XV. Mathematics, Grade 10

Grade 10 Mathematics

SESSION 1

This session contains 21 questions.

You may use your reference sheet during this session.
*You may **not** use a calculator during this session.*

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Test & Answer Booklet.

For some questions, you will mark your answers by filling in the circles in your Test & Answer Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

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Directions for Completing Questions with Answer Grids

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2. Enter your answer in the answer boxes at the top of the answer grid.
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5. Do not fill in a circle under an unused answer box.
6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.
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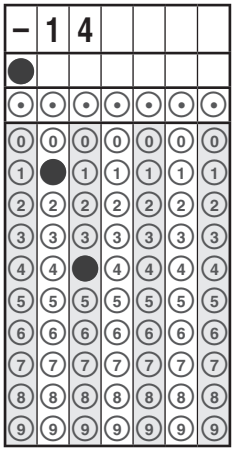
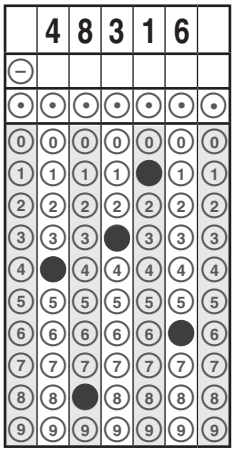
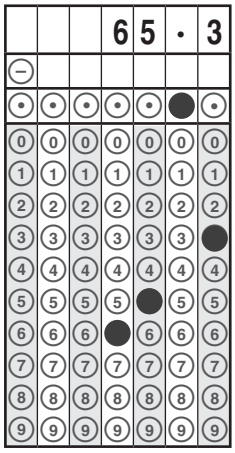
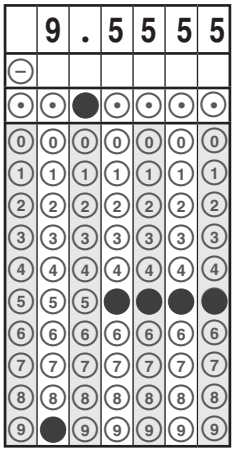
8. See below for examples of how to correctly complete an answer grid.

EXAMPLES









MASSACHUSETTS DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION

Massachusetts Comprehensive Assessment System
Grade 10 Mathematics Reference Sheet

CONVERSIONS

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon ≈ 3.785 liters
1 liter ≈ 0.264 gallon
1 liter = 1000 cubic centimeters

1 inch = 2.54 centimeters
1 meter ≈ 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile ≈ 1.609 kilometers
1 kilometer ≈ 0.62 mile

1 pound = 16 ounces
1 pound ≈ 0.454 kilogram
1 kilogram ≈ 2.2 pounds
1 ton = 2000 pounds

AREA (A) FORMULAS

square . . . . . $A = s^2$
rectangle . . . . . $A = lw$
parallelogram . . . . . $A = bh$
triangle . . . . . $A = \frac{1}{2}bh$
trapezoid . . . . . $A = \frac{1}{2}h(b_1 + b_2)$
circle . . . . . $A = \pi r^2$

TOTAL SURFACE AREA (SA) FORMULAS

cube . . . . . $SA = 6s^2$
right square pyramid . . . . $SA = s^2 + 2s\ell$
(ℓ = slant height)
right rectangular prism . . $SA = 2(lw) + 2(hw) + 2(lh)$

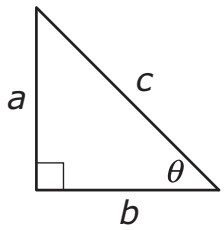
VOLUME (V) FORMULAS

cube . . . . . $V = s^3$
(s = length of an edge)
prism . . . . . $V = Bh$
cylinder . . . . . $V = \pi r^2 h$
cone . . . . . $V = \frac{1}{3}\pi r^2 h$
pyramid . . . . . $V = \frac{1}{3}Bh$
sphere . . . . . $V = \frac{4}{3}\pi r^3$

CIRCLE FORMULAS

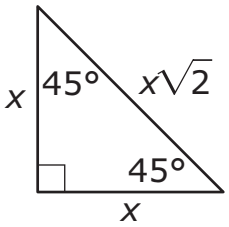
pi . . . . . $\pi \approx 3.14$
circumference . . . . $C = 2\pi r$ OR $C = \pi d$
area . . . . . $A = \pi r^2$

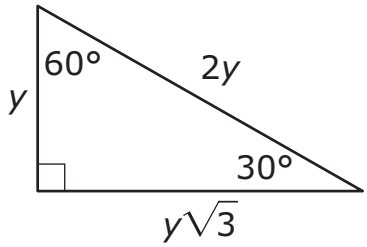
RIGHT TRIANGLES



Pythagorean Theorem
$a^2 + b^2 = c^2$
Trigonometric Ratios
$\sin\theta = \frac{a}{c}$
$\cos\theta = \frac{b}{c}$
$\tan\theta = \frac{a}{b}$

SPECIAL RIGHT TRIANGLES





1 Which of the following is equivalent to this expression?

$$-5x(-6x^2 + 1)$$

Ⓐ $30x^3 - 4x$

Ⓑ $30x^3 - 5x$

Ⓒ $-11x^3 - 4x$

Ⓓ $-11x^3 - 5x$

2 Consider this function.

$$f(x) = x(18 - x)$$

What are the values of $f(0)$, $f(5)$, and $f(18)$?

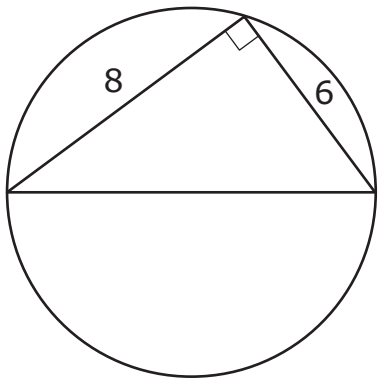
Ⓐ $f(0) = -18$
$f(5) = 90$
$f(18) = -36$

Ⓑ $f(0) = 0$
$f(5) = 90$
$f(18) = -324$

Ⓒ $f(0) = 0$
$f(5) = 65$
$f(18) = 0$

Ⓓ $f(0) = 18$
$f(5) = -450$
$f(18) = -36$

3 This diagram shows a circle with an inscribed right triangle and some of its measurements, in units.



Based on the diagram, what is the circumference, in units, of the circle?

Ⓐ 5π

Ⓑ 10π

Ⓒ 14π

Ⓓ 25π

4 On a coordinate plane, a single transformation will be performed on square *RSTU*.

Select **three** transformations of square *RSTU* that would result in a congruent figure.

Ⓐ a translation 3 units up and 8 units to the right

Ⓑ a rotation of 270° counterclockwise about the origin

Ⓒ a dilation by a scale factor of 1 with respect to the origin

Ⓓ a dilation by a scale factor of 1.5 with respect to the origin

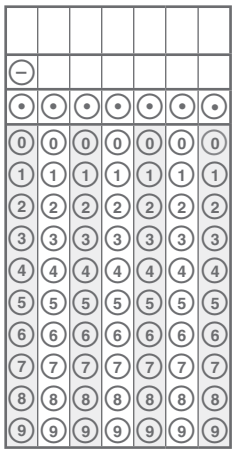
Ⓔ a dilation by a scale factor of −2 with respect to the origin

5 Consider this system of equations.

$$h + c = 2.25$$
$$h - c = 1.75$$

What value of h makes the system of equations true?

Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.



6 Which of the following is equivalent to this expression?

$$4k^4 + 16k^3 + 10k^2$$

Ⓐ $4k^2(k^2 + 4k + 2)$

Ⓑ $2k^2(2k^2 + 8k + 5)$

Ⓒ $2(2k^4 + 14k^3 + 8k^2)$

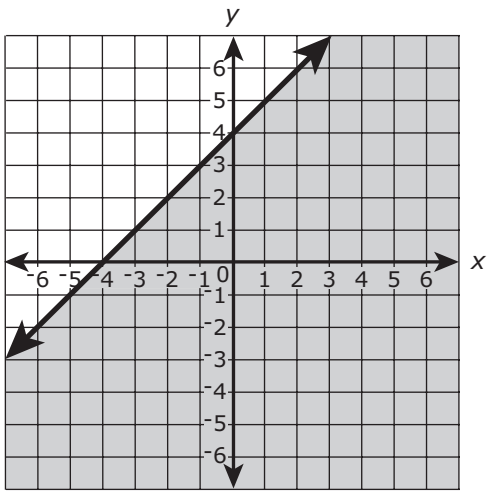
Ⓓ $2k^2(2k^2 + 16k + 10)$

7 Consider this inequality.

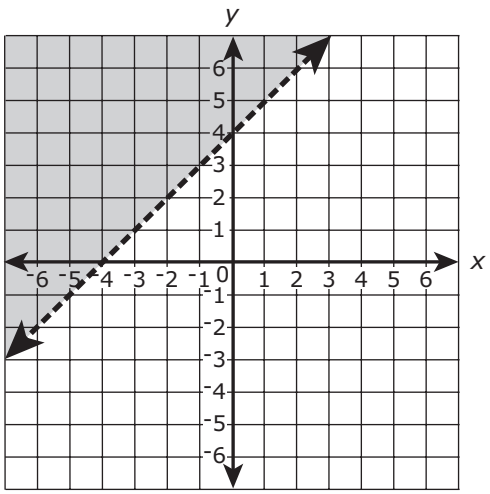
$$y \geq x - 4$$

Which of the following graphs represents the solution set of the inequality?

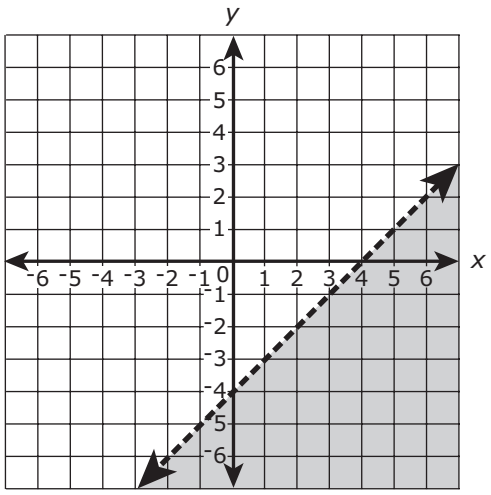
Ⓐ



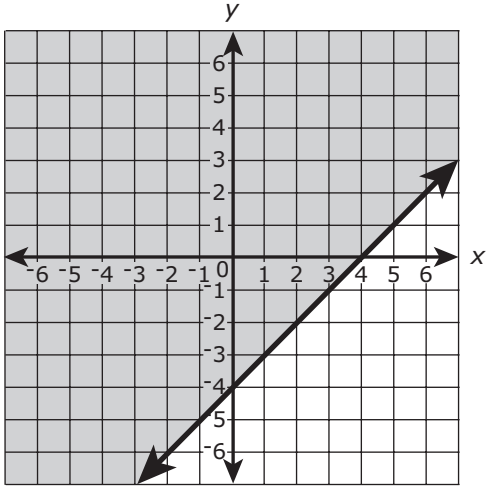
Ⓑ



Ⓒ



Ⓓ



8 Line w is represented by this equation.

$$y = 5x + 3$$

Which of the following equations represents a line that is perpendicular to line w?

Ⓐ $y = -\frac{1}{5}x + 1$

Ⓑ $y = -5x + 1$

Ⓒ $y = \frac{1}{5}x + 1$

Ⓓ $y = 5x + 1$

This question has four parts. Be sure to label each part of your response.

9 A line and a parabola are graphed on a coordinate plane. The equation of the line and the equation of the parabola are shown in this table.

Graph	Equation
Line	$y = -3x + 5$
Parabola	$y = -x^2 + 2x + 1$

A. What is the value of y for the line when $x = -4$? Show or explain how you got your answer.

B. What is the value of y for the parabola when $x = -4$? Show or explain how you got your answer.

C. The line and the parabola intersect at two points. The distance, in units, between the two points is represented by this expression.

$$\sqrt{(4-1)^2+(-7-2)^2}$$

Simplify the expression to determine the distance, in units, between the two points. Show or explain how you got your answer.

D. The area, in square units, of the region on the coordinate plane enclosed by the parabola and the line is represented by this expression.

$$-\frac{4^3}{3}+\frac{5(4)^2}{2}-4(4)-\left(-\frac{1^3}{3}+\frac{5(1)^2}{2}-4(1)\right)$$

Simplify the expression to determine the area, in square units, of the enclosed region. Show or explain how you got your answer.

9

10 A waiter recorded the amount of money he earned in tips each weekday for a two-week period. His data are shown in this table.

Money Earned in Tips

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	$25	$44	$48	$63	$75
2	$35	$35	$48	$62	$75

Which statement about the data in the table is true?

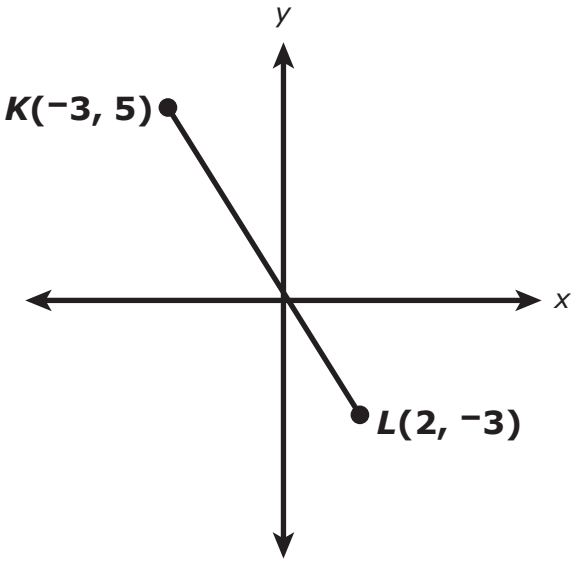
Ⓐ The median and the range for week 1 are equal to the median and the range for week 2.

Ⓑ The median and the mode for week 1 are equal to the median and the mode for week 2.

Ⓒ The mean and the median for week 1 are equal to the mean and the median for week 2.

Ⓓ The mean and the range for week 1 are equal to the mean and the range for week 2.

11 Line segment *KL* is shown on this coordinate plane.



What are the coordinates of the midpoint of line segment *KL*?

Ⓐ $(-1, \frac{1}{2})$

Ⓑ $(-\frac{1}{2}, 1)$

Ⓒ $(\frac{1}{2}, -1)$

Ⓓ $(1, -\frac{1}{2})$

This question has two parts.

12 Shayla and Carlos each have a bag that contains 5 green marbles, 5 red marbles, and 10 yellow marbles. The marbles are all the same size and shape.

Part A

Shayla will select two marbles from her bag at random. She will not return the first marble to the bag before selecting the second marble.

Which expression represents the probability that Shayla will select two red marbles?

Ⓐ $\frac{5}{20} \cdot \frac{4}{19}$

Ⓑ $\frac{5}{20} \cdot \frac{4}{20}$

Ⓒ $\frac{5}{20} \cdot \frac{5}{19}$

Ⓓ $\frac{5}{20} \cdot \frac{5}{20}$

Part B

Carlos will select two marbles from his bag at random. He will not return the first marble to the bag before selecting the second marble.

The first marble Carlos selects will **not** be yellow. What is the probability that the second marble he selects will be yellow?

Ⓐ $\frac{9}{20}$

Ⓑ $\frac{9}{19}$

Ⓒ $\frac{10}{20}$

Ⓓ $\frac{10}{19}$

13 What are the solutions of this equation?

$$x^2 + 7x + 12 = 0$$

Ⓐ $x = -3$; $x = -4$

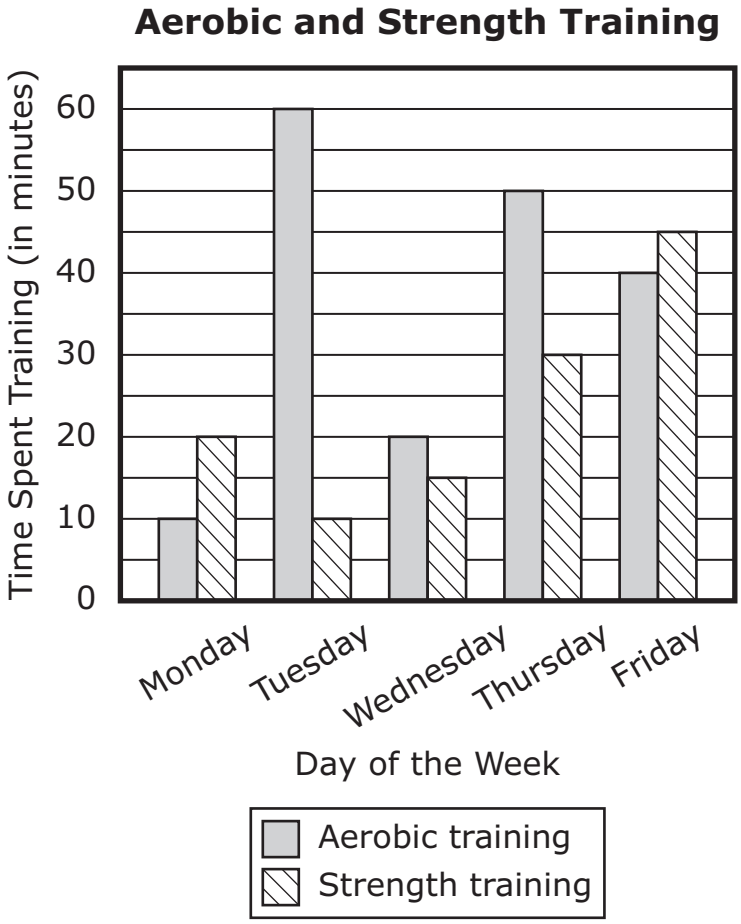
Ⓑ $x = -2$; $x = -6$

Ⓒ $x = 2$; $x = 6$

Ⓓ $x = 3$; $x = 4$

This question has four parts. Be sure to label each part of your response.

14 This double bar graph shows the amounts of time, in minutes, an athlete spent on aerobic training and strength training each day for 5 days.



A. On what day did the athlete spend the longest **total** amount of time training? Show or explain how you got your answer.

B. What is the median total number of minutes the athlete spent training each day? Show or explain how you got your answer.

C. What percent of the total number of minutes the athlete spent training for the 5 days was spent on **strength** training? Show or explain how you got your answer.

D. Determine whether the sum of the mean number of minutes spent on aerobic training and the mean number of minutes spent on strength training is equal to the mean total number of minutes spent training. Show or explain how you got your answer.

14

15 A rectangular garden that is $16\frac{1}{4}$ feet wide and $11\frac{3}{4}$ feet long will be covered with soil. If a bag of soil covers an area of 20 square feet, which of the following is **closest** to the number of bags of soil needed to cover the garden?

Ⓐ 2

Ⓑ 3

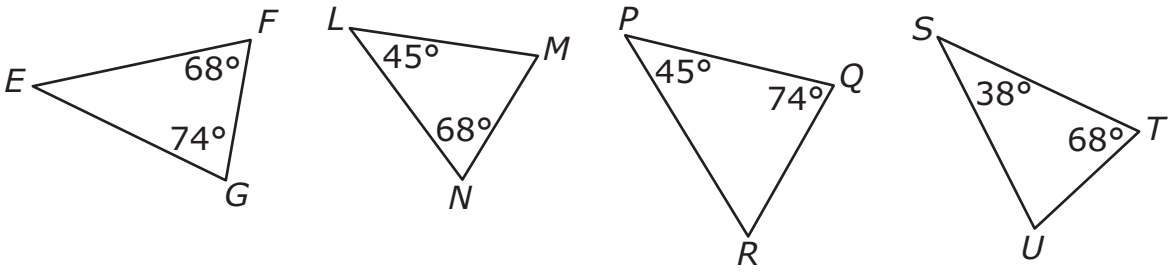
Ⓒ 8

Ⓓ 10

This question has two parts.

16 **Part A**

Four triangles and some of their angle measures are shown.



Based on the angle measures, which of the following similarity statements is true?

Ⓐ $\triangle FGE \sim \triangle TUS$

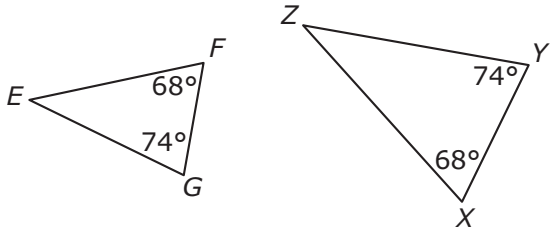
Ⓑ $\triangle GEF \sim \triangle QPR$

Ⓒ $\triangle LMN \sim \triangle PQR$

Ⓓ $\triangle NML \sim \triangle TSU$

Part B

These two triangles are similar.



Which of the following similarity statements about the triangles are true?

Select the **two** true statements.

Ⓐ $\triangle EFG \sim \triangle ZYX$

Ⓑ $\triangle EGF \sim \triangle XYZ$

Ⓒ $\triangle FEG \sim \triangle XZY$

Ⓓ $\triangle FGE \sim \triangle YZX$

Ⓔ $\triangle GFE \sim \triangle YXZ$

17 Which of the following is equivalent to this expression?

$$x^2 + 5x - 84$$

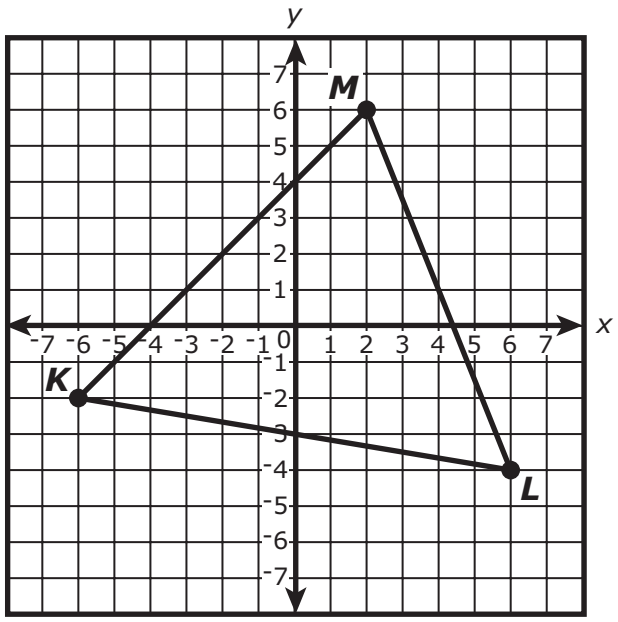
Ⓐ $(x + 6)(x - 14)$

Ⓑ $(x - 6)(x + 14)$

Ⓒ $(x + 7)(x - 12)$

Ⓓ $(x - 7)(x + 12)$

18 Triangle *KLM*, shown on this coordinate plane, will be dilated by a scale factor of $\frac{1}{2}$ with respect to the origin.



What are the ordered pairs that represent the vertices of the image of triangle *KLM* after the dilation?

Select the **three** ordered pairs.

Ⓐ (−3, −1)

Ⓑ (−2, 3)

Ⓒ (−1, −3)

Ⓓ (1, 3)

Ⓔ (2, −2)

Ⓕ (3, −2)

This question has two parts.

19 **Part A**

Which of the following statements is true?

Ⓐ The sum of two rational numbers is rational.

Ⓑ The product of two rational numbers is irrational.

Ⓒ The sum of a rational number and an irrational number is rational.

Ⓓ The product of a non-zero rational number and an irrational number is rational.

Part B

Which of the following statements is true?

Ⓐ The sum of $\frac{\pi}{2}$ and $\frac{\pi}{2}$ is rational, and the product of $\frac{1}{2}$ and π is rational.

Ⓑ The sum of $\frac{\pi}{2}$ and $\frac{\pi}{2}$ is rational, and the product of $\frac{1}{2}$ and π is irrational.

Ⓒ The sum of $\frac{\pi}{2}$ and $\frac{\pi}{2}$ is irrational, and the product of $\frac{1}{2}$ and π is rational.

Ⓓ The sum of $\frac{\pi}{2}$ and $\frac{\pi}{2}$ is irrational, and the product of $\frac{1}{2}$ and π is irrational.

20 Which of the following is the solution set of this inequality?

$$2 - 4y > 14$$

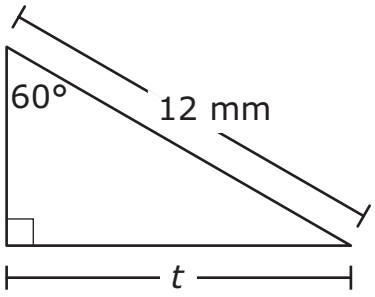
Ⓐ $y > -3$

Ⓑ $y < -3$

Ⓒ $y > 3$

Ⓓ $y < 3$

21 A right triangle and some of its measurements are shown in this diagram.



Based on the measurements shown in the diagram, what is t?

Ⓐ 6 mm

Ⓑ $4\sqrt{3}$ mm

Ⓒ $6\sqrt{3}$ mm

Ⓓ 8 mm

Grade 10 Mathematics
SESSION 2

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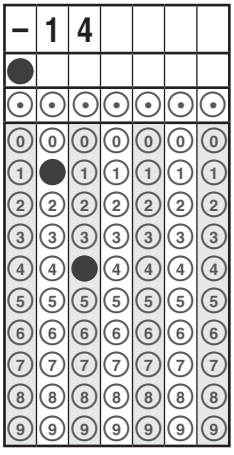
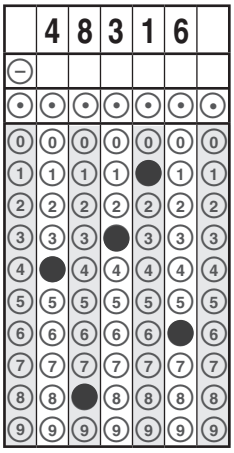
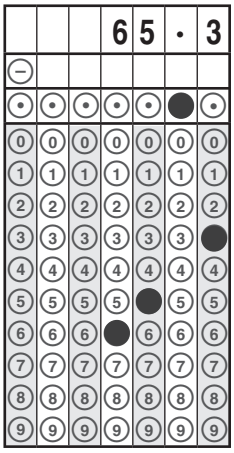
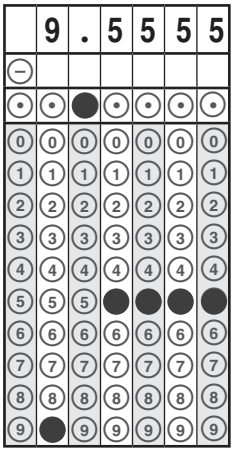
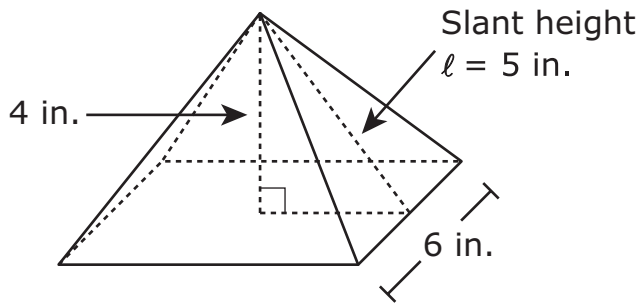








22 This diagram shows a right square pyramid and some of its dimensions.



What is the volume of the pyramid?

Ⓐ 48 cubic inches

Ⓑ 60 cubic inches

Ⓒ 144 cubic inches

Ⓓ 180 cubic inches

23 A travel agent surveyed people in two age groups about whether or not they like traveling. Which two-way table shows the possible results of the survey?

Ⓐ

Travel Survey

	Likes Traveling	Dislikes Traveling	Totals
Ages 18–30	40	10	50
Ages 31–60	20	30	50
Totals	60	40	100

Ⓑ

Travel Survey

	Likes Traveling	Dislikes Traveling	Totals
Ages 18–30	30	10	50
Ages 31–60	30	10	50
Totals	60	40	100

Ⓒ

Travel Survey

	Likes Traveling	Dislikes Traveling	Totals
Ages 18–30	40	10	50
Ages 31–60	10	30	50
Totals	60	40	100

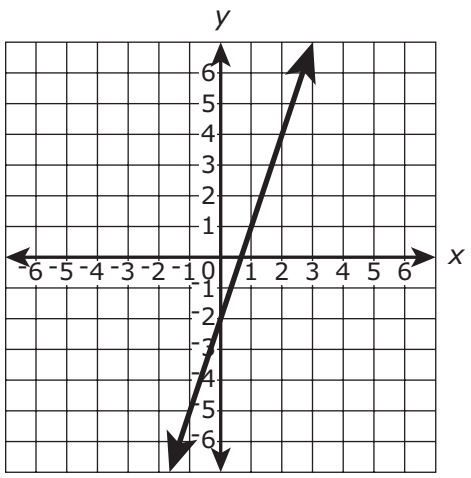
Ⓓ

Travel Survey

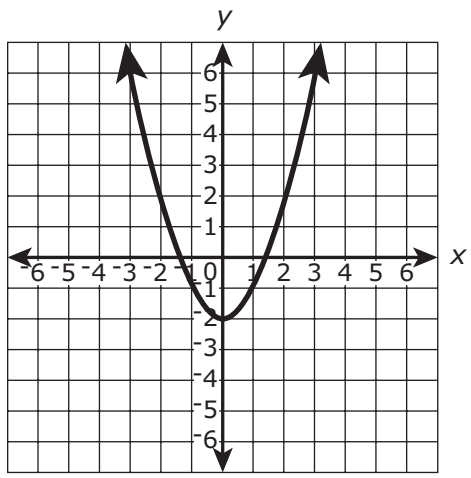
	Likes Traveling	Dislikes Traveling	Totals
Ages 18–30	30	10	50
Ages 31–60	40	10	50
Totals	60	40	100

24 Which of the following graphs does **not** represent y as a function of x?

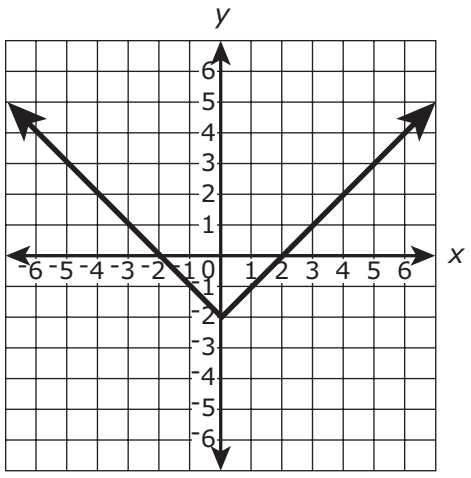
Ⓐ



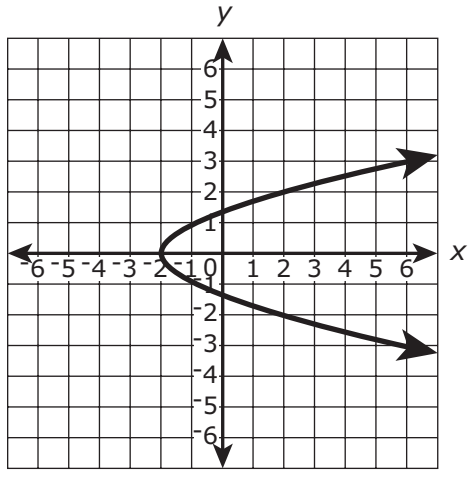
Ⓑ



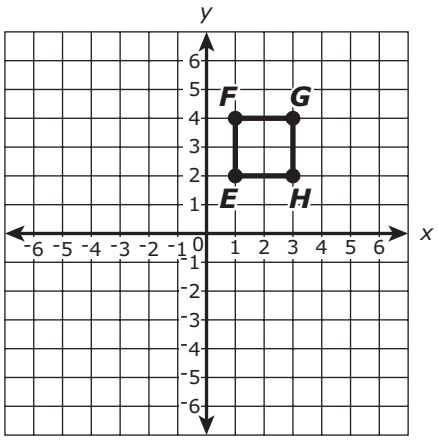
Ⓒ



Ⓓ

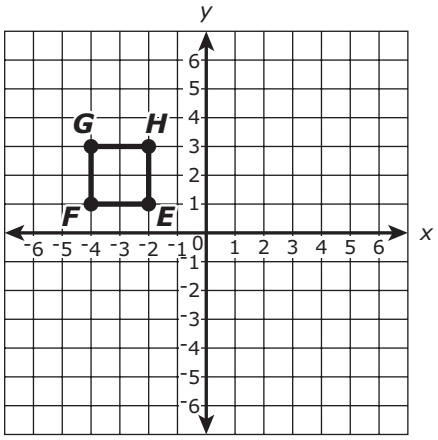


25 Consider square *EFGH*, shown on this coordinate plane.

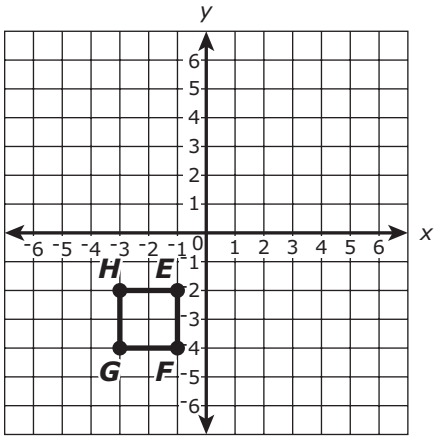


Square *EFGH* will be reflected over the *y*-axis. Which graph correctly shows the image of square *EFGH* after the reflection?

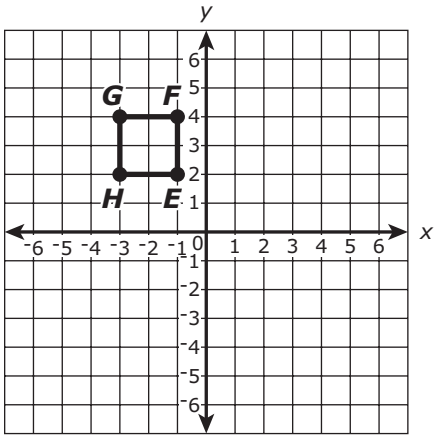
Ⓐ



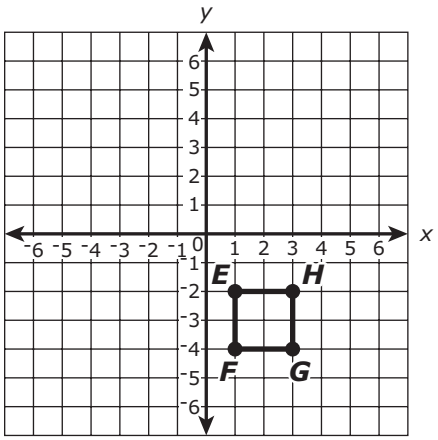
Ⓑ



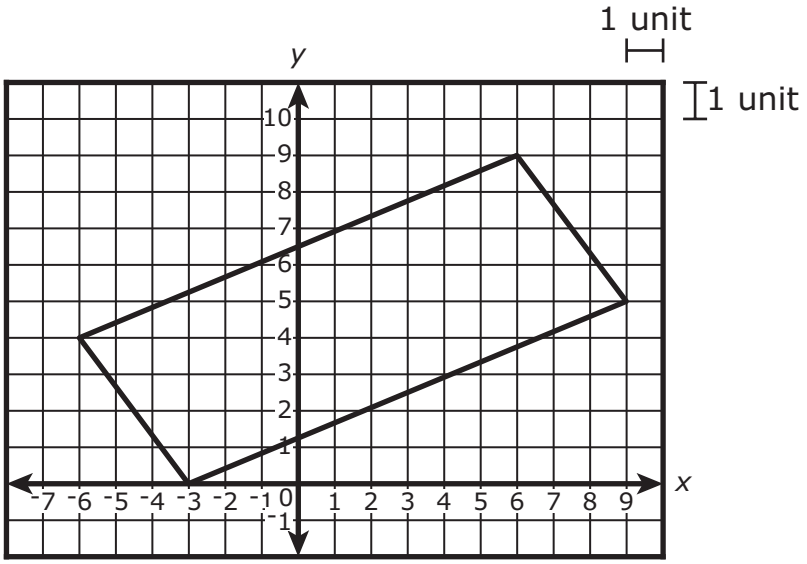
Ⓒ



Ⓓ



26 A parallelogram is shown on this coordinate plane.



What is the perimeter, in units, of the parallelogram?

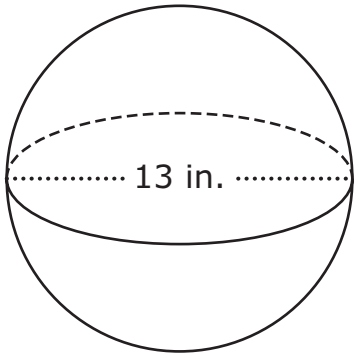
Ⓐ 24

Ⓑ 36

Ⓒ 48

Ⓓ 64

27 A sphere and one of its dimensions are shown in this diagram.



Which of the following is **closest** to the volume of the sphere?

Ⓐ 9203 $in.^3$

Ⓑ 1150 $in.^3$

Ⓒ 163 $in.^3$

Ⓓ 82 $in.^3$

28 This table shows the values of the linear function $f(x)$ for different values of x.

x	$f(x)$
0	120
20	90
40	60
60	30

The function $g(x)$ is represented by this equation.

$$g(x) = 10x + 40$$

Which statement correctly compares the rates of change and y-intercepts of $f(x)$ and $g(x)$?

Ⓐ Function $f(x)$ has a greater rate of change and a greater y-intercept than function $g(x)$.

Ⓑ Function $g(x)$ has a greater rate of change and a greater y-intercept than function $f(x)$.

Ⓒ Function $f(x)$ has a greater rate of change than function $g(x)$, and function $g(x)$ has a greater y-intercept than function $f(x)$.

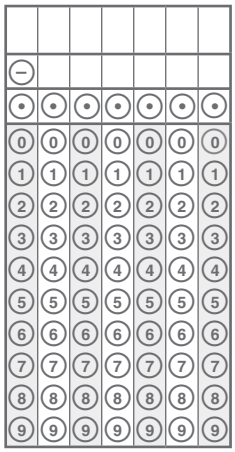
Ⓓ Function $g(x)$ has a greater rate of change than function $f(x)$, and function $f(x)$ has a greater y-intercept than function $g(x)$.

29 A factory worker loaded some boxes onto a cart. Each box has the same weight. This expression represents the total weight, in pounds, of the cart **and** n boxes.

$$10n + 25$$

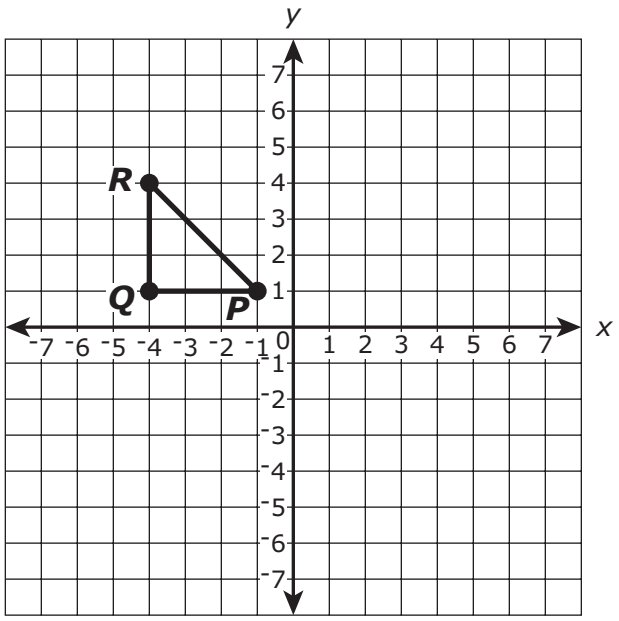
Based on the expression, what is the weight, in pounds, of the cart?

Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.



This question has four parts. Be sure to label each part of your response.

30 A student graphed Δ*PQR* on a coordinate plane, as shown.



A. The student reflected Δ*PQR* over the *x*-axis to create Δ*EFG*. What are the coordinates of vertex *E*? Show or explain how you got your answer.

B. The student performed a different single transformation on Δ*PQR* to create Δ*JKL*. The coordinates of vertex *K* are (4, 1). What could be the single transformation the student performed?

C. Describe a single transformation the student can perform on Δ*PQR* so that its image, Δ*UVW*, is similar to, but **not** congruent to, Δ*PQR*. Show or explain how you got your answer.

D. What will be the coordinates of vertex *W* after the student performs the transformation described in Part C? Show or explain how you got your answer.

30

31 Marvin solved this equation.

$$4(x + 5) = 88$$

Marvin created a table showing each step he used to solve the equation. The table also showed the correct explanation for each step.

Which of the following tables shows the correct explanation for each step in Marvin's solution?

Ⓐ

$4(x + 5) = 88$	Given
$4x + 20 = 88$	He multiplied both sides by 4.
$4x = 68$	He added 20 to both sides.
$x = 17$	He multiplied both sides by 4.

Ⓑ

$4(x + 5) = 88$	Given
$4x + 20 = 88$	He used the distributive property.
$4x = 68$	He subtracted 20 from both sides.
$x = 17$	He divided both sides by 4.

Ⓒ

$4(x + 5) = 88$	Given
$4x + 20 = 88$	He used the distributive property.
$4x = 68$	He divided both sides by 20.
$x = 17$	He subtracted 4 from both sides.

Ⓓ

$4(x + 5) = 88$	Given
$4x + 20 = 88$	He added 4 to both sides.
$4x = 68$	He multiplied both sides by 20.
$x = 17$	He divided both sides by 4.

32 Each **exterior** angle of a regular polygon has a measure of 30°. What is the total number of sides of the polygon?

Ⓐ 6

Ⓑ 9

Ⓒ 12

Ⓓ 15

This question has two parts.

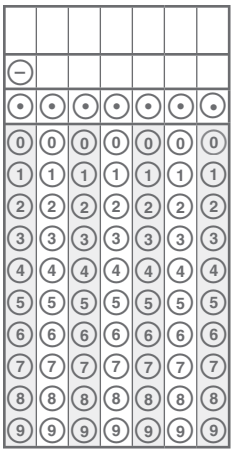
33 On a map, 1 inch equals 0.75 mile.

Part A

The distance between a museum and a library on the map is 2 inches.

What is the actual distance, in miles, between the museum and the library?

Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.

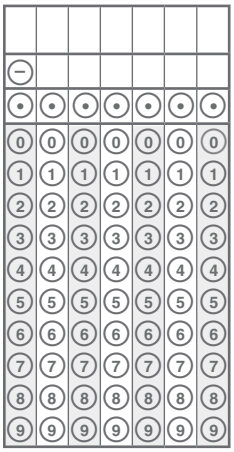


Part B

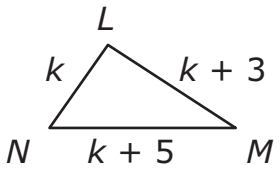
The actual distance between the library and a bus stop is 3 miles.

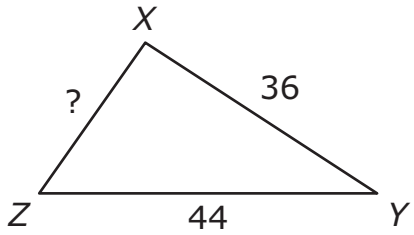
What is the distance, in inches, between the library and the bus stop on the map?

Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.



34 Triangle *LMN* is similar to triangle *XYZ*. This diagram shows some of the dimensions, in units, of the triangles.





Based on the diagram, what is the length, in units, of $\overline{XZ}$?

Ⓐ 13.5

Ⓑ 22.5

Ⓒ 24

Ⓓ 28

This question has four parts. Be sure to label each part of your response.

35 At the beginning of the year, Samantha deposits $1000 into a savings account that pays 2.5% interest. She does not deposit money into or withdraw money from the account for 1 year.

A. What is the interest rate expressed as a **decimal**?

B. This formula can be used to calculate the total amount of money, including interest, in an account over time for a deposit of $1000.

$$A = 1000\left(1 + \frac{r}{n}\right)^{nt}$$

In the formula, the variables A, r, t, and n are defined as follows:

- A = the amount of money in the savings account after t years
- r = the interest rate as a decimal
- t = the amount of time, in years, the money is invested
- n = the number of times the interest is compounded in 1 year

What is the amount of money, in dollars, in Samantha's savings account at the end of 1 year if the interest is compounded annually (once per year)? Show or explain how you got your answer.

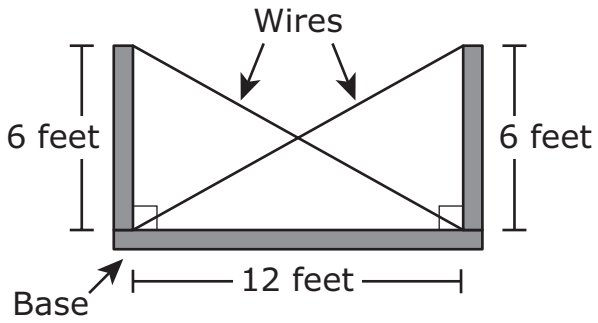
C. Samantha deposits $1000 into a new savings account. The new savings account pays 3% interest, compounded semiannually (twice per year). She does not deposit money into or withdraw money from the account for $1\frac{1}{2}$ years.

Write an equation that can be used to determine the amount of money, in dollars, in the **new** savings account at the end of $1\frac{1}{2}$ years.

D. Use the equation you wrote in Part C to determine the amount of money, in dollars, in Samantha's new savings account at the end of $1\frac{1}{2}$ years. Show or explain how you got your answer.

35

36 A storage rack has two wires that help support the sides of the rack. Each wire connects the top of one side to the base of the rack. The sides form right angles with the base of the rack. The rack and its interior dimensions are shown in this diagram.



Which of the following is **closest** to the length, in feet, of each wire?

Ⓐ 9

Ⓑ 10.4

Ⓒ 13.4

Ⓓ 18

This question has two parts.

37 **Part A**

This table shows the value of linear function $f(x)$ for different values of x.

x	2	4	5	7
$f(x)$	223	206	197.5	180.5

A student graphed the line that represents $f(x)$ on a coordinate plane. Which statement about the graph of $f(x)$ is true?

Ⓐ The slope of the line is negative, and the y-intercept of the line is negative.

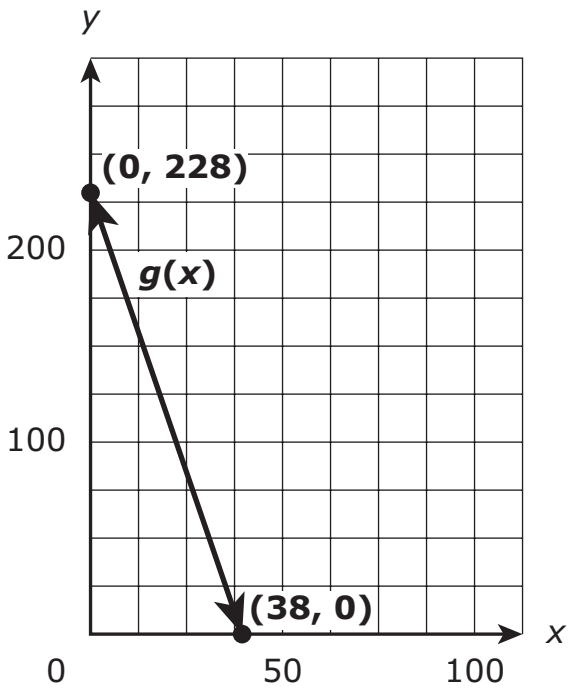
Ⓑ The slope of the line is negative, and the y-intercept of the line is positive.

Ⓒ The slope of the line is positive, and the y-intercept of the line is negative.

Ⓓ The slope of the line is positive, and the y-intercept of the line is positive.

Part B

The student also graphed linear function $g(x)$ on a coordinate plane, as shown.



Which of the following equations models $g(x)$?

Ⓐ $g(x) = -6x + 228$

Ⓑ $g(x) = -3x + 38$

Ⓒ $g(x) = 3x + 228$

Ⓓ $g(x) = 6x + 38$

38 A student has two part-time jobs: babysitting and tutoring. The student earns an hourly wage at each job.

- On Monday, the student earned a total of $130 for 4 hours of babysitting and 2 hours of tutoring.
- On Tuesday, the student earned a total of $80 for 3 hours of babysitting and 1 hour of tutoring.

Which of the following systems of equations can be used to find x, the student's hourly wage for babysitting, and y, the student's hourly wage for tutoring?

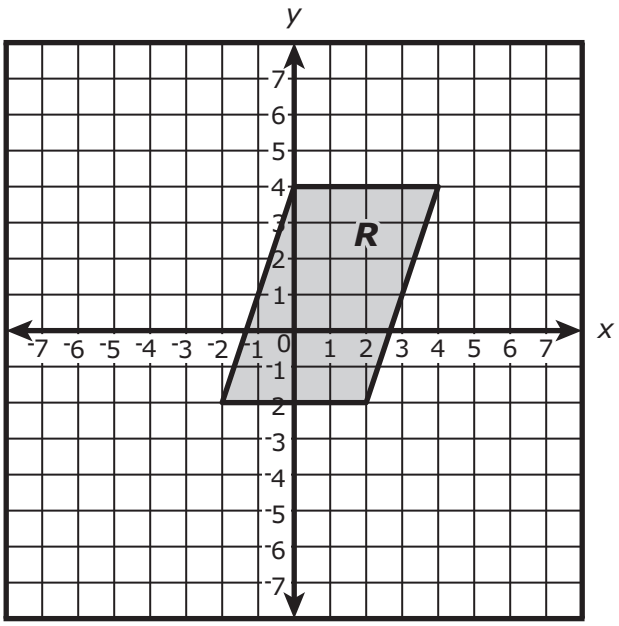
Ⓐ $2x + 4y = 130$
$x + 3y = 80$

Ⓑ $3x + y = 130$
$4x + 2y = 80$

Ⓒ $4x + 3y = 130$
$2x + y = 80$

Ⓓ $4x + 2y = 130$
$3x + y = 80$

39 Figure *R* is shown on this coordinate plane.



Which of the following transformations would carry Figure *R* onto itself?

Ⓐ a reflection over the line $y = 1$

Ⓑ a reflection over the line $x = 1$

Ⓒ a 90° clockwise rotation about the point (1, 1)

Ⓓ a 180° clockwise rotation about the point (1, 1)

This question has two parts.

40 The population of each of four towns is predicted to increase or decrease at a constant rate. The equations shown in this table can be used to predict the population, P, of each town t years from today.

Population Predictions

Town	Equation
Pinehill	$P = 800 - 20t$
Rye	$P = 500 + 15t$
Smithfield	$P = 10t + 950$
Troy	$P = -50t + 600$

Part A

Based on the equations in the table, which statements about the populations of these towns are true?

Select **two** true statements.

Ⓐ The population of Troy is decreasing.

Ⓑ The population of Pinehill is increasing.

Ⓒ The populations of Rye and Smithfield are each increasing.

Ⓓ The populations of Smithfield and Troy are each decreasing.

Ⓔ The populations of all four of the towns are each increasing.

Part B

Which of the following lists the towns, based on their populations **today**, from least to greatest population?

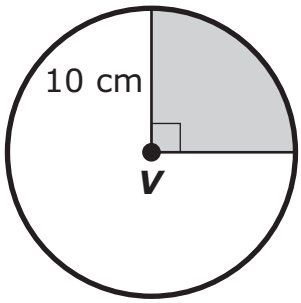
Ⓐ Pinehill, Rye, Smithfield, Troy

Ⓑ Rye, Troy, Pinehill, Smithfield

Ⓒ Smithfield, Pinehill, Rye, Troy

Ⓓ Troy, Pinehill, Smithfield, Rye

41 A student shaded part of circle *V*, as shown.



Which of the following is **closest** to the area of the shaded part of circle *V*?

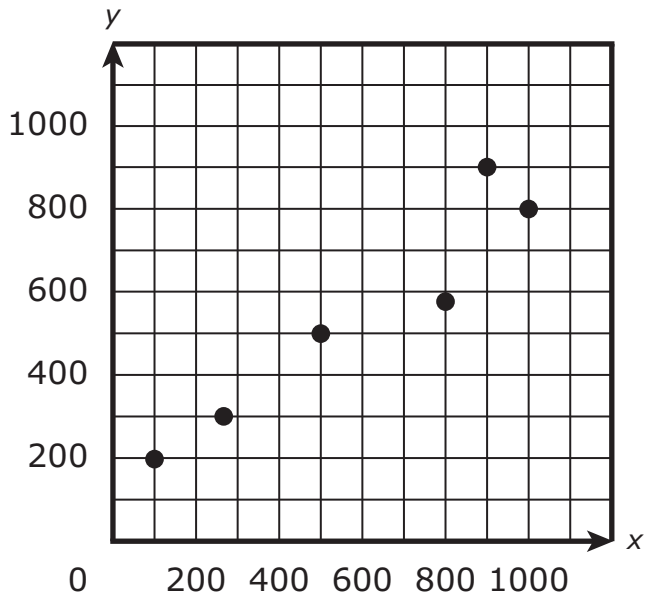
Ⓐ 78.5 cm^2

Ⓑ 31.4 cm^2

Ⓒ 25.0 cm^2

Ⓓ 15.7 cm^2

42 A student will draw the line of best fit for the set of data shown in this scatter plot.



Which of the following **best** describes how to draw the line of best fit for the set of data?

Ⓐ The line of best fit should pass through the origin.

Ⓑ The line of best fit should connect all of the data points.

Ⓒ The line of best fit should come as close as possible to every data point.

Ⓓ The line of best fit should contain the points with the highest and lowest *y*-values.

Grade 10 Mathematics
Spring 2019 Released Operational Items

PBT Item No.	Page No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
1	354	*Algebra and Functions*	A-APR.A.1	SR	Multiply two polynomial expressions.	B
2	354	*Algebra and Functions*	F-IF.A.2	SR	Evaluate a quadratic function for different input values.	C
3	355	*Geometry*	G-C.A.2	SR	Use an inscribed right triangle to determine the circumference of a circle.	B
4	355	*Geometry*	G-CO.B.6	SR	Identify transformations that would produce a congruent figure.	A,B,C
5	356	*Algebra and Functions*	A-REI.C.6	SA	Solve for one variable in a system of linear equations algebraically.	2
6	356	*Algebra and Functions*	A-SSE.A.2	SR	Factor a trinomial expression.	B
7	357	*Algebra and Functions*	A-REI.D.12	SR	Identify the graph of the solution set of a linear inequality in two variables.	D
8	358	*Geometry*	G-GPE.B.5	SR	Identify an equation of a line perpendicular to a given line.	A
9	359	*Number and Quantity*	N-RN.A.2	CR	Evaluate expressions involving radicals and rational exponents.	
10	361	*Statistics and Probability*	S-ID.A.2	SR	Compare measures of center and spread of two data sets.	C
11	362	*Geometry*	G-GPE.B.6	SR	Find the midpoint of a line segment graphed on a coordinate plane.	B
12	363	*Statistics and Probability*	S-CP.B.6	SR	Calculate conditional probabilities of real-world events from a description.	A;D
13	364	*Algebra and Functions*	A-REI.B.4	SR	Find the solutions of a quadratic equation in one variable.	A
14	365	*Statistics and Probability*	S-ID.A.2	CR	Interpret data in a data display and compare the measures of center of the data sets.	
15	367	*Number and Quantity*	N-Q.A.2	SR	Estimate the solution of a real-world problem using units.	D
16	368	*Geometry*	G-SRT.A.3	SR	Use similarity criteria to identify and name similar triangles.	A;C,E
17	369	*Algebra and Functions*	A-SSE.B.3	SR	Factor a quadratic trinomial expression.	D
18	370	*Geometry*	G-SRT.A.1	SR	Identify the graph of a figure on a coordinate plane after a dilation.	A,D,F
19	371	*Number and Quantity*	N-RN.B.3	SR	Identify correct statements about operations with rational and irrational numbers.	A;D
20	372	*Algebra and Functions*	A-REI.B.3	SR	Determine the solution set of a linear inequality in one variable.	B
21	373	*Geometry*	G-SRT.C.6	SR	Use a trigonometric ratio to determine a missing side length in a right triangle.	C
22	376	*Geometry*	G-GMD.A.3	SR	Calculate the volume of a right square pyramid.	A
23	377	*Statistics and Probability*	S-ID.B.5	SR	Identify a two-way table that represents a real-world situation.	A

PBT Item No.	Page No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
24	378	*Algebra and Functions*	F-IF.A.1	SR	Identify a graph that does not represent a functional relationship.	D
25	379	*Geometry*	G-CO.A.5	SR	Identify the graph of a figure on a coordinate plane after a reflection.	C
26	380	*Geometry*	G-GPE.B.7	SR	Calculate the perimeter of a parallelogram shown on a coordinate plane.	B
27	381	*Geometry*	G-GMD.A.3	SR	Calculate the volume of a sphere.	B
28	382	*Algebra and Functions*	F-IF.C.9	SR	Compare the properties of linear functions represented in different ways.	D
29	383	*Algebra and Functions*	A-SSE.A.1	SA	Interpret part of an expression that represents a real-world situation.	25
30	384	*Geometry*	G-CO.A.2	CR	Describe transformations that create congruent and non-congruent images and determine the coordinates of the vertices of transformed figures.	
31	386	*Algebra and Functions*	A-REI.A.1	SR	Justify each step in the solution of a linear equation.	B
32	387	*Geometry*	G-CO.C.11	SR	Determine the number of sides of a regular polygon based on the measures of its exterior angles.	C
33	388–389	*Number and Quantity*	N-Q.A.1	SA	Use dimensional analysis to equate actual distances and those on a map.	1.5; 4
34	389	*Geometry*	G-SRT.B.5	SR	Use similar triangles to determine a missing side length.	C
35	390	*Algebra and Functions*	A-CED.A.1	CR	Create exponential equations from a formula and use them to solve real-world problems.	
36	392	*Geometry*	G-SRT.C.8	SR	Use the Pythagorean theorem to solve a real-world problem.	C
37	393–394	*Algebra and Functions*	F-LE.A.2	SR	Identify the features of a linear function from values in a table and determine an equation for another linear function shown on a graph.	B;A
38	395	*Algebra and Functions*	A-CED.A.2	SR	Determine a system of two-variable equations based on a real-world situation.	D
39	396	*Geometry*	G-CO.A.3	SR	Identify a transformation that would carry a figure onto itself.	D
40	397–398	*Algebra and Functions*	F-LE.B.5	SR	Interpret parameters of linear functions based on a real-world situation.	A,C;B
41	399	*Geometry*	G-C.B.5	SR	Determine the area of a sector of a circle.	A
42	400	*Statistics and Probability*	S-ID.B.6	SR	Identify the method for drawing the line of best fit for data displayed in a scatter plot.	C

* Mathematics item types are: selected-response (SR), short-answer (SA), and constructed-response (CR).

** Answers are provided here for selected-response and short-answer items only. Sample responses and scoring guidelines for constructed-response items will be posted to the Department's website later this year.