Released 2013 Achievement Test

Mathematics

GRADE 6

This document contains the test items from the 2013 Mathematics Achievement Test in Grade 6.

A test blueprint and an answer key are included in this document. These materials, along with the program of studies and subject bulletin, provide information that can be used to inform instructional practice.

Assessment Highlights reports for all achievement test subjects and grades will be posted on the Alberta Education website every year in the fall. *Assessment Highlights* provides information about the overall test, the test blueprints, and student performance on the 2013 Mathematics Achievement Test in Grade 6. Also provided is commentary on student performance at the acceptable standard and the standard of excellence on selected items from the 2013 Achievement test. This information is intended for teachers and is best used in conjunction with the multi-year and detailed school reports that are available to schools via the extranet.

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The Alberta Education website: education.alberta.ca.

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2013 Grade 6 Mathematics Achievement Test Blueprint

Program of Study Strands	Reporting Category: Item Complexity			Number (Percentage) of Items
	Low Complexity Items	Moderate Complexity Items	High Complexity Items	
Number	13, 33, 37, 39, NR2	6, 11, 14, 17, 19, 26, 28, 34, 35, 38, NR1, NR3, NR4	20	**19 (38%)**
Patterns and Relations	7, 15, 24	2, 18, 32, 36, NR8, NR9	5, 10, NR7	**12 (24%)**
Shape and Space	1, 3, 4, 31, 40, NR6	9, 22, 30, NR10	8, 12, NR5	**13 (26%)**
Statistics and Probability	16, 21, 23, 27, 29	25		**6 (12%)**
Number (Percentage) of Questions	**19 (38%)**	**24 (48%)**	**7 (14%)**	**50 (100%)**

Additional Information

The table below provides additional information about the items that appeared on the 2013 Grade 6 Mathematics Achievement Test. (The results for students writing in French are presented in a separate report.)

Item	Key	Correct Response %	Item Complexity	Strand	Specific Outcome	Item Description
MC 1	B	51.5	L	SS	1	Connect points to create angles and use a protractor to determine the number of angles that are between two given measurements.
MC 2	D	56.3	M	PR	5	Apply knowledge of preservation of equality to determine the relationship between different objects on a balanced scale.
MC 3	C	61.8	L	SS	5	Compare the sides and angles of a given set of irregular polygons to determine which polygons are congruent with one another.
MC 4	B	46.1	L	SS	2	Determine the value of a given angle by applying knowledge of interior angles of triangles.
MC 5	A	57.6	H	PR	4	Represent a given relationship involving whole numbers with an equation (Gr.5, PR.2).
MC 6	C	64.6	M	N	3	Identify the common factors of a given set of whole numbers.
MC 7	A	69.6	L	PR	3	Identify the equations that illustrate the commutative property.
MC 8	A	35.4	H	SS	3	Determine the area of a shaded region of a rectangular grid when the area of the grid is given (Gr.4, SS.3).
MC 9	D	57.4	M	SS	3	Determine the area of a square given the area of an inscribed triangle.
MC 10	B	72.5	H	PR	5	Apply knowledge of preservation of equality to determine the mass of an object on a balanced scale when the masses of other objects are given.
MC 11	C	35.4	M	N	5	Determine the value of a numerator of an improper fraction that is on a number line.
MC 12	C	39.5	H	SS	7	Perform a combination of transformations on a 2-D shape and identify the coordinates of one vertex of the image (Gr.5, SS.9).
MC 13	C	56.1	L	N	1	Identify the word statement that represents a given symbolic value that is less than one thousandth.
MC 14	B	75.1	M	N	3	Determine the multiples for two given numbers to solve a problem.

Item	Key	Correct Response %	Item Complexity	Strand	Specific Outcome	Item Description
MC 15	C	49.8	L	PR	1	Graph or extend a table of values that represents a pattern to make a prediction (Gr.5, PR.1).
MC 16	B	91.3	L	SP	4	Determine the theoretical probability of a given outcome in a probability experiment involving a spinner with 6 congruent sections (Gr.5, SP.4).
MC 17	A	59.8	M	N	6	Use a diagram composed of regular and irregular 2-D shapes to determine the percentage of the diagram that is occupied by a specific 2-D shape (Gr.5, N.9).
MC 18	B	56.6	M	PR	2	Generate values in one column of a table of values given a pattern rule (Gr.5, PR.1).
MC 19	D	47.2	M	N	4	Determine the mixed number that represents a given number line value (Gr.5, N.7).
MC 20	C	64.2	H	N	6	Determine the total cost of buying 3 items when the cost of one of the items is reduced by a given percentage (Gr.5, N.9).
MC 21	D	77.1	L	SP	2	Identify the most appropriate method for collecting data to answer a given question.
MC 22	A	44.9	M	SS	3	Apply a formula for right rectangular prisms to determine which prism has twice the volume of a given prism (Gr.5, SS.4).
MC 23	D	59	L	SP	3	Identify the line graph that represents information about an event.
MC 24	D	42.8	L	PR	3	From a set of formulas, identify those that represent the perimeter of a given rectangle (Gr.5, SS.2).
MC 25	B	34.5	M	SP	4	Determine the number of equivalent sections that a spinner must have for a certain theoretical probability of an event to occur.
MC 26	B	73.4	M	N	7	Determine the location of a point on a number line based on statements that describe its position relative to the location of 4 other points on the number line.
MC 27	D	33.4	L	SP	1	Identify the graph that represents given discrete data (Gr.5, N.7).
MC 28	A	44.9	M	N	5	For a given ratio, match the pictorial representation to an equivalent symbolic representation.

Item	Key	Correct Response %	Item Complexity	Strand	Specific Outcome	Item Description
MC 29	C	52.5	L	SP	1	Identify the data set that would be most appropriately represented by a line graph.
MC 30	A	31.2	M	SS	6	Identify a 2-D shape and its transformation image (Gr.5, SS.8).
MC 31	D	70.3	L	SS	8	Identify the 2-D shape whose vertices match given coordinates in the first quadrant of the Cartesian plane.
MC 32	A	68	M	PR	4	Determine the meaning of the variable in a given single-variable equation that represents a given context (Gr.5, PR.2).
MC 33	B	51.3	L	N	2	From a set of given decimal values, determine which of the decimal values are greater than a given fraction but less than another given fraction (Gr.5, N.9).
MC 34	A	42.6	M	N	9	Apply the order of operations to solve 4 equations, and then find the sum of the 4 solutions.
MC 35	C	55.2	M	N	7	Determine the number of correct integer comparisons from a given set of number statements containing the < and > symbols.
MC 36	C	55.3	M	PR	2	Predict the missing element in a given table of values based on the relationship between the two columns of values (Gr.5, PR.1).
MC 37	D	34.3	L	N	3	From a given set of whole numbers, determine which numbers are composite numbers.
MC 38	C	69.7	M	N	4	Translate a given mixed number between pictorial and symbolic representations.
MC 39	C	61.8	L	N	2	Determine which operation is necessary to solve a given problem, and solve it.
MC 40	B	67.5	L	SS	1	Measure a given angle using a protractor, and/or estimate the measure of the angle using 90 degrees and 180 degrees as reference angles (Gr.5, SS.1).
NR 1	18	75.1	M	N	9	Apply the order of operations to evaluate an expression involving whole numbers.
NR 2	25	78.8	L	N	6	Determine the percent displayed in a pictorial representation that is out of 100.

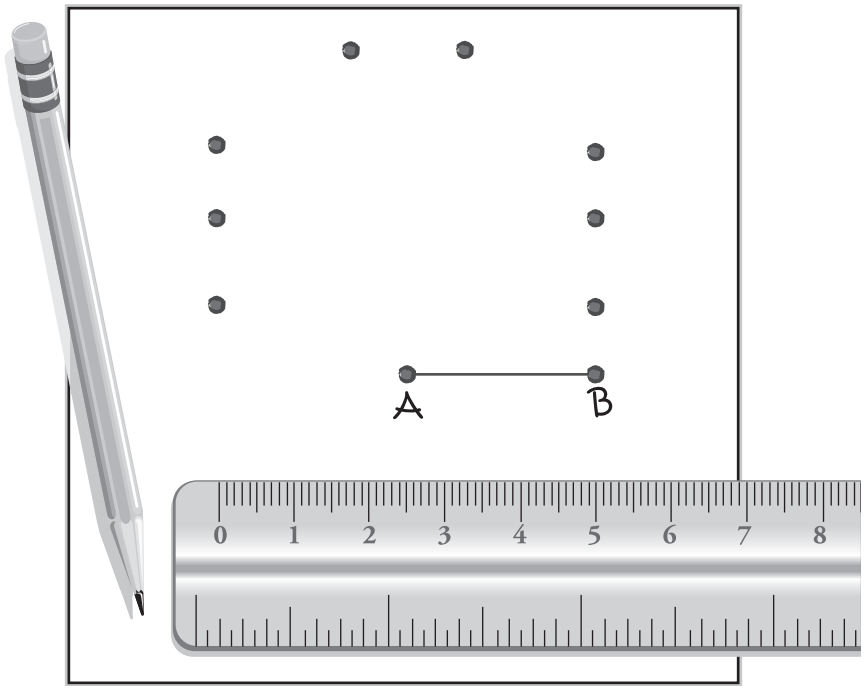
Item	Key	Correct Response %	Item Complexity	Strand	Specific Outcome	Item Description
NR 3	11.9	58	M	N	2	Determine the distance travelled over a period of time using a given relationship between distance and time that involves whole number and decimal values.
NR 4	40.5	64	M	N	8	Solve a problem involving the multiplication of decimals by single-digit natural numbers (Gr.5, N.11).
NR 5	12	45.3	H	SS	3	Determine the area of an irregular polygon that is comprised of regular 2-D shapes (Gr.4, SS.3).
NR 6	2312	54.4	L	SS	1	Classify a set of given angles according to their measure.
NR 7	20	66.4	H	PR	5	Apply knowledge of preservation of equality to determine the mass of an object when given the masses of all other objects on a balanced scale (Gr.2, PR.4).
NR 8	6	66.6	M	PR	2	Predict the value of an unknown term using the relationship in a given table of values (Gr.5, PR.1).
NR 9	2017, 17	38.3	M	PR	2	Use a pattern from a table of values to predict a value of a future term (Gr.5, PR.1).
NR 10	7.5	45.1	M	SS	4	Determine the perimeter of an equilateral triangle that is formed from wire that has been cut into equal lengths.

Grade 6 Mathematics Achievement Test

2013

Use the following information to answer question 1.

Gabby uses line segment *AB* to create 8 different angles on the diagram shown below. She draws a straight line from point *A* to each dot.

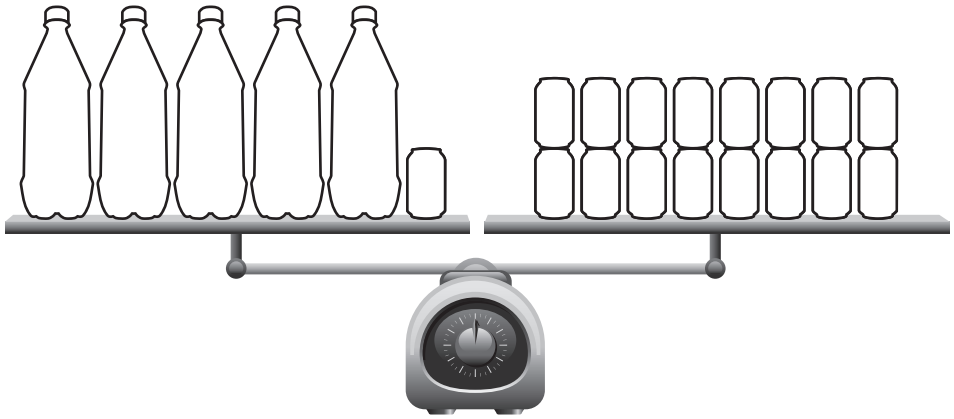


1. How many of the angles that Gabby draws above are **between** 45° and 135°?

A. 3
B. 4
C. 5
D. 6

Use the following information to answer question 2.

Tom balances bottles and cans on a scale.



2. If Tom removes 2 bottles, how many cans need to be removed to keep the scale balanced?

A. 3
B. 4
C. 5
D. 6

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

In order to claim a prize, the following skill-testing question is asked.

$$3 \times (4 + 8) \div 2$$

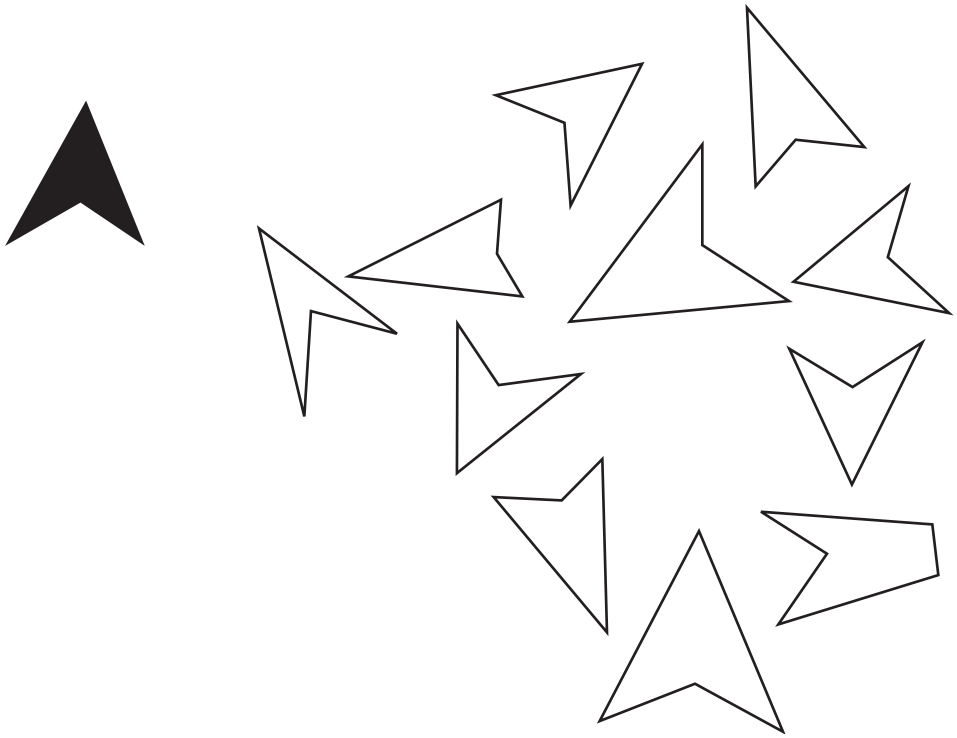
Numerical Response

1. The solution of the expression shown above is _____.

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

Use the following information to answer question 3.

Zane plays a math game in which he needs to find all of the polygons that are congruent to the black polygon, as shown below.



3. How many of the polygons shown above are congruent to the **black** polygon?

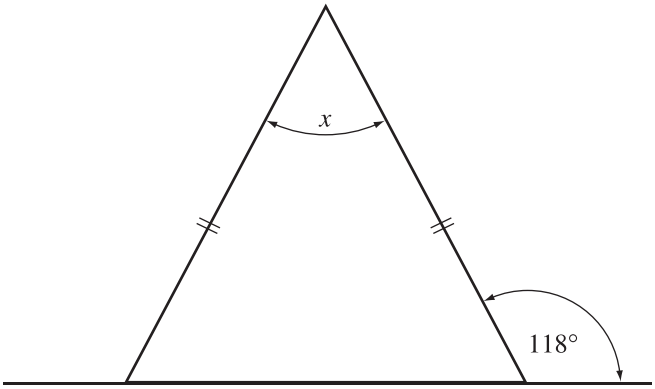
A. 2

B. 3

C. 4

D. 5

Use the following information to answer question 4.



4. The value of angle x is

A. 55°
B. 56°
C. 57°
D. 58°

Use the following information to answer question 5.

Melanie, m, is four years younger than Brad, b. Rick, r, is three years older than Brad.

5. Which of the following equations could be used to represent the relationship between Melanie's and Rick's ages?

A. $r = m + 7$
B. $r = m - 7$
C. $m = r - 1$
D. $m = r + 1$

Use the following information to answer question 6.

Taylor creates the Math Game Card shown below by recording numbers in the squares. Some of the numbers have a common factor.

Math Game Card		
63	14	32
57		84
49	98	21

6. What common factor do six of the numbers on the game card share?

A. 2
B. 4
C. 7
D. 9

Use the following information to answer question 7.

Candice uses the values $a = 2$ and $b = 3$ to determine which of the following equations demonstrates the commutative property.

I $a + b = b + a$
II $a - b = b - a$
III $a \times b = b \times a$
IV $a \div b = b \div a$

7. Candice determines that the equations that demonstrate the commutative property are

A. I and III
B. I and IV
C. II and III
D. II and IV

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

Science Vocabulary Word Search

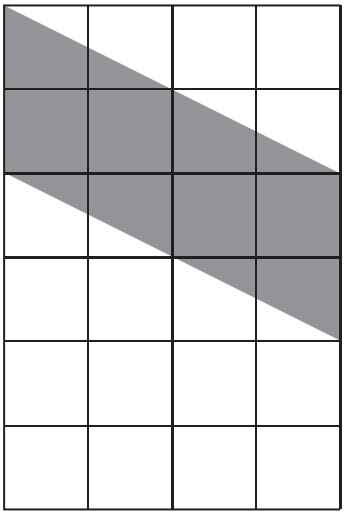
Numerical Response

2. What percentage of the word search grid shown above is shaded black?

Answer: _____ **%**

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

Use the following information to answer question 8.



8. What is the area of the shaded region on the grid shown above if the area of the entire grid is 96 cm^2?

A. 32 cm^2

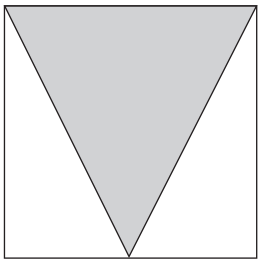
B. 24 cm^2

C. 16 cm^2

D. 12 cm^2

Use the following information to answer question 9.

The area of the shaded isosceles triangle shown below is 24 cm^2.



9. What is the area of the entire square shown above?

A. 30 cm^2
B. 36 cm^2
C. 42 cm^2
D. 48 cm^2

Use the following information to answer numerical-response question 3.

Connie rides her bike from home to school and back 3 days a week. She travels a total of 7.14 km in those 3 days.

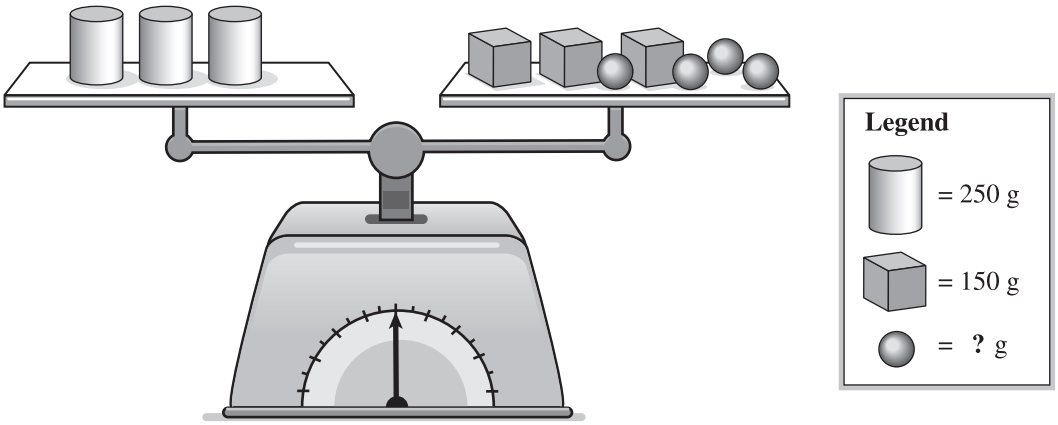
Numerical Response

3. What is the total distance Connie travels if she rides her bike 5 days a week?

Answer: _____ km

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

Use the following information to answer question 10.

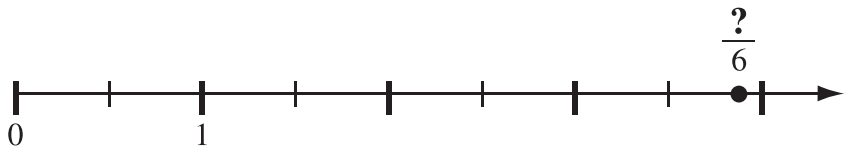


10. What is the mass of one ●?

A. 50 g
B. 75 g
C. 150 g
D. 300 g

Use the following information to answer question 11.

An improper fraction is represented on the number line below.

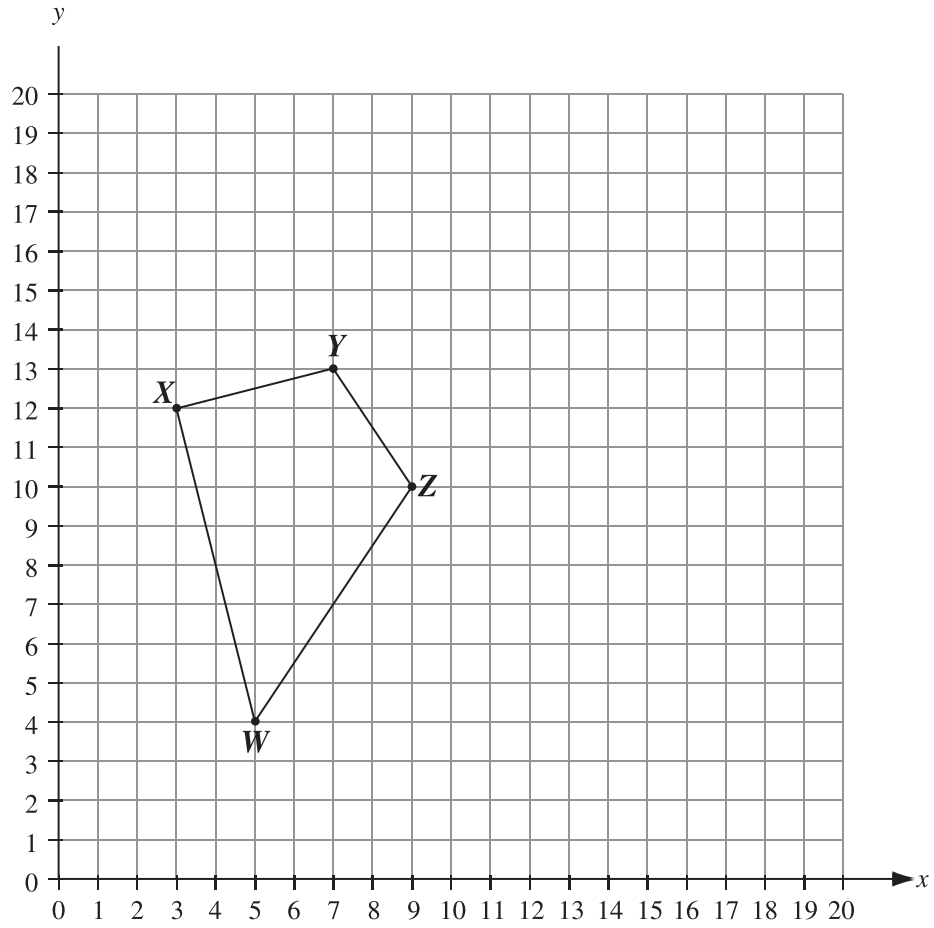


11. Which of the following numbers could the question mark represent in the fraction shown above?

A. 18
B. 20
C. 23
D. 25

Use the following information to answer question 12.

Translate quadrilateral ***WXYZ*** shown below 2 units left and 1 unit down, followed by a 90° counter-clockwise rotation about point ***Y′***.



12. After the transformations of quadrilateral $WXYZ$ described above, the coordinates of Z'' will be

A. (8, 9)

B. (3, 10)

C. (8, 14)

D. (11, 15)

13. Which of the following word statements represents the value of 0.012?

A. Two thousandths
B. Twelve hundredths
C. Twelve thousandths
D. Twelve ten thousandths

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

During ski season, Alec practises for 1 hour on Monday, 1.5 hours on Wednesday, and 2 hours on Friday.

Numerical Response

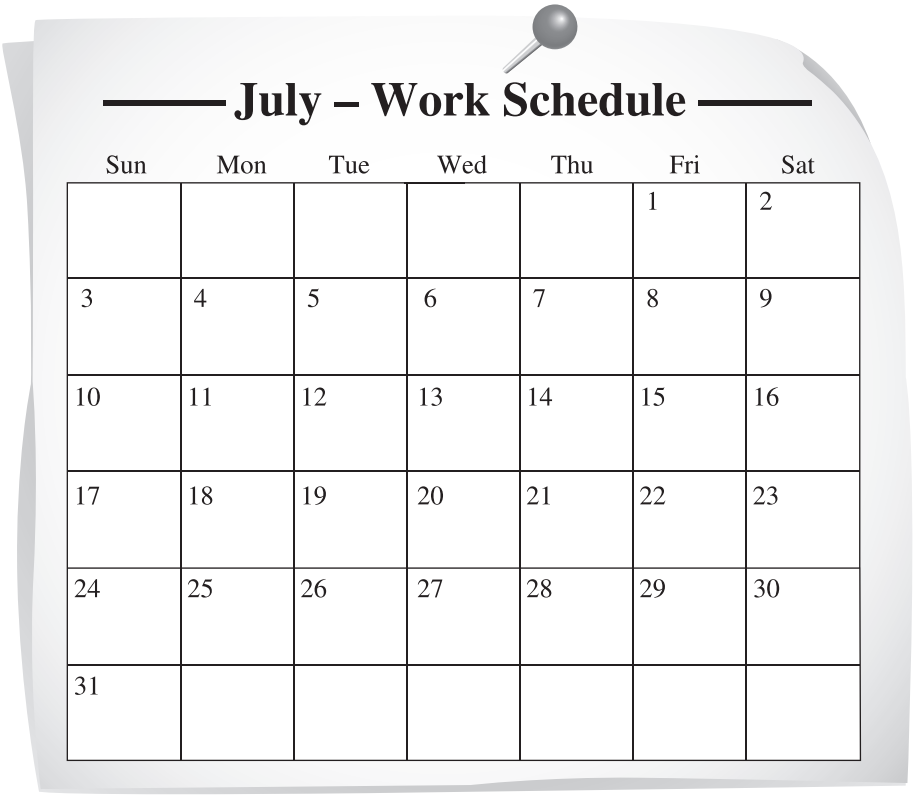
4. How many hours in total will Alec practise if the ski season is 9 weeks long?

Answer: _____ hours

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

Use the following information to answer question 14.

Heather works on all days in July that are a multiple of 3. Samuel works on all days in July that are a multiple of 4.



July – Work Schedule

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

14. How many times do Heather and Samuel work on the same day in July?

A. 1

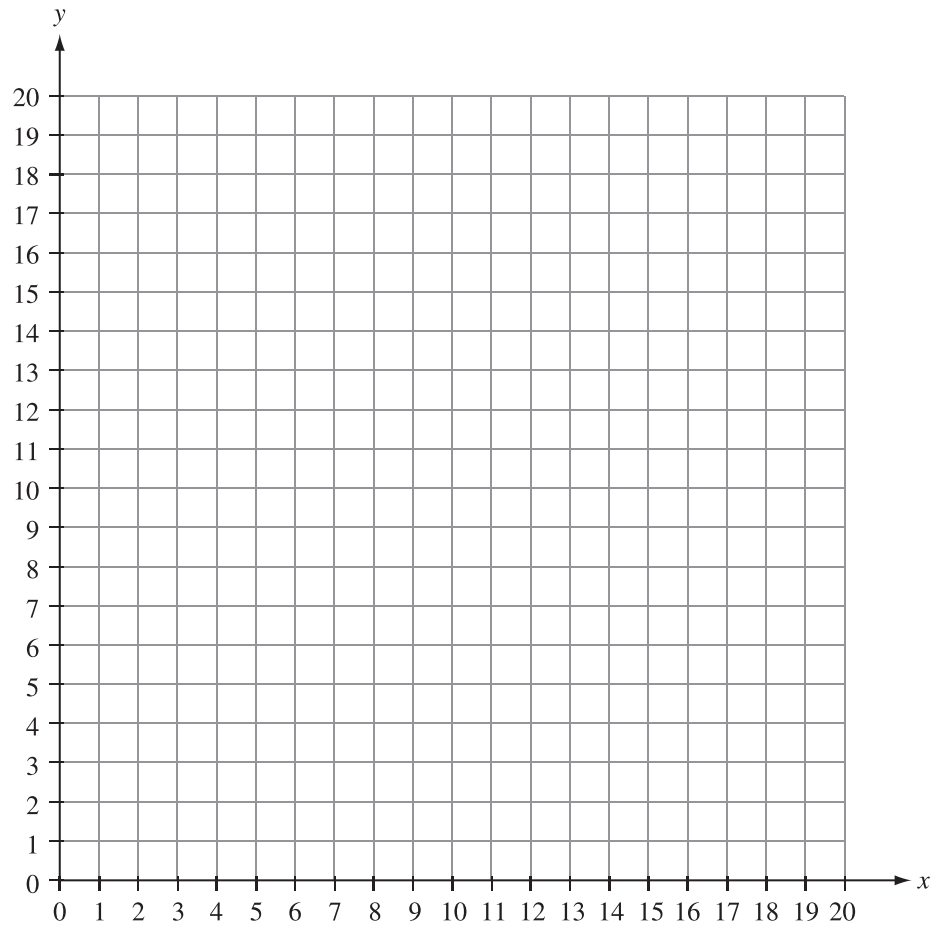
B. 2

C. 3

D. 4

Use the following information to answer question 15.

x	*y*
2	4
4	6
6	8



15. If the data above was plotted on the grid, and the line created was extended, then which of the following coordinates would be on the line?

A. (7, 10)

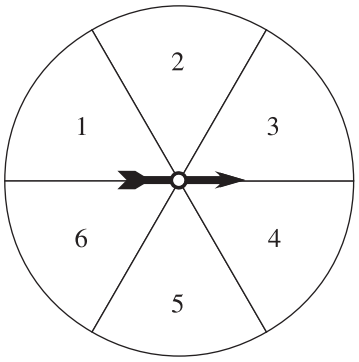
B. (10, 8)

C. (14, 16)

D. (16, 20)

Use the following information to answer question 16.

A game in a school fair involves a spinner. A student wins a prize if the spinner stops on an even number. The spinner is shown below.



16. How likely is it that a student will win a prize on his or her first try?

A. About 100% likely

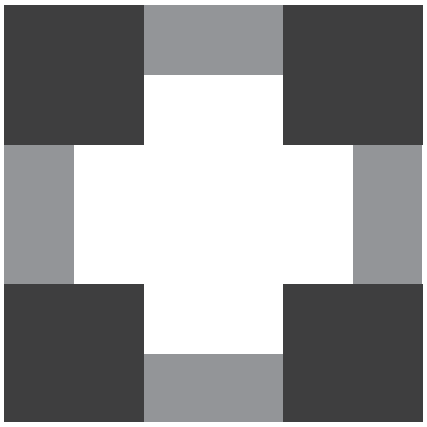
B. About 50% likely

C. Not very likely

D. Very likely

Use the following information to answer question 17 and numerical-response question 5.

The 4 black squares in the diagram below have the same dimensions. The area of each grey rectangle is equal to $\frac{1}{2}$ the area of a black square.



17. The percentage of the diagram shown above occupied by the black squares is approximately

A. 44%

B. 50%

C. 56%

D. 60%

Numerical Response

5. What is the area of the white polygon in the diagram above if the area of each grey rectangle is 2 cm^2?

Answer: _____ cm^2

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

Use the following information to answer question 18.

Lily creates the following table to record the number of pages she will read over 5 days.

Day number (d)	**Number of pages read each day ($2d + 1$)**
1	
2	
3	
4	
5	

18. How many more pages will Lily read on day 5 than on day 2?

A. 5

B. 6

C. 11

D. 16

Use the following information to answer question 19.

Below the following figure there is a number line.

19. Which of the following mixed numbers could represent the length of the figure above?

A. $1\frac{9}{14}$ units

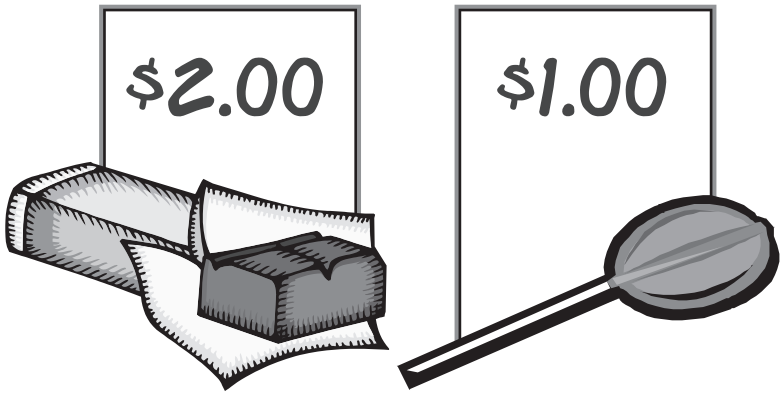
B. $1\frac{5}{9}$ units

C. $2\frac{4}{14}$ units

D. $2\frac{4}{5}$ units

Use the following information to answer question 20.

A candy store sells chocolate bars and lollipops at the prices shown below. If a customer buys 2 lollipops, then the price of the second lollipop is reduced by 25%.



20. How much would it cost to buy 1 chocolate bar and 2 lollipops?

A. $2.75
B. $3.25
C. $3.75
D. $4.25

Use the following information to answer question 21.

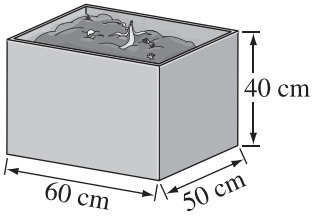
Sydney wants to determine which pizza company has the most restaurants in Alberta.

21. Which method of collecting data is **most** appropriate for answering Sydney's question?

A. Sydney counts the number of restaurants for each pizza company in her town.
B. Sydney looks up last year's reported sales for each pizza company on the Internet.
C. Sydney asks people from across the province to identify their favourite restaurant.
D. Sydney visits each pizza company's website to find the number of restaurant locations.

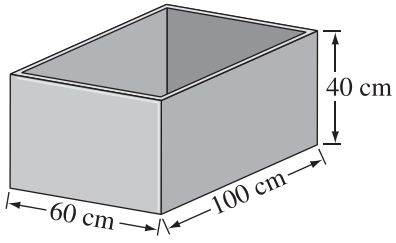
Use the following information to answer question 22.

Ginette has a compost bin with the dimensions shown below.

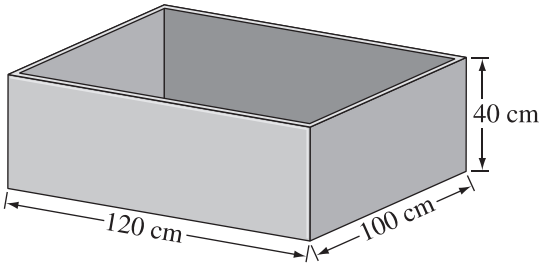


22. Which of the following bins has a volume that is **twice** the volume of Ginette's bin?

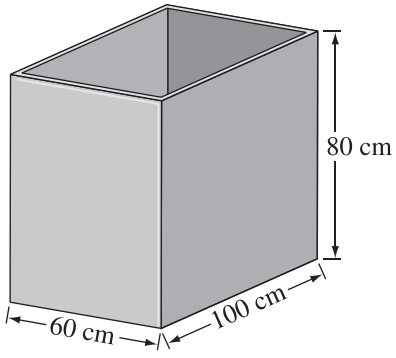
A.



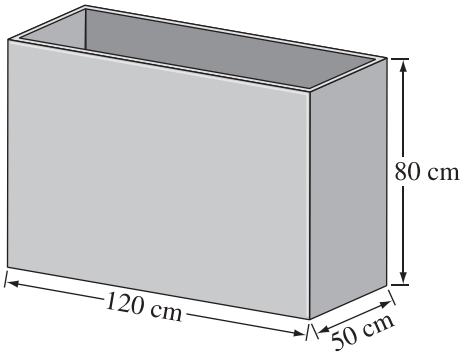
B.



C.



D.

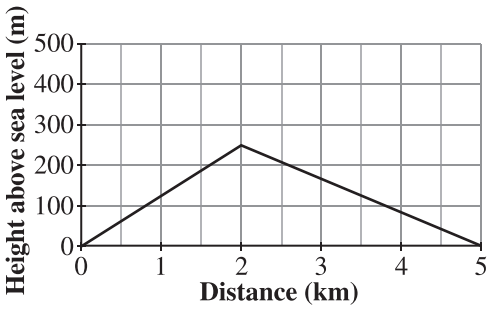


Use the following information to answer question 23.

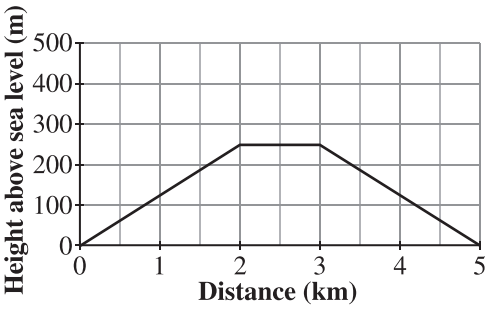
A hiking trail begins at a parking lot that is 150 m above sea level. A boy walks on the 2 kilometre trail to the top of a hill. He returns to the parking lot on the same trail after exploring a 1 kilometre path at the top of the hill.

23. Which of the following graphs could represent the boy's hike?

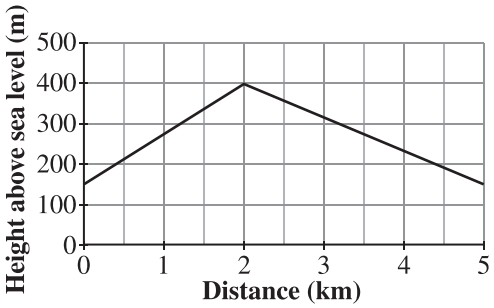
A.



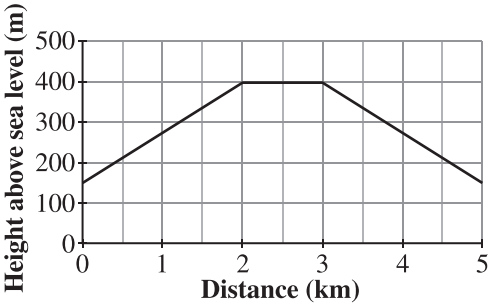
B.



C.

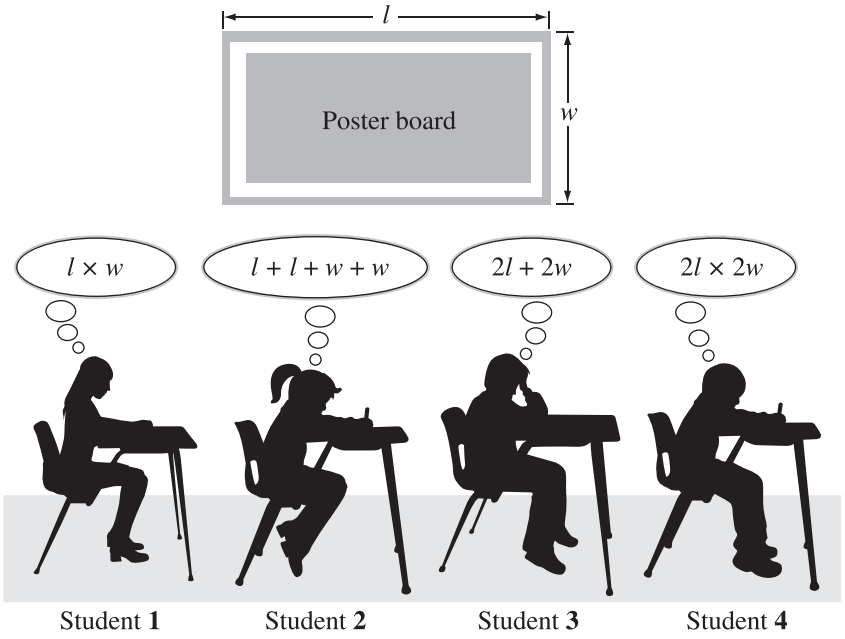


D.



Use the following information to answer question 24.

Four students are thinking about how to decorate a rectangular poster board for a school project.



24. The two students who correctly determined expressions for the perimeter of the poster board are students

A. 1 and 4

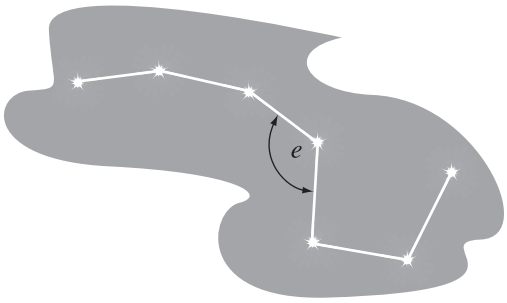
B. 1 and 3

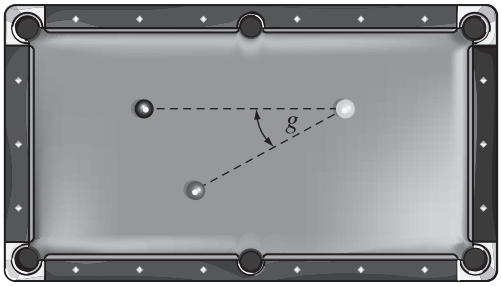
C. 2 and 4

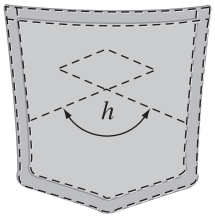
D. 2 and 3

Use the following information to answer numerical-response question 6.

Each diagram shown below uses a letter to label an angle.







Numerical Response

6. Use the following code to identify the type of angle indicated in each diagram.

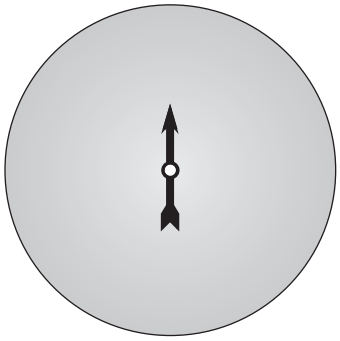
1 = Acute
2 = Obtuse
3 = Reflex
4 = Right
5 = Straight

_____	_____	_____	_____
Angle *e*	**Angle *f***	**Angle *g***	**Angle *h***

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

Use the following information to answer question 25.

Jacob wants to create a spinner that can be used for giving away different prizes. He wants the theoretical probability of winning each prize to be 0.2.



25. How many sections of equal size should the spinner shown above have?

A. 4

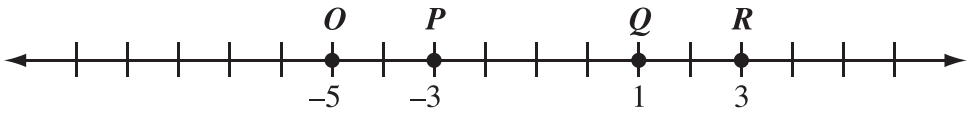
B. 5

C. 6

D. 7

Use the following information to answer question 26.

The locations of four points are shown on the number line below.



26. Where would a point that is both 5 units from point *R* and 3 units from point *Q* be located on the number line above?

A. Between points *O* and *P*

B. Between points *P* and *Q*

C. To the right of *R*

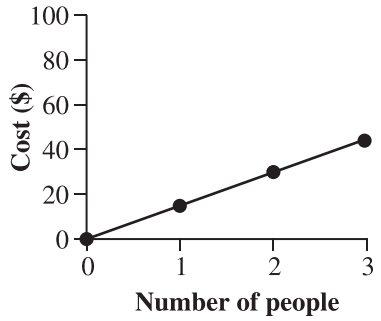
D. To the left of *O*

Use the following information to answer question 27.

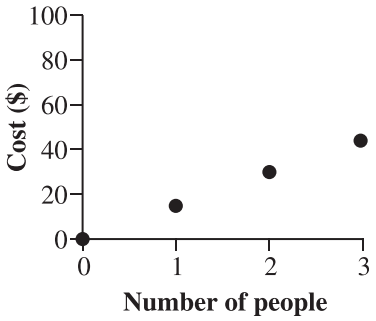
A catering company charges $50 and an additional fee of $15 for every person who attends a dinner party.

27. Which of the following graphs correctly represents the cost of a dinner party with this catering company?

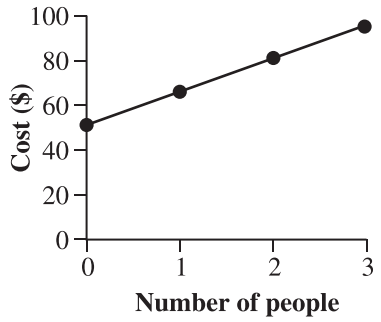
A.



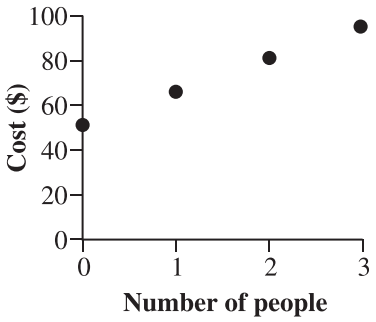
B.



C.

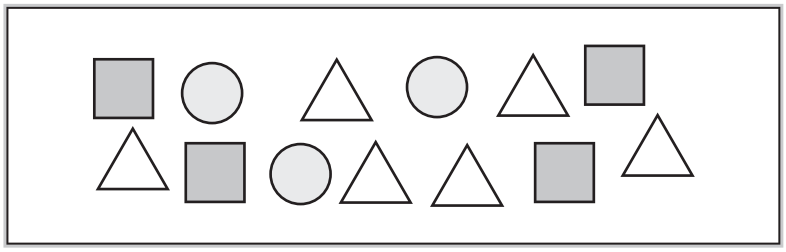


D.

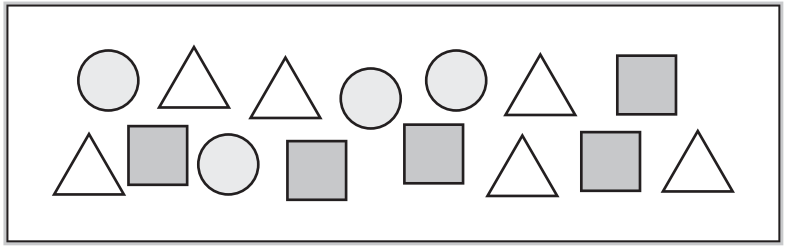


28. Which of the following diagrams represents a 3:2 ratio of triangles to squares?

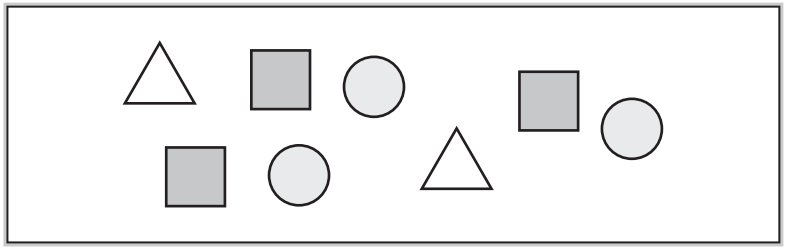
A.



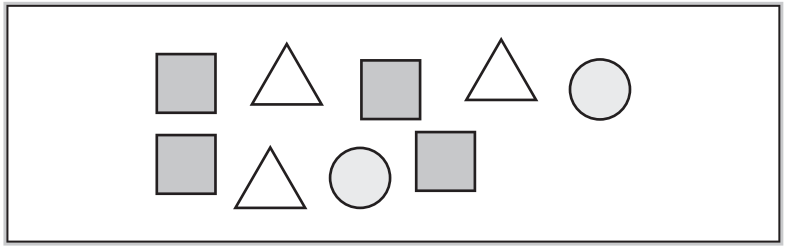
B.



C.

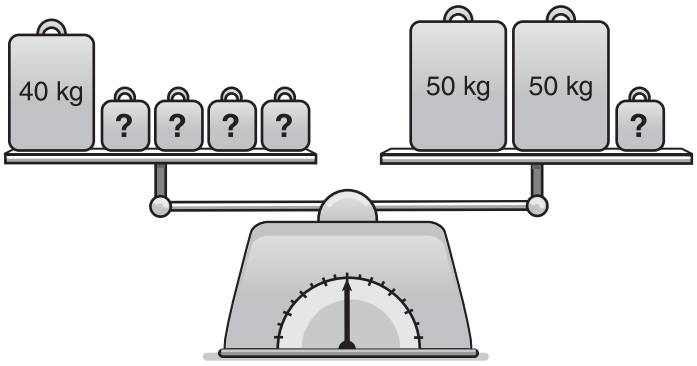


D.



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

The diagram shown below represents masses on a balanced scale.



Numerical Response

7. What is the mass of 

?

Answer: _____ kg

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

29. Which of the following sets of data is **best** represented by a line graph?

A. Heights of Grade 6 students

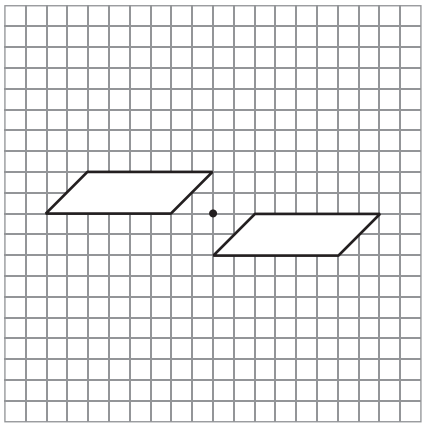
B. Shoe sizes of Grade 6 students

C. Temperatures in the playground during the day

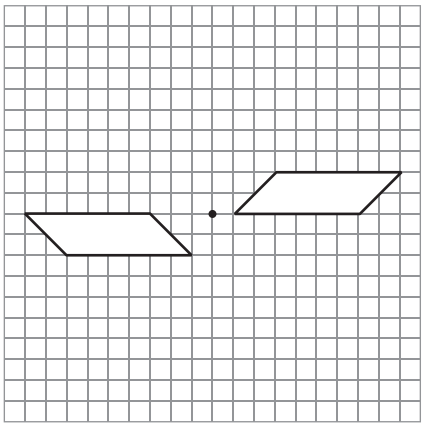
D. Number of students who walk home for lunch

30. Which of the following diagrams shows an image resulting from a 180° rotation about the black dot?

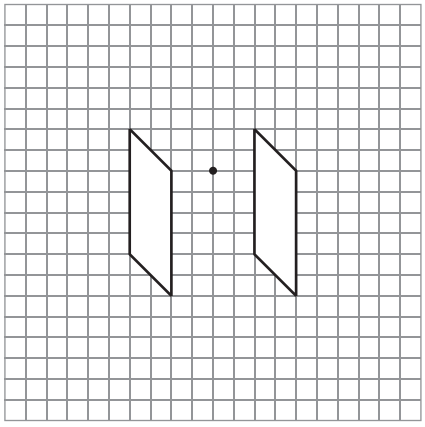
A.



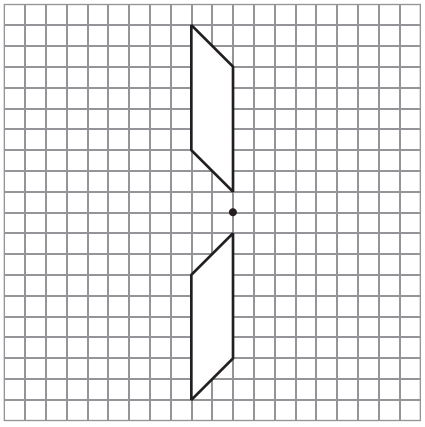
B.



C.

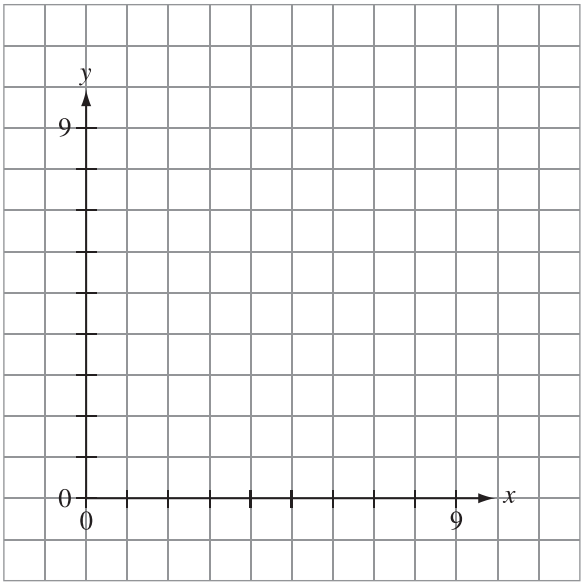


D.



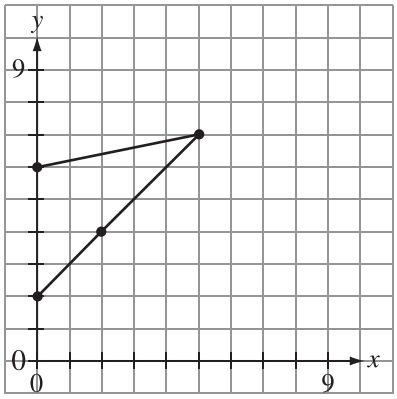
Use the following information to answer question 31.

Sebastian created a 2-D shape in the first quadrant of the Cartesian plane by plotting the points (2, 0), (2, 4), (5, 7), and (6, 0) and connecting the points in this order.

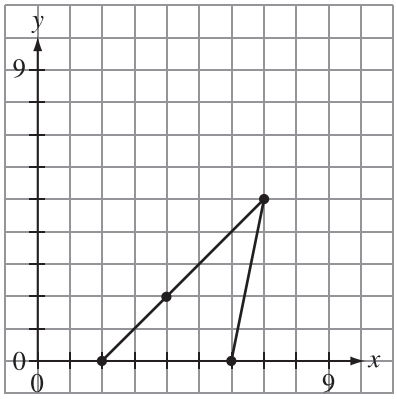


31. Which of the following 2-D shapes matches the shape that Sebastian creates?

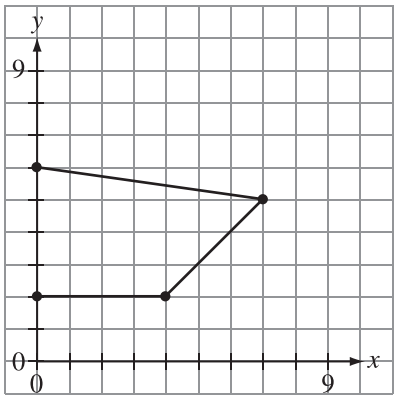
A.



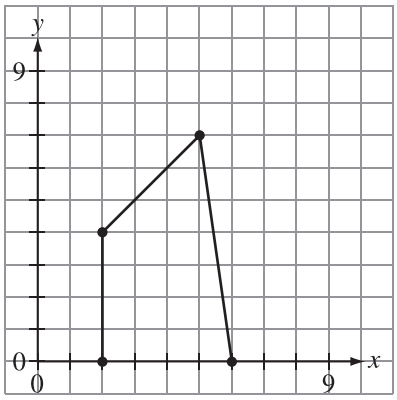
B.



C.

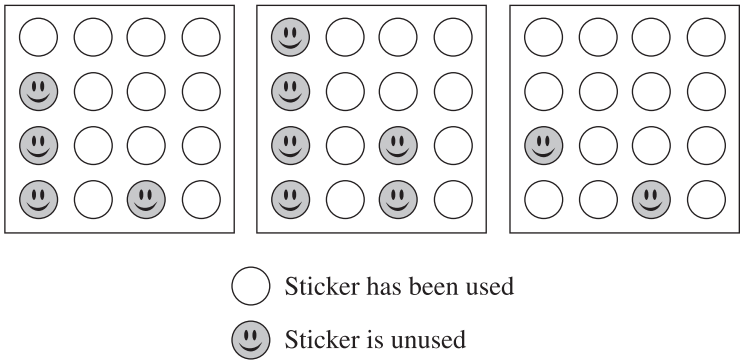


D.



Use the following information to answer question 32.

Luke started with 3 full sheets of stickers for a school project. After he completed his activity, he was left with the following sheets.



32. Based on the information above, what does the variable x represent in the equation $48 - x = 12$?

A. Used stickers

B. Unused stickers

C. Stickers on a sheet

D. Total number of stickers

Use the following information to answer question 33.

Decimal Numbers

0.40 0.91 0.01 0.99 0.75 0.09

33. How many of the decimal numbers shown above are **greater** than $\frac{1}{10}$ and **less** than $\frac{9}{10}$?

A. 1

B. 2

C. 3

D. 4

Use the following information to answer numerical-response question 8.

Interlocking posts are linked together using rods to form picture frames. The number of rods required for each frame is displayed below.

Number of Pictures	Number of Rods Required
1	4
2	7
3	10

Numerical Response

8. How many pictures are in a frame that uses 19 rods?

Answer: _____ pictures

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

Use the following information to answer question 34.

$7 - 3 \times 2 =$ **W**

$3 \times (2 - 1) =$ **X**

$12 \div (3 \times 2) =$ **Y**

$6 + 2 \div 2 =$ **Z**

34. What is the sum of the values of W, X, Y, and Z?

A. 13
B. 17
C. 21
D. 25

Use the following information to answer question 35.

Integers are compared in the statements below.

$-5 > -4$
$10 < 16$
$0 > -4$
$-18 < -13$
$11 < -12$
$5 > 4$
$-13 > -15$
$7 < 0$

35. How many of the statements in the chart above are correct?

A. 3
B. 4
C. 5
D. 6

Use the following information to answer question 36.

The table shown below represents a pattern rule.

n	***m***
1	2
2	5
3	10
4	17
5	☐
6	37

36. The missing value of *m* in the table above is

A. 24
B. 25
C. 26
D. 27

Use the following information to answer question 37.

Whole Numbers

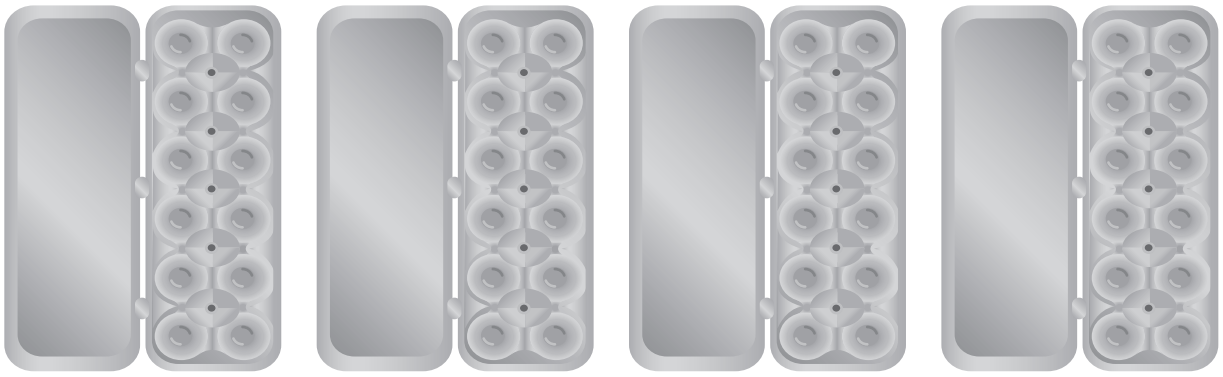
9 10 11 12 13 14 15 16 17

37. How many of the whole numbers shown above are also composite numbers?

A. 3
B. 4
C. 5
D. 6

Use the following information to answer question 38.

Patrick fills $3\frac{5}{12}$ of the egg cartons shown below with eggs.



38. How many eggs in **total** does Patrick have?

A. 35
B. 36
C. 41
D. 43

Use the following information to answer numerical-response question 9.

Admission to a circus increases each year.

Circus Admission		
Year	**Adult Ticket**	**Child Ticket**
2011	$12.00	$4.50
2012	$12.50	$5.00
2013	$13.00	$5.50

Numerical Response

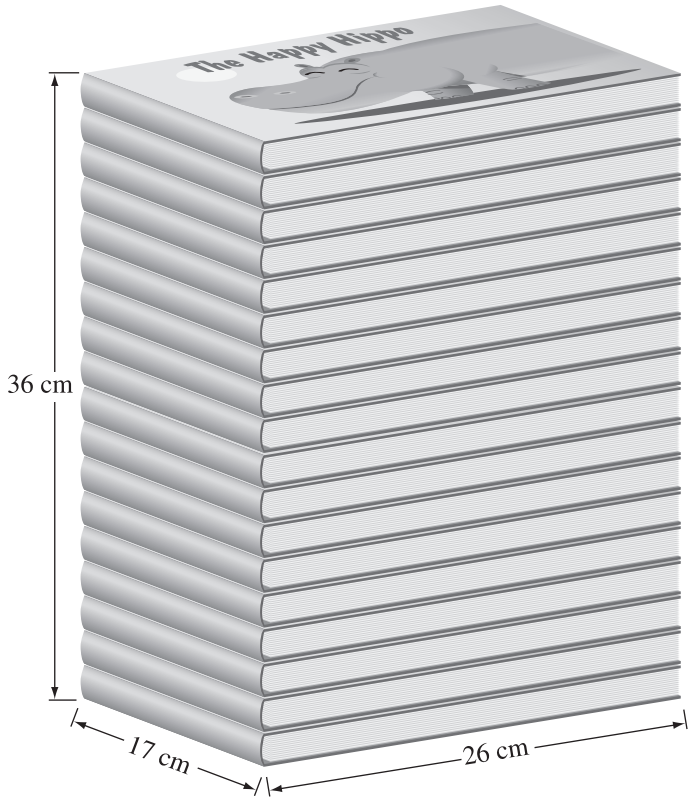
9. If the pattern in the table continues, in which **year** will the cost of a child's ticket be exactly half the cost of an adult's ticket?

Answer: _____

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

Use the following information to answer question 39.

A stack of identical books is shown below.

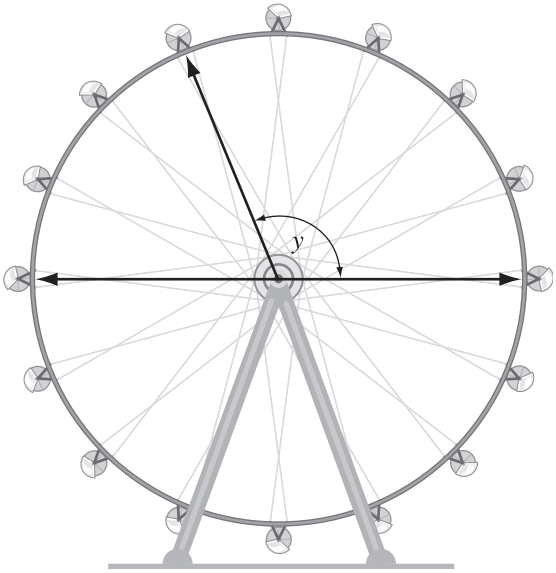


39. What is the combined height of 3 of the books shown above?

A. 36 cm
B. 17 cm
C. 6 cm
D. 2 cm

Use the following information to answer question 40.

Seats are evenly spaced around the amusement ride shown below.



40. The measure of angle *y* shown above is

A. 101.25°
B. 112.50°
C. 118.50°
D. 123.75°

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

A 10-cm-long wire is cut into 4 equal pieces. An equilateral triangle is made by using 3 of the pieces.

Numerical Response

10. What is the perimeter of the equilateral triangle?

Answer: _____ cm

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