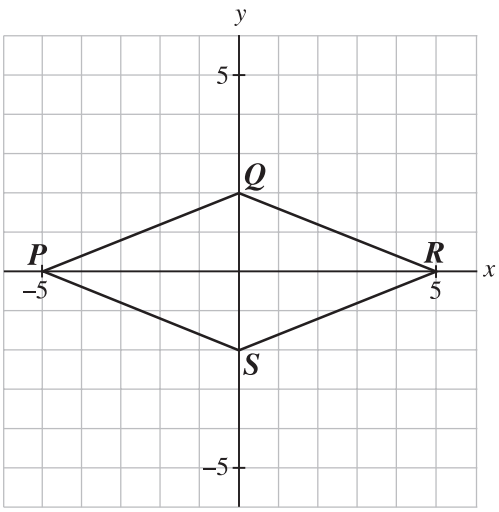
1. According to the information above, what is the cost of the one-time registration fee?

Answer: _____ dollars

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer question 2.

The 2-D shape shown below is rotated about its centre.



2. What are the order of rotational symmetry and the angle of rotation of the 2-D shape?

Row	Order of rotational symmetry	Angle of rotation
A.	1	180°
B.	1	360°
C.	2	180°
D.	2	360°

Use the following information to answer question 3.

Two students, Robert and Jacob, simplify the expression $3(x^2 + 4x - 1) - (2x + 5)$, as shown below.

	Robert	**Jacob**
Step 1	$= 3x^2 + 12x - 3 - (2x + 5)$	$= 3x^2 + 12x - 1 - (2x + 5)$
Step 2	$= 3x^2 + 12x - 3 - 2x + 5$	$= 3x^2 + 12x - 1 - 2x - 5$
Step 3	$= 3x^2 + 10x + 2$	$= 3x^2 + 10x - 6$

3. The **first** error made in the simplification of the expression shown above was made by

A. Robert in Step 1

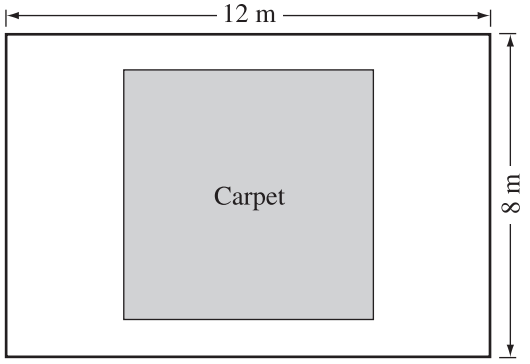
B. Jacob in Step 1

C. Robert in Step 2

D. Jacob in Step 2

Use the following information to answer question 4.

A square carpet covers 37.5% of the floor area of a rectangular room, as shown below.



4. What is the side length of the carpet shown above?

A. 7 m

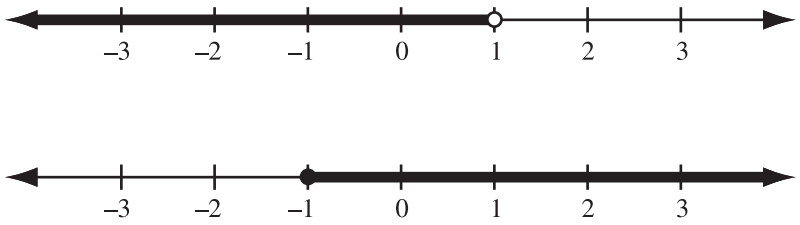
B. 6 m

C. 5 m

D. 4 m

Use the following information to answer question 5.

An inequality is shown on each number line below.



5. Which expression represents the values (n) that are part of both inequalities?

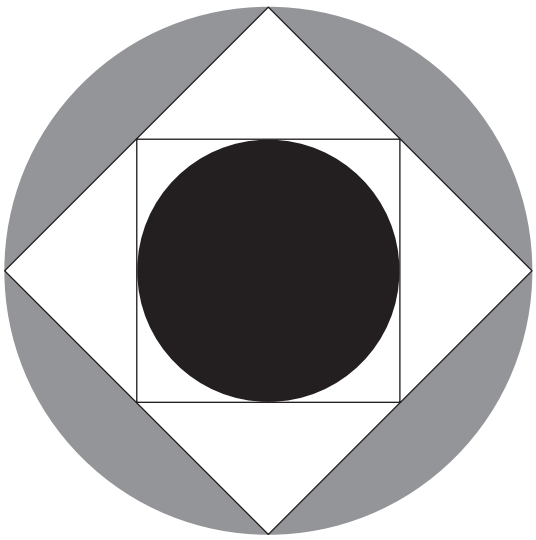
A. $-1 \leq n \leq 1$

B. $-1 \leq n < 1$

C. $-1 < n \leq 1$

D. $-1 < n < 1$

Use the following diagram to answer numerical-response question 2.



Numerical Response

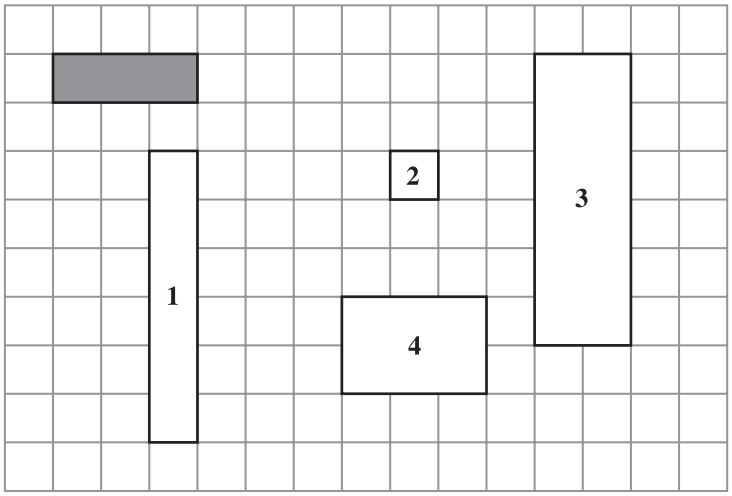
2. How many lines of symmetry does the diagram shown above have?

Answer: _____ lines

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer question 6.

Four-sided Polygons



6. Which of the polygons above is proportional to the shaded rectangle?

A. 1
B. 2
C. 3
D. 4

Use the following information to answer question 7.

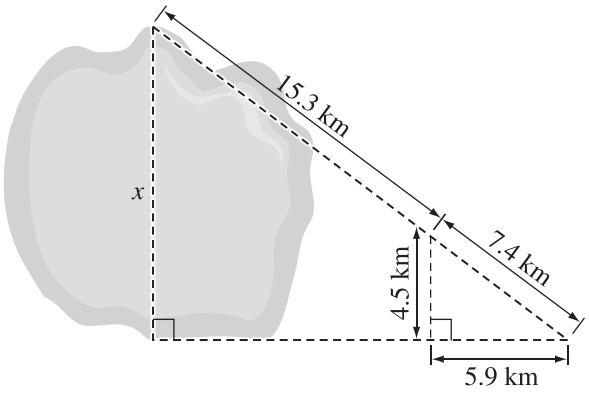
A teacher placed a cafeteria coupon in only one of three differently coloured envelopes. A randomly selected student was asked to choose one of the three envelopes. The student chose the red envelope because red was his favourite colour.

7. The student's decision was based on

A. subjective judgment
B. theoretical probability
C. experimental probability
D. mathematical calculation

Use the following information to answer question 8.

In the diagram below, x represents the approximate distance across a circular lake.



8. What is the approximate area of the lake, to the nearest square kilometre?

A. 599 km^2
B. 272 km^2
C. 150 km^2
D. 68 km^2

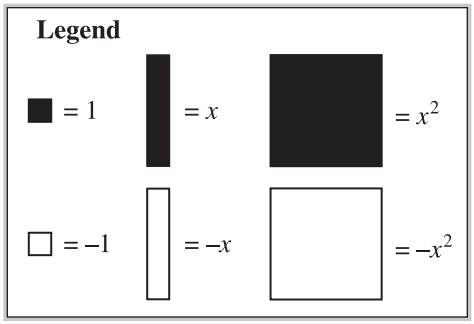
Numerical Response

3. If $(x^3)^2 \div x^4 = 144$, then what is the whole number value of x?

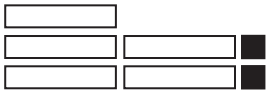
Answer: _____

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer question 9.

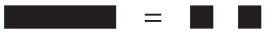


The left and right sides of an equation are represented below.

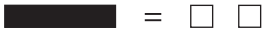
Left side	Right side
	

9. The solution to the equation above can be represented by

A. 

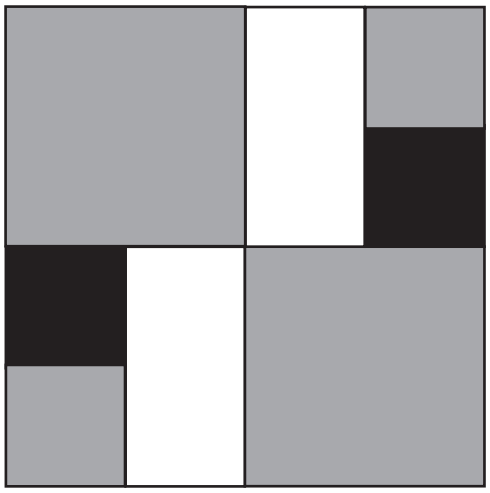
B. 

C. 

D. 

Use the following information to answer numerical-response question 4.

The diagram shown below is a square and has a perimeter of 8 cm.



Numerical Response

4. What is the **total** area of the white rectangles and the black squares?

Answer: _____ **cm^2**

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer question 10.

The gong shown below is 30 cm in diameter and hangs by a chain from a nail.
The total length of the chain is 18 cm. The lengths of chain on each side of the nail are equal to each other and form a tangent to the gong.

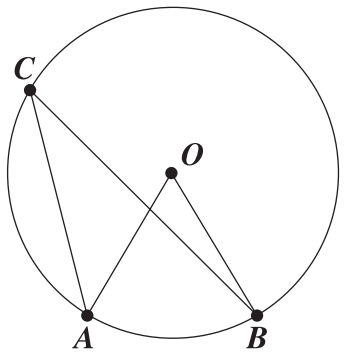
Note: The diagram shown above has **not** been drawn to scale.

10. How far above the top of the gong is the nail, to the nearest tenth of a centimetre?

A. 2.3 cm
B. 2.5 cm
C. 12.0 cm
D. 17.5 cm

Use the following information to answer question 11.

The letter ***O*** in the diagram below represents the centre of the circle.



Note: The diagram shown above has **not** been drawn to scale.

11. If the sum of $\angle AOB$ and $\angle ACB$ is 75°, then $\angle ACB$ equals

A. 30°
B. 25°
C. 20°
D. 15°

Use the following information to answer question 12.

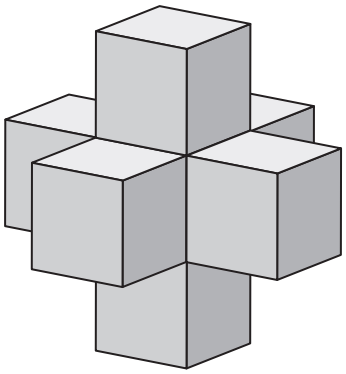
Nina and Sarah observe that 6 of their 10 female classmates are shorter than 160 cm. Nina concludes that of the 410 students in their school, 246 are shorter than 160 cm. Sarah believes Nina's conclusion cannot be supported by her observation.

12. Which of the following statements **best** supports Sarah's belief?

A. Nina's survey sample contains only female students.
B. Nina's probability calculation is incorrect.
C. Nina did not use a proper questionnaire.
D. Nina completed her survey too quickly.

Use the following information to answer question 13.

The following 3-D object is composed of identical cubes. The volume of the 3-D object is 56 cm^3.



13. The surface area of the 3-D object above is

A. 30 cm^2

B. 60 cm^2

C. 120 cm^2

D. 144 cm^2

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14. Which of the following expressions represents the addition of 7^2 and 7^3?

A. $(7 + 7)^{2 + 3}$

B. $(7 + 7)^{2 \times 3}$

C. $(7 \times 7) + (7 \times 7 \times 7)$

D. $(7 + 7) \times (7 + 7 + 7)$

Use the following information to answer question 15.

The square roots of two rational numbers are represented on the number line shown below.

15. If Q is located between points P and R on the number line above, then which of the following square roots could **not** represent Q?

A. $\sqrt{\frac{324}{81}}$

B. $\sqrt{\frac{256}{9}}$

C. $\sqrt{\frac{225}{64}}$

D. $\sqrt{\frac{169}{4}}$

Use the following information to answer numerical-response question 5.

A scientific calculator has 40 buttons, of which $\frac{1}{4}$ are white, $\frac{1}{5}$ are grey, and 4 are orange. The rest of the buttons are black.

Numerical Response

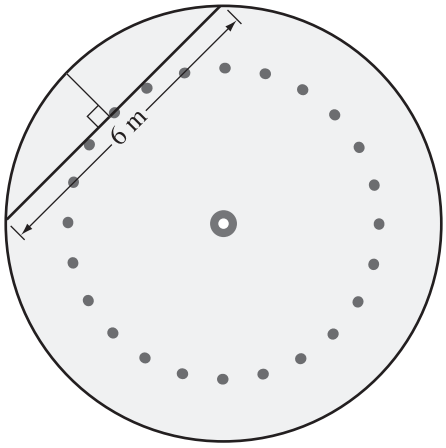
5. How many black buttons does the calculator have?

Answer: _____

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer question 16.

A diagram of a swimming pool is shown below. The dotted circle represents floating buoys. The pool has a diameter of 10 metres.



16. The shortest distance from the buoys to the edge of the pool is

A. 1 m

B. 2 m

C. 3 m

D. 4 m

Use the following information to answer question 17.

Tara, Jennifer, and Mindy donated some money to a charity. Jennifer donated twice as much as Tara, and Mindy donated $10 less than Jennifer.

17. If the **total** amount donated to the charity is $50, then how much money did Tara donate?

A. $6

B. $8

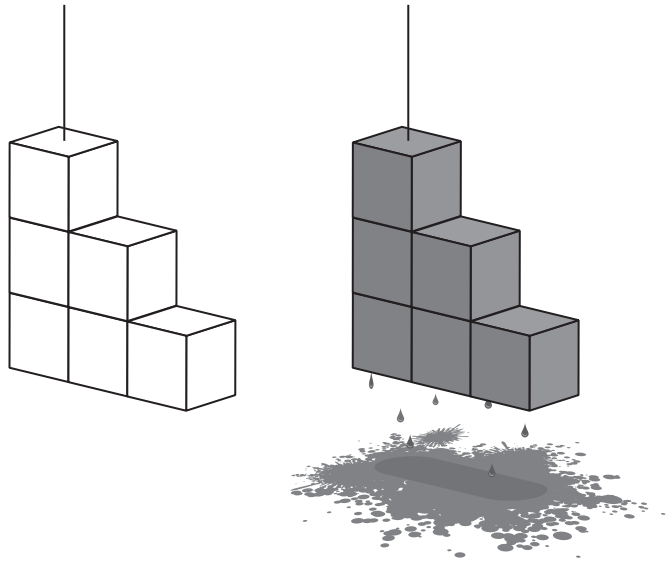
C. $12

D. $24

Use the following information to answer question 18.

A 3-D object made of 2 cm × 2 cm × 2 cm cubes is dipped in paint.

Unpainted Object **Painted Object**



18. If the painted object is separated into individual cubes, then the total area of the **unpainted** surfaces will be

A. 12 cm^2

B. 24 cm^2

C. 32 cm^2

D. 48 cm^2

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19. Which pair of expressions below are equivalent for all values of x?

A. $-3x + 4x^2 + 2$ and $4x^2 - 2 + 3x$

B. $-3x + 4x^2 + 2$ and $2 - 3x + 4x^2$

C. $2 - 4x^2 + 3x$ and $-4x^2 + 3x - 2$

D. $2 - 4x^2 + 3x$ and $-3x + 4x^2 + 2$

Use the following information to answer question 20.

The expression $\left(\frac{(n^3)^4}{n^2}\right)\left(n^{10} \div n^5 \times n^2\right)$ can be simplified to the form n^p.

20. The value of p is

A. 20

B. 17

C. 14

D. 13

Use the following information to answer question 21.

Nathan completed a 5 km run on his first day of training for a cross-country race. He increased the length of his next training runs by 1.5 km each time.

21. Which of the following equations could be used to determine the distance (d) that Nathan ran on each training run (r)?

A. $d = 1.5r$

B. $d = 5r$

C. $d = 1.5 + 3.5r$

D. $d = 3.5 + 1.5r$

Use the following information to answer question 22.

The relationship between two variables is given in the equation $35 + 15n = A$.

22. Which of the following situations could be represented using the equation above?

A. The price of a caterer for a party is \$35 for each dinner ordered and \$15 for each dessert ordered.

B. The bill for framing a painting is \$35 for each square metre of glass required and \$15 for the wooden frame.

C. The fee for a computer consultant is \$15 for an administration charge and \$35 for each hour worked.

D. The cost of silk screening a design on T-shirts is \$15 for each shirt created and a \$35 design fee.

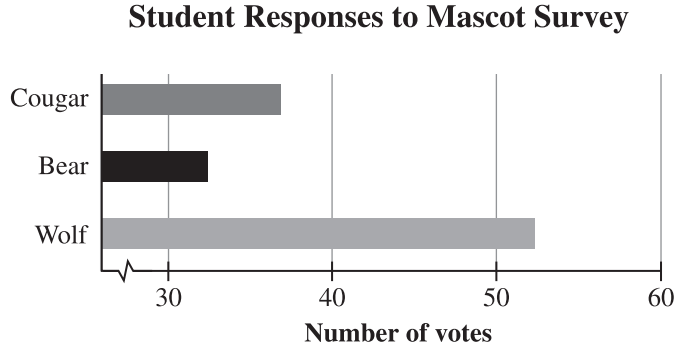
Numerical Response

6. The value of x in the equation $\frac{x}{5} + 1 = 26$ is _____.

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer question 23.

The student council of a senior high school surveyed 120 out of 250 Grade 10 students to determine which of three animals should be the school's new mascot. The results of the survey are shown below.



23. What potential bias exists in the data collection for this survey?

A. The survey question is confusing.

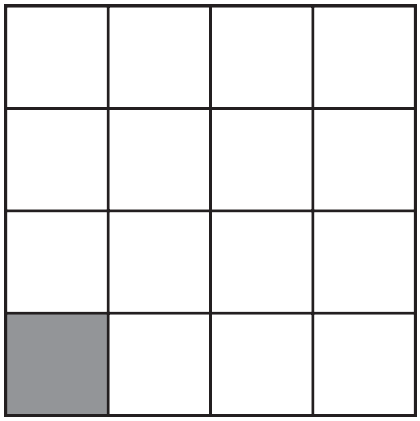
B. The survey took too long to complete.

C. The sample does not represent the population.

D. The participants' cultural beliefs were not considered.

Use the following information to answer numerical-response question 7.

The squares of the grid below are identical. The area of the shaded square on the grid is 9 units^2.

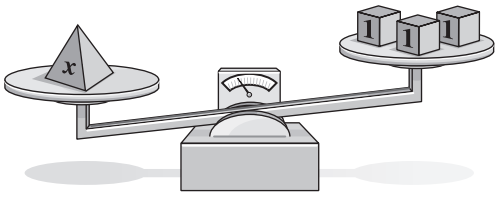


Numerical Response

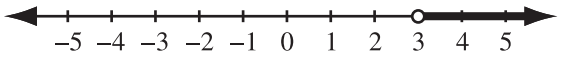
7. The perimeter of the grid shown above is _____ units.

(Record your answer in the numerical-response section on the answer sheet.)

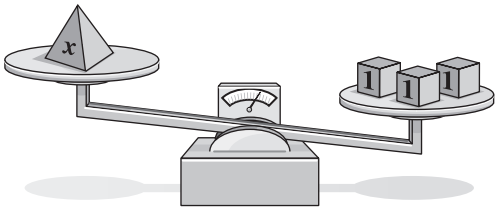
Use the following diagrams to answer question 24.



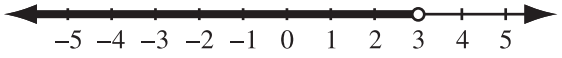
I



III



II



IV

24. The two diagrams shown above that **both** represent the inequality $x > 3$ are numbered

A. I and III

B. I and IV

C. II and III

D. II and IV

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25. Which of the following sets of powers is arranged in order of increasing value from left to right?

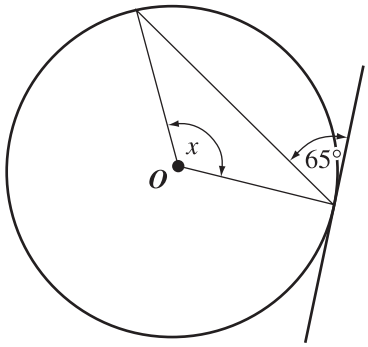
A. $-2^2,\ -1^2,\ (-1)^2,\ (-2)^2$

B. $(-2)^2,\ (-1)^2,\ -1^2,\ -2^2$

C. $-1^2,\ (-1)^2,\ -2^2,\ (-2)^2$

D. $(-1)^2,\ -1^2,\ -2^2,\ (-2)^2$

Use the following information to answer question 26.



Note: The diagram shown above has **not** been drawn to scale. The letter ***O*** represents the centre of the circle.

26. If the line shown above is a tangent to the circle, then the measure of angle x is

A. 110°
B. 115°
C. 130°
D. 155°

Use the following information to answer question 27.

Connie buys a horse for $750 (including GST). She considers the two payment plans shown below.

Plan 1 Pay $150 now and $25 each month
Plan 2 Pay $200 now and $55 each month

27. How many **fewer** monthly payments could Connie make if she selects Plan 2?

A. 10
B. 14
C. 20
D. 24

Use the following information to answer question 28.

The simplifications of two different expressions are shown below.

Expression X	**Expression Y**
$(3^2)^3 - 4^4 + 4^2 \times (-5)^2$	$2^6 \div 2^2 + (-5^2) \times 3$
$= 3^6 - 4^4 + 4^2 \times (-5)^2$	$= 2^3 + (-5^2) \times 3$
$= 729 - 256 + 16 \times 25$	$= 8 + (-25) \times 3$
$= 729 - 256 + 400$	$= 8 + (-75)$
$= 873$	$= -67$

28. Which of the following statements about the simplifications above is true?

A. The simplifications of both expressions are correct.

B. The simplifications of both expressions are incorrect.

C. The simplification of Expression X is correct and the simplification of Expression Y is incorrect.

D. The simplification of Expression Y is correct and the simplification of Expression X is incorrect.

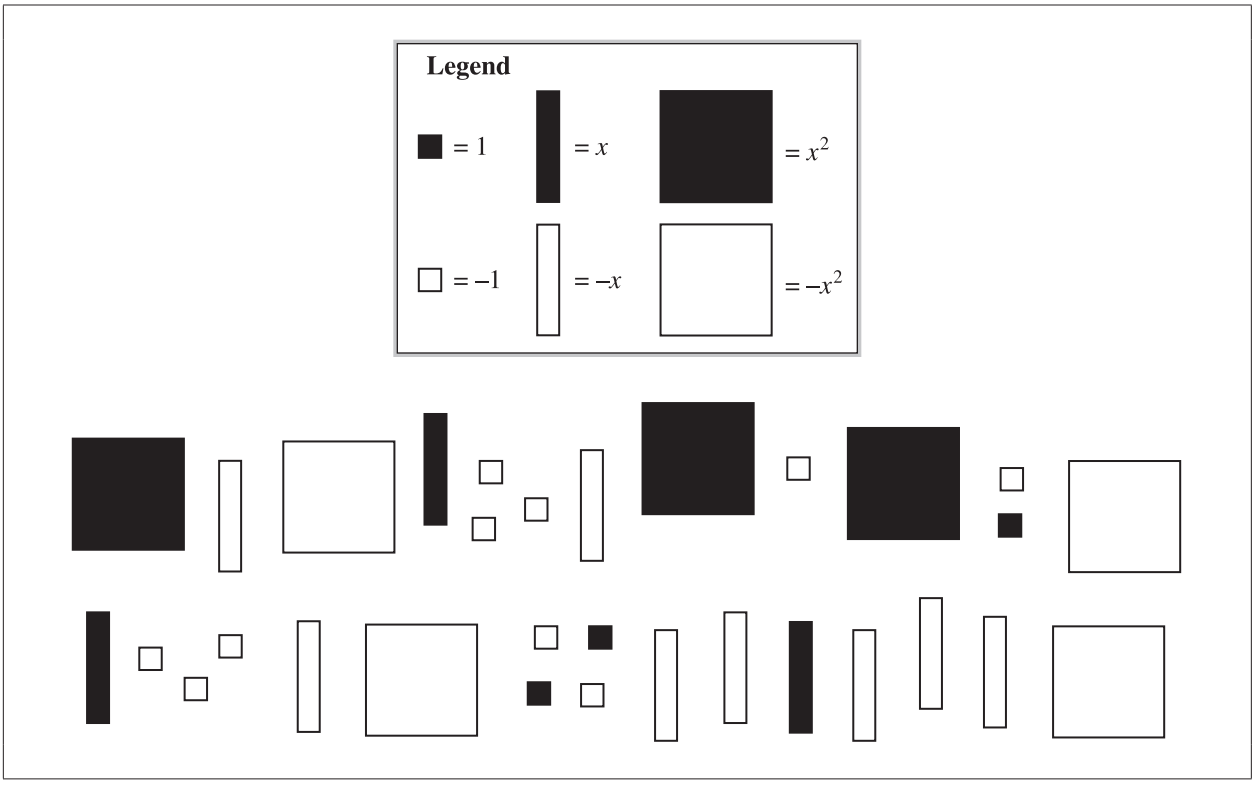
Numerical Response

8. How many whole numbers could represent the value of x in the inequality statement $\frac{1}{4} < \frac{3}{x} < 0.5$?

Answer: _____ whole numbers

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer question 29.



29. Which of the following polynomial expressions could be added to the expression shown above to result in a sum that contains only a constant term?

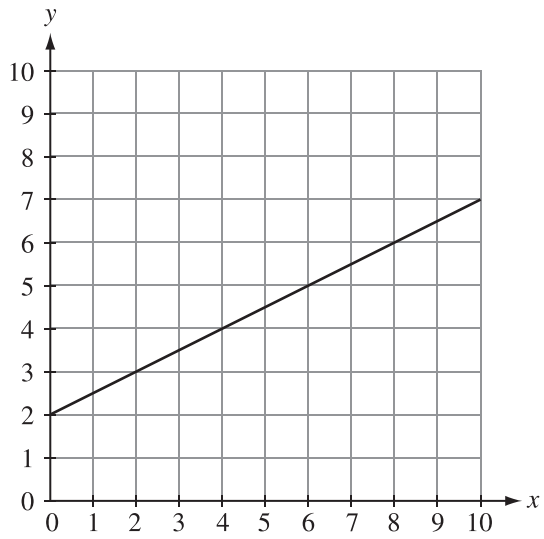
A. $x^2 + 5x + 3$

B. $4x^2 + 8x$

C. $-x^2 - 5x - 3$

D. $-4x^2 - 8x$

Use the following information to answer question 30.



30. The line created by the relation $y = 5 - x$ will intersect the line shown on the graph above at

A. (0, 5)

B. (5, 0)

C. (2, 3)

D. (3, 2)

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31. The value of x in the equation $2(x + 5) - 12 = 50$ is

A. 24

B. 26

C. 32

D. 36

Use the following information to answer question 32.

The two ×s shown on the map below represent the locations of two communities in Alberta. The distance between the two communities is 1 000 km.

32. Which of the following ratios represents the scale used to create the map?

A. 1 cm:10 km

B. 1 cm:100 km

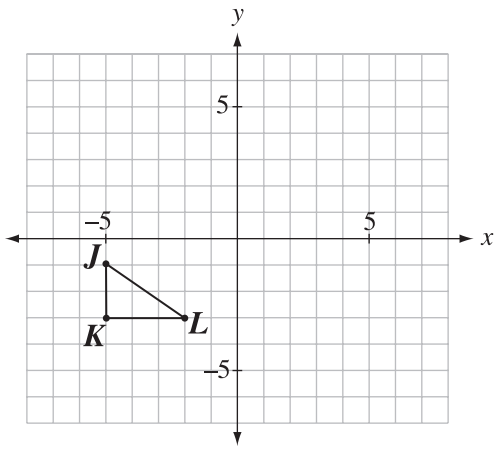
C. 1 cm:1 000 km

D. 1 cm:10 000 km

Use the following information to answer question 33.

Triangle *JKL,* shown below, undergoes the following transformations:

- a 90° clockwise rotation about vertex *L*
- a translation of 3 units right and 4 units up

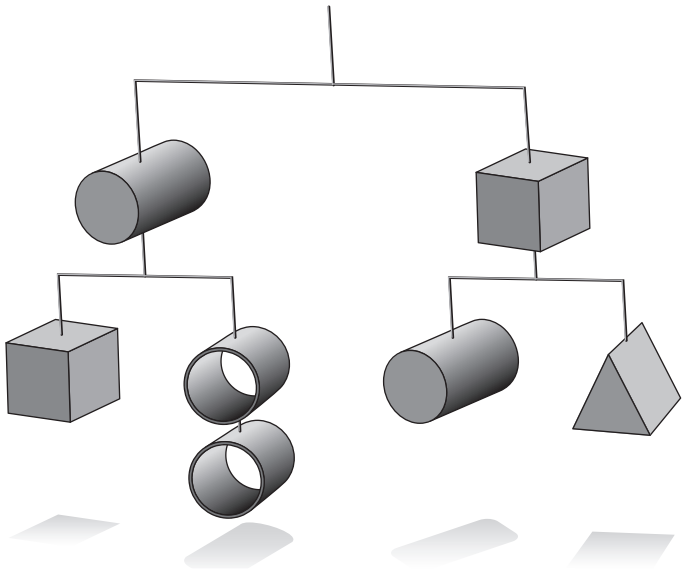


33. Which of the following rows represents the ordered pair for each vertex after **both** the transformations described above have been completed?

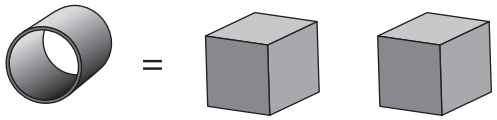
Row	*J″*	*K″*	*L″*
A.	(1, 1)	(1, 4)	(3, 4)
B.	(1, 1)	(1, –2)	(–1,–2)
C.	(4, 3)	(2, 3)	(2, 0)
D.	(3, 4)	(1, 4)	(1, 1)

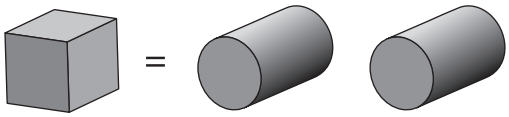
Use the following information to answer question 34.

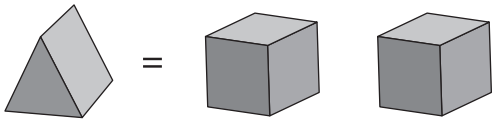
The following diagram represents a balanced mobile.

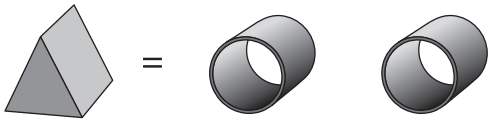


34. Which of the following equations correctly represents the relationship between some of the objects shown in the diagram above?

A. 

B. 

C. 

D. 

Use the following information to answer question 35.

Each of the four students shown below simplifies the following expression.

$$4 + 3 \times 5 - 6^4 \div (4 + 2)^3 \times 2$$

35. Which student correctly simplified the expression?

A. Student 1
B. Student 2
C. Student 3
D. Student 4

Numerical Response

9. The quotient of $(-12x^2 - 9x) \div \blacksquare x$ is $-4x - 3$. What is the value of $\blacksquare$?

Answer: _____

(Record your answer in the numerical-response section on the answer sheet.)

Use the following information to answer question 36.

X: -0.054

Y: $-\frac{11}{3}$

Z: $-\frac{15}{4}$

36. Which of the following inequalities represents the rational numbers shown above?

A. $Y < Z < X$

B. $Y < X < Z$

C. $Z < X < Y$

D. $Z < Y < X$

Use the following information to answer question 37.

Emily's cellphone plan charges her \$0.05 per text message, \$0.06 per minute of voice usage and a \$5.00 base fee each month.

37. What is Emily's cellphone bill if she sent 33 text messages and talked for 47 minutes in one month?

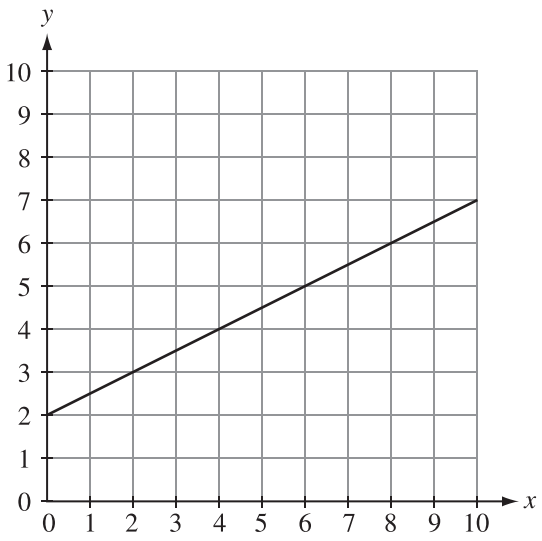
A. \$5.11

B. \$6.65

C. \$7.82

D. \$9.47

Use the following information to answer question 38.



38. The equation representing the linear relation on the graph shown above is

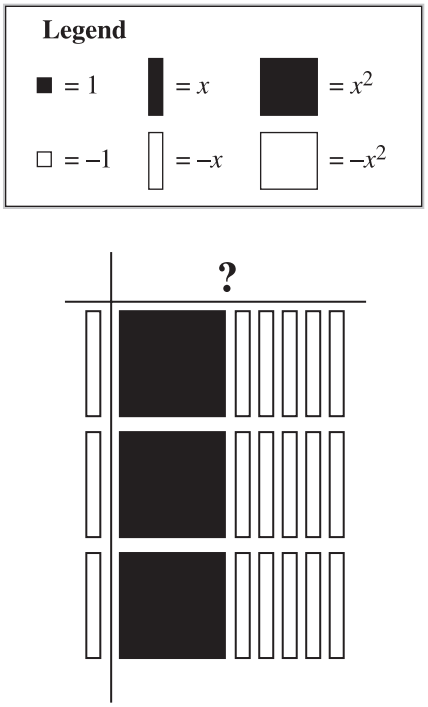
A. $y = 0.5x + 2$

B. $y = 0.5x - 2$

C. $y = 2x + 4$

D. $y = 2x - 4$

Use the following information to answer question 39.



39. Which of the following polynomials represents the unknown expression in the model shown above?

A. $x^2 - 5x$

B. $-x^2 + 5x$

C. $x - 5$

D. $-x + 5$

Use the following information to answer question 40.

Ethan conducts a survey to determine the demand for an outdoor skating rink in his community.

40. Ethan can **best** minimize the bias in his survey by collecting data from people who

A. are different ages
B. live in different cities
C. participate in figure skating
D. visit the rink at the same time each day

Use the following information to answer numerical-response question 10.

Patricia wants to buy a new pair of ice skates that cost $250 including GST. She already has $86 she plans to use towards this purchase. She earns $10.25/hour at her part-time job.

Numerical Response

10. What is the minimum number of hours that she must work to save enough money to purchase the pair of ice skates?

Answer: _____ hours

(Record your answer in the numerical-response section on the answer sheet.)