MASSACHUSETTS COMPREHENSIVE ASSESSMENT SYSTEM

PRACTICE TEST

Mathematics

Grade 10

Student Name

School Name

District Name

MASSACHUSETTS DEPARTMENT OF
ELEMENTARY AND SECONDARY
EDUCATION

Grade 10 Mathematics
SESSION 1

This session contains 13 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 Practice Test Booklet.

For some questions, you will mark your answers by filling in the circles in your Practice Test 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.

For other questions, you will need to fill in an answer grid. Directions for completing questions with answer grids are provided on the next page.

If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided. Only responses written within the provided space will be scored.

Directions for Completing Questions with Answer Grids

1. Work the question and find an answer.
2. Enter your answer in the answer boxes at the top of the answer grid.
3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
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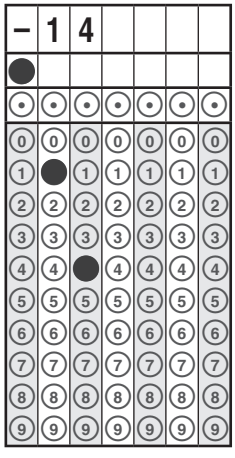
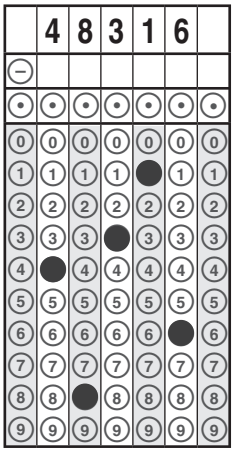
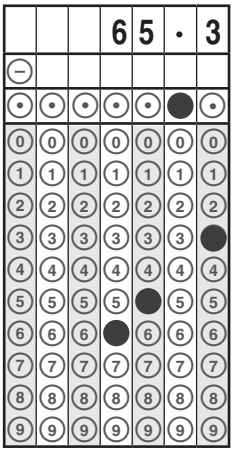
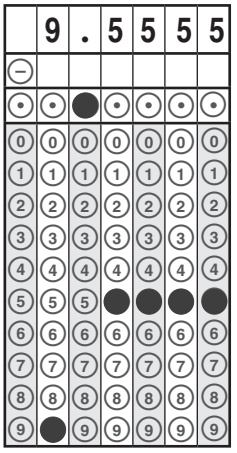
8. See below for examples of how to correctly complete an answer grid.

EXAMPLES









1 Albert drew the line represented by this equation on a coordinate plane.

$$y = -\frac{1}{2}x + 5$$

On the same coordinate plane, Penny drew a line that is perpendicular to Albert's line **and** passes through the point (−4, 3). Which of the following equations represents Penny's line?

Ⓐ $y = 2x + 5$

Ⓑ $y = 2x + 11$

Ⓒ $y = -2x - 5$

Ⓓ $y = -2x - 11$

2 A student determined an equation for the line of best fit for each of three sets of data. She then calculated the correlation coefficient for each linear fit. The list of her results is shown.

$$-0.91,\ 0.39,\ 0.87$$

Which of the following statements about the relationships described by the correlation coefficients are true?

Select the **three** true statements.

Ⓐ The correlation coefficient of −0.91 describes no relationship.

Ⓑ The correlation coefficient of −0.91 describes a strong relationship.

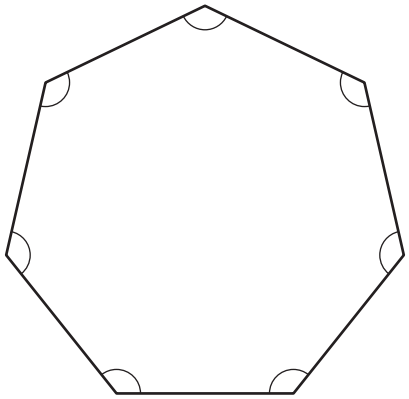
Ⓒ The correlation coefficient of 0.39 describes no relationship.

Ⓓ The correlation coefficient of 0.39 describes a weak relationship.

Ⓔ The correlation coefficient of 0.87 describes a weak relationship.

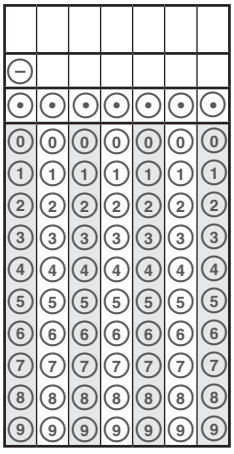
Ⓕ The correlation coefficient of 0.87 describes a strong relationship.

3 Consider this polygon.



What is the sum, in degrees, of the measures of the interior angles of the polygon?

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. Write your response in the answer space provided.

4 Consider this inequality.

$$y \geq 2x - 1$$

A. On the coordinate plane provided in your answer space, graph the solution set of the inequality.

B. Write an ordered pair that is a solution of the inequality from Part A. Show or explain how you got your answer.

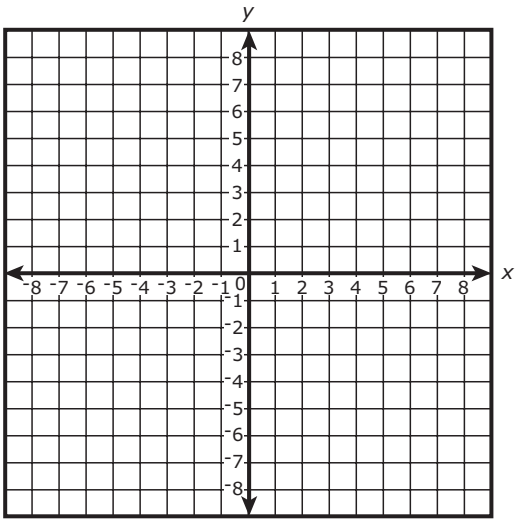
Consider this system of inequalities.

$$x + y > -2$$
$$x - y < 4$$

C. On the coordinate plane provided in your answer space, graph the solution set of the system of inequalities.

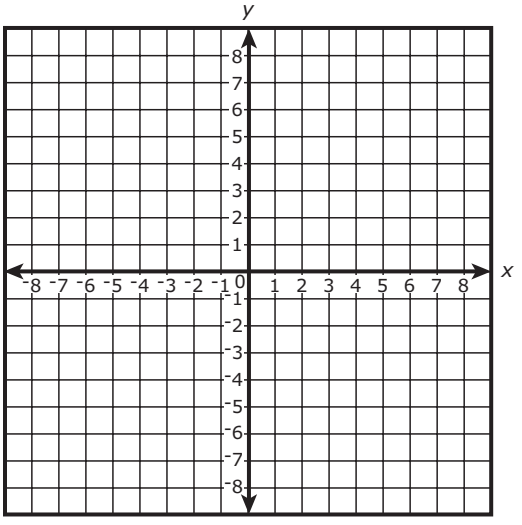
D. Write an ordered pair that is a solution of both the inequality from Part A **and** the system of inequalities from Part C. Show or explain how you got your answer.

4 A.


y
x
8 7 6 5 4 3 2 1
-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8
-1 -2 -3 -4 -5 -6 -7 -8

B. _____

C.


y
x
8 7 6 5 4 3 2 1
-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8
-1 -2 -3 -4 -5 -6 -7 -8

D. _____

5 This equation represents the ideal gas law, where T is the temperature.

$$PV = nRT$$

Which equation has been correctly rearranged to solve for T?

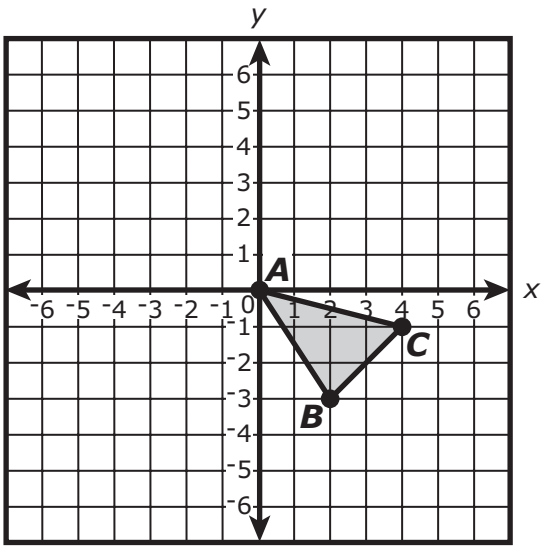
Ⓐ $T = nR - PV$

Ⓑ $T = PV - nR$

Ⓒ $T = \frac{nR}{PV}$

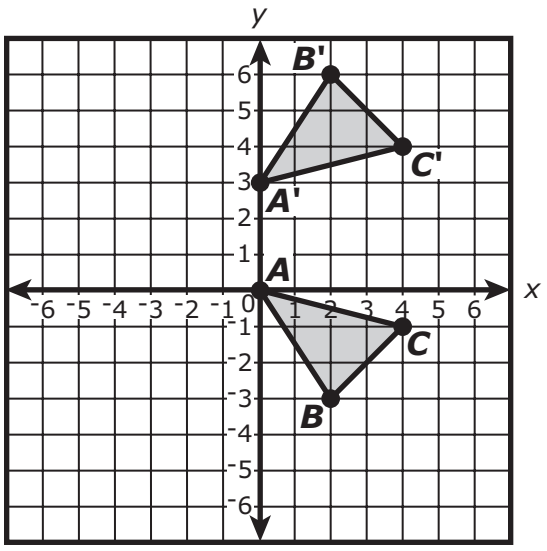
Ⓓ $T = \frac{PV}{nR}$

6 Triangle ABC is shown on this coordinate plane.

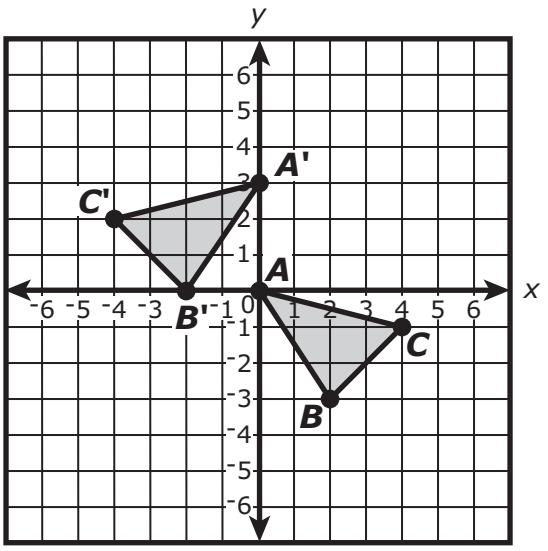


Triangle ABC will be reflected across the x-axis and then translated 3 units up to create its image, triangle $A'B'C'$. Which of the following shows the correct location of triangle $A'B'C'$ on the coordinate plane?

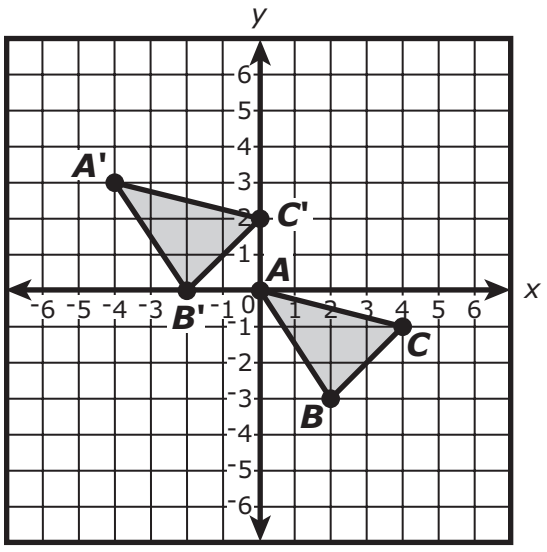
Ⓐ


y
x
A'
B'
C'
A
B
C

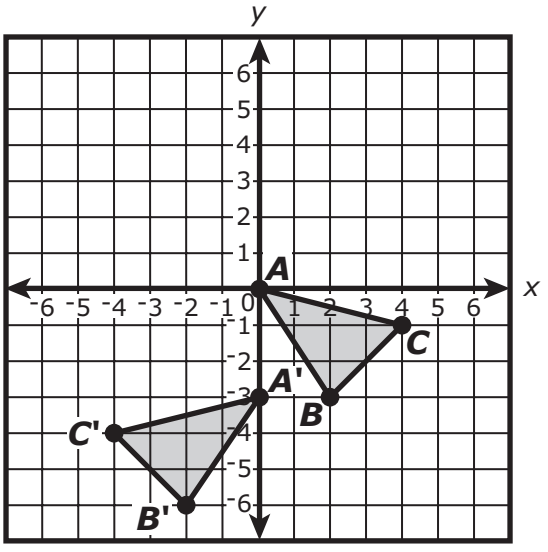
Ⓑ


y
x
A'
C'
B'
A
B
C

Ⓒ


y
x
A'
C'
A
B'
B
C

Ⓓ


y
x
A
C
A'
B
C'
B'

This question has two parts.

7 **Part A**

Which of the following expressions has a value that is rational?

Ⓐ $3\sqrt{9} \cdot \sqrt{2}$

Ⓑ $\frac{\sqrt{9}}{\pi}$

Ⓒ $\frac{\pi\sqrt{24}}{\sqrt{6\pi^2}}$

Ⓓ $-\sqrt{3} + 2$

Part B

Consider this expression.

$$1.8 + \sqrt{1.8}$$

Which of the following statements about the expression is true?

Ⓐ The expression is rational because one of the terms is rational.

Ⓑ The expression is irrational because one of the terms is irrational.

Ⓒ The expression is rational because both of the terms are rational.

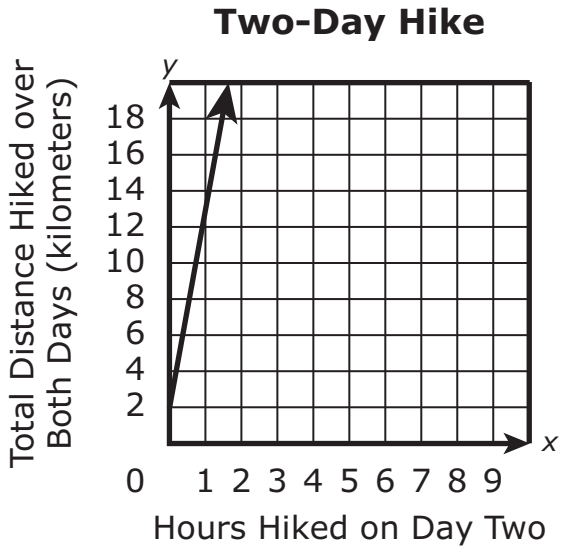
Ⓓ The expression is irrational because both of the terms are irrational.

8 A student went on a two-day hike.

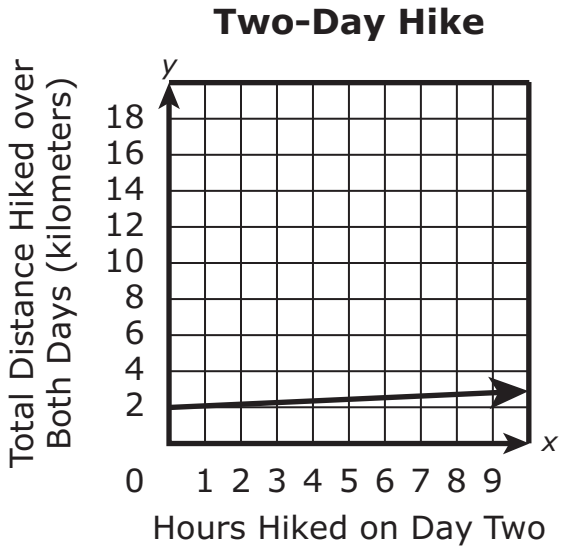
- On day one, the student hiked 11 kilometers.
- On day two, the student hiked at a rate of 2 kilometers per hour for x hours.

Which of the following graphs represents y, the total distance, in kilometers, the student hiked over both days after hiking for x hours on day two?

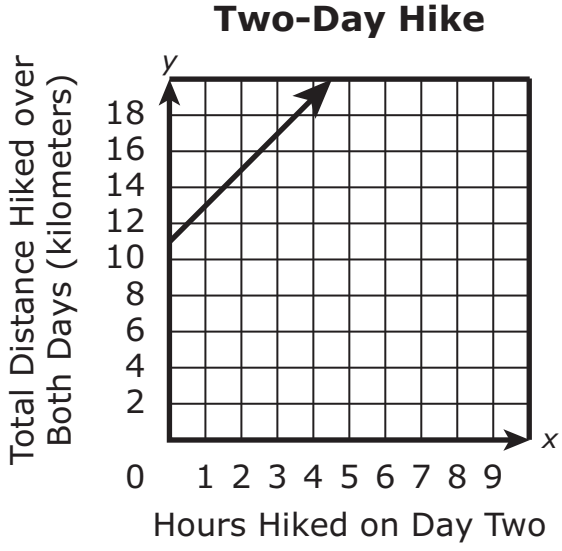
Ⓐ



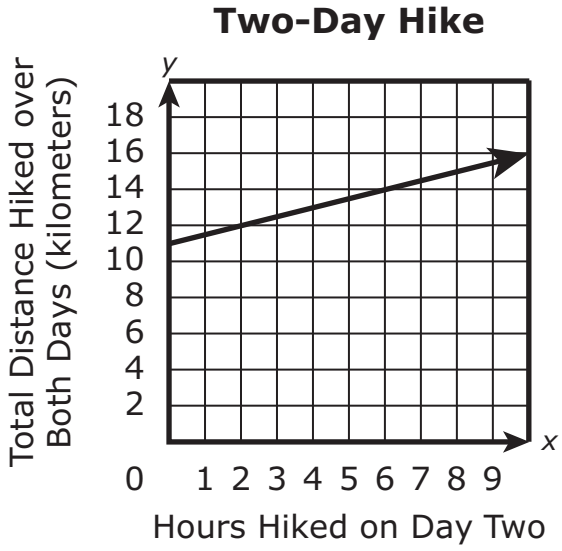
Ⓑ



Ⓒ



Ⓓ



9 Consider this expression.

$$\sqrt[3]{t}$$

Which of the following are equivalent to the expression for all positive values of t?

Select the **three** equivalent expressions.

Ⓐ $t^{\frac{1}{3}}$

Ⓑ $t^{\frac{2}{3}}$

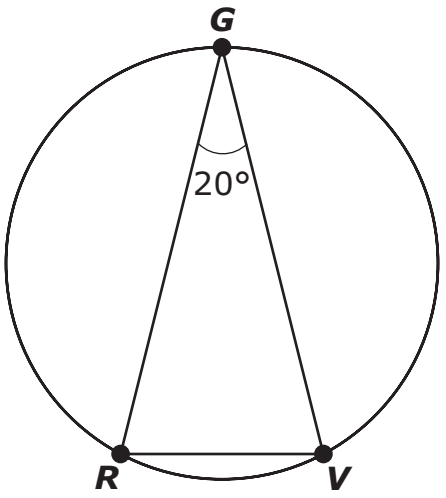
Ⓒ $t^{\frac{3}{2}}$

Ⓓ $\frac{t^{\frac{1}{3}}}{t^{\frac{2}{3}}}$

Ⓔ $\frac{t^{\frac{2}{3}}}{t^{\frac{1}{3}}}$

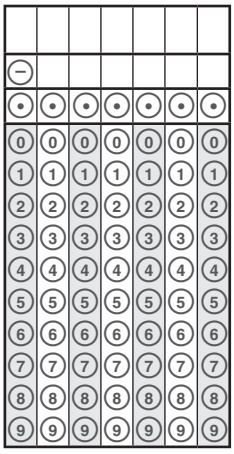
Ⓕ $\frac{t^{\frac{4}{3}}}{t}$

10 Triangle *GRV* is inscribed in a circle, as shown.



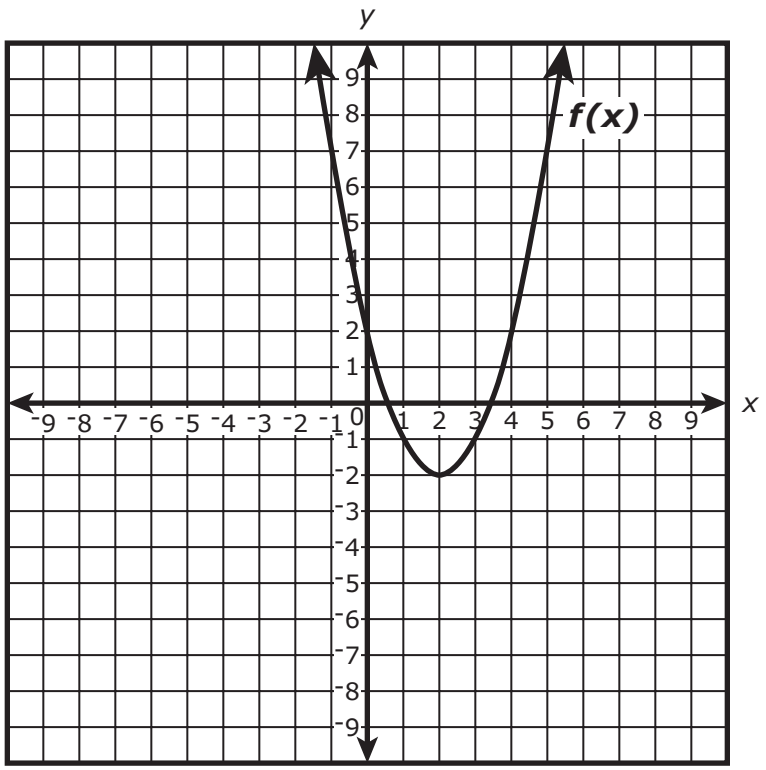
In the triangle, $\overline{GR} \cong \overline{GV}$. What is the measure, in degrees, of $\overset{\frown}{GR}$?

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.

11 The function $f(x)$ is graphed on this coordinate plane.



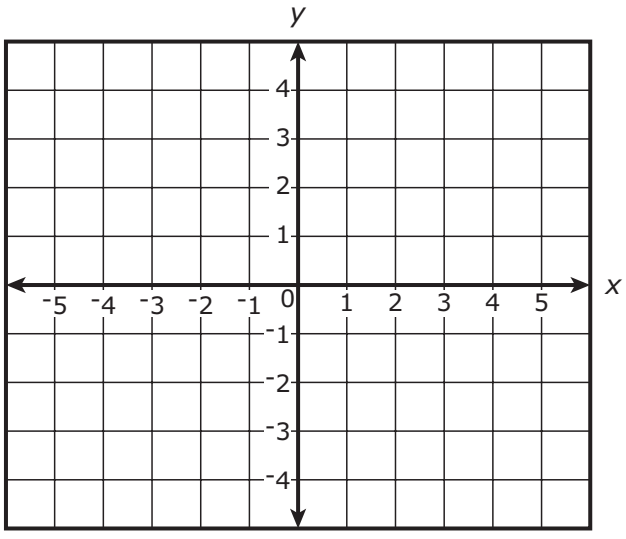
A. Based on the graph, what is the value of $f(4)$?

B. If the value of $f(4) + k$ is -5, what is the value of k? Show or explain how you got your answer.

C. Explain the difference between the graph of $f(x) + 3$ and the graph of $f(x + 3)$.

D. On the coordinate plane provided in your answer space, use the graph of $f(x)$ to graph $-f(x + 2) + 1$.

11

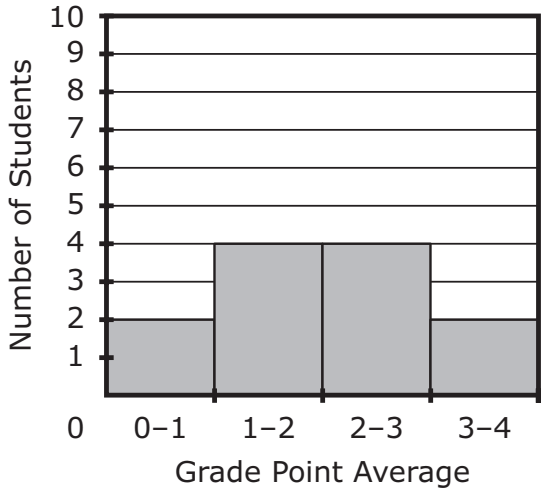


12 A guidance counselor will meet with twelve students to discuss their grade point averages. The list of grade point averages is shown.

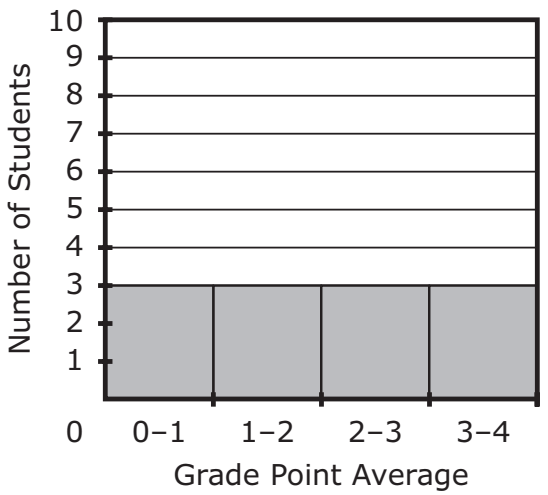
3.4, 2.2, 1.9, 3.8, 2.7, 3.1, 3.6, 1.8, 3.3, 2.4, 3.5, 2.9

Which of the following histograms correctly shows the distribution of the students' grade point averages?

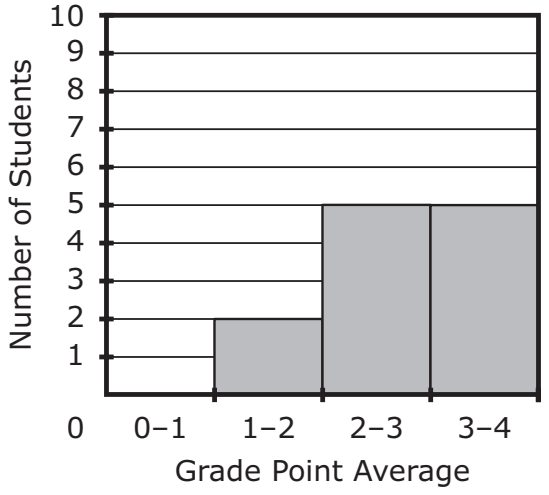
Ⓐ



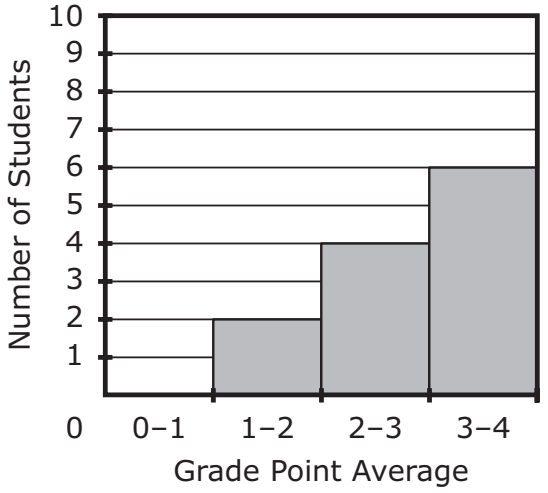
Ⓑ



Ⓒ



Ⓓ



13 Ten years ago, the population of a town was 5,085 people. Since then, the population of the town has increased by a total of 19.51%.

Which of the following is **closest** to the current population of the town?

Ⓐ 5,500

Ⓑ 6,000

Ⓒ 6,600

Ⓓ 7,200

STOP!

Grade 10 Mathematics
SESSION 2

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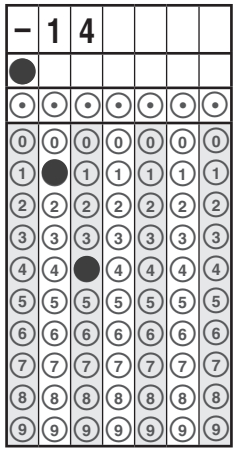
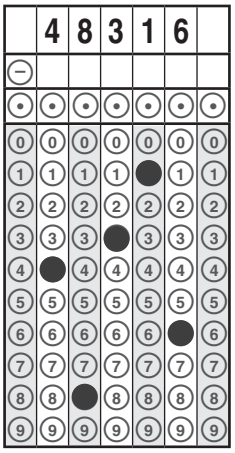
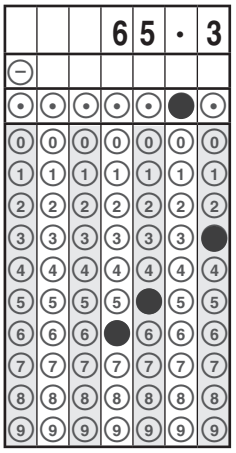
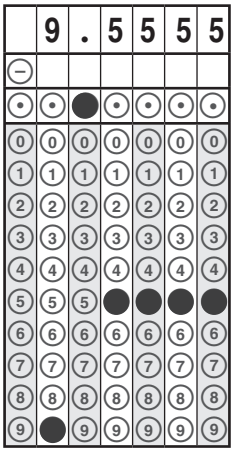
EXAMPLES









Go On ➡

14 The number of loaves of bread remaining in a restaurant h hours after opening for the day can be modeled by this function.

$$L(h) = 42 - 3.5h$$

What is the domain of the function?

Ⓐ $0 \leq h \leq 12$

Ⓑ $0 \leq h \leq 38.5$

Ⓒ $0 \leq h \leq 42$

Ⓓ $0 \leq h \leq 45.5$

15 A series of transformations will be performed on a figure that is graphed on a coordinate plane. Which of the following series of transformations would produce a congruent figure?

Select the **three** correct answers.

Ⓐ a translation $\frac{1}{2}$ unit up followed by a reflection across the y-axis

Ⓑ a reflection across the x-axis followed by a rotation of 90 degrees

Ⓒ a dilation by a scale factor of 2 followed by a translation 5 units left

Ⓓ a dilation by a scale factor of -1 followed by a reflection across the y-axis

Ⓔ a dilation by a scale factor of -2 followed by a dilation by a scale factor of 2

16 A carpenter measured the dimensions of the floor in a rectangular room. He rounded the measurements to the nearest foot and recorded them as shown.

width = 9 feet
length = 15 feet

Based on the rounded measurements, which of the following statements could be true?

Ⓐ The actual width of the floor is 8 feet 4 inches.

Ⓑ The actual length of the floor is 15 feet 5 inches.

Ⓒ The actual area of the floor is 149.5 square feet.

Ⓓ The actual perimeter of the floor is 44 feet 10 inches.

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

17 A coach recorded the number of goals scored by a soccer team in each of its last ten games. The data are shown.

3, 2, 10, 2, 1, 5, 3, 2, 1, 5

A. What are the first quartile, the median, and the third quartile of the data? Be sure to label each one.

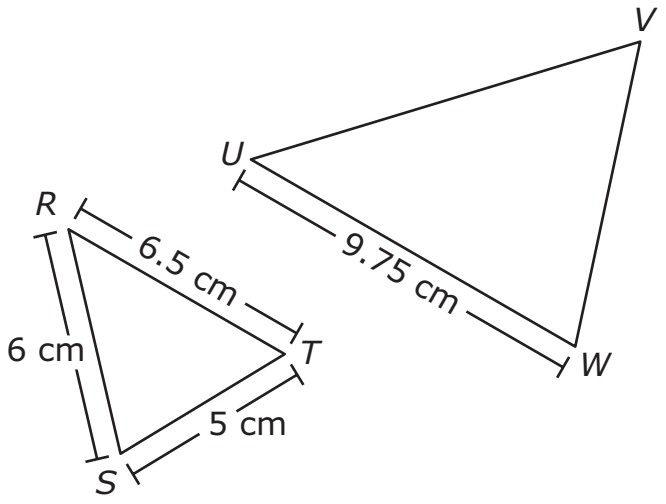
B. What is the interquartile range of the data? Show or explain how you got your answer.

C. The value 10 in the data is an outlier. Explain how this outlier affects the distribution of the data.

D. If the value 10 in the data is replaced by the mode, by how much will the mean change? Show or explain how you got your answer.

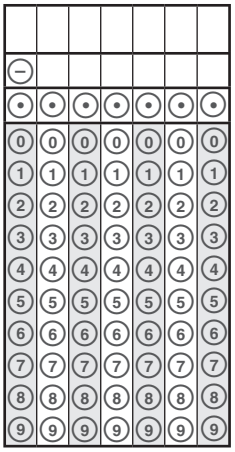
17

18 Similar triangles *RST* and *UVW* are shown in this diagram.



Based on the dimensions in the diagram, what is the length, in centimeters, of $\overline{VW}$?

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



19 Consider this function.

$$f(x) = x^2 + 1$$

Which of the following expressions is equivalent to $f(m + 2)$?

Ⓐ $m^2 + 3$

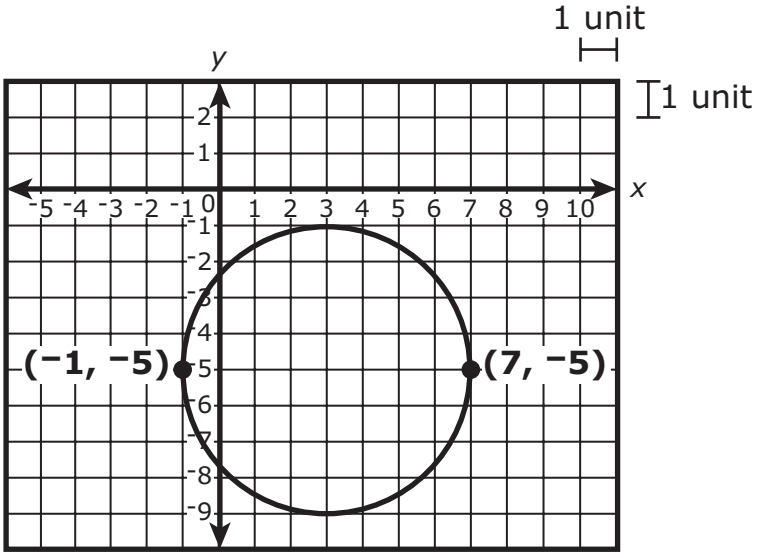
Ⓑ $m^2 + 5$

Ⓒ $m^2 + 4m + 4$

Ⓓ $m^2 + 4m + 5$

This question has two parts.

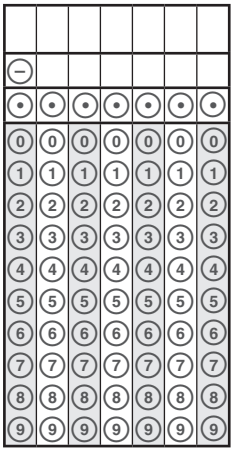
20 A circle is graphed on this coordinate plane.



Part A

What is the radius, in units, of the circle?

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



Part B

Which of the following equations represents the circle?

Ⓐ $(x + 3)^2 + (y - 5)^2 = 4$

Ⓑ $(x + 3)^2 + (y - 5)^2 = 8$

Ⓒ $(x - 3)^2 + (y + 5)^2 = 16$

Ⓓ $(x - 3)^2 + (y + 5)^2 = 64$

21 The number of customers doing business with a landscaping company each week, over t weeks since the beginning of last summer, can be modeled by this function.

$$f(t) = 21 + 4t$$

Based on the function, which of the following statements is true?

Ⓐ The number of customers increased by 21 per week.

Ⓑ The number of customers decreased by a factor of 4.

Ⓒ The company began last summer with 21 customers.

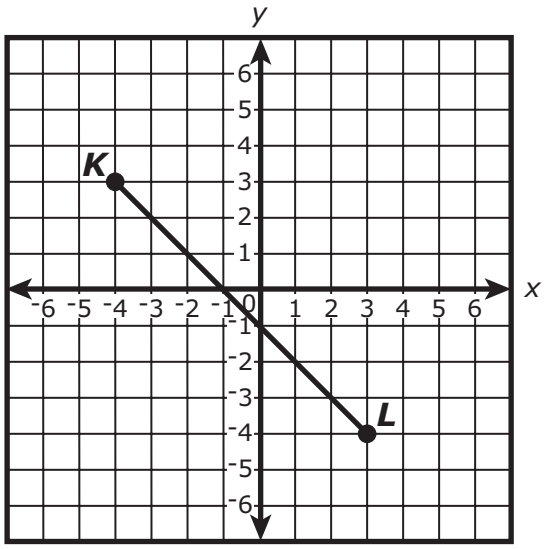
Ⓓ The company had a total of 21 customers after 4 weeks.

22 A student plotted $\overline{EF}$ on a coordinate plane. The coordinates of the endpoints are shown.

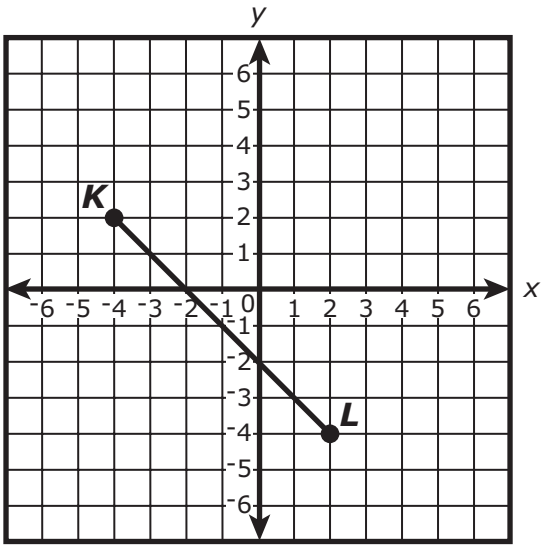
- $E(-2, 1)$
- $F(1, -2)$

The student will dilate $\overline{EF}$ by a scale factor of 2 with respect to point F to create $\overline{KL}$. Which of the following graphs correctly shows $\overline{KL}$?

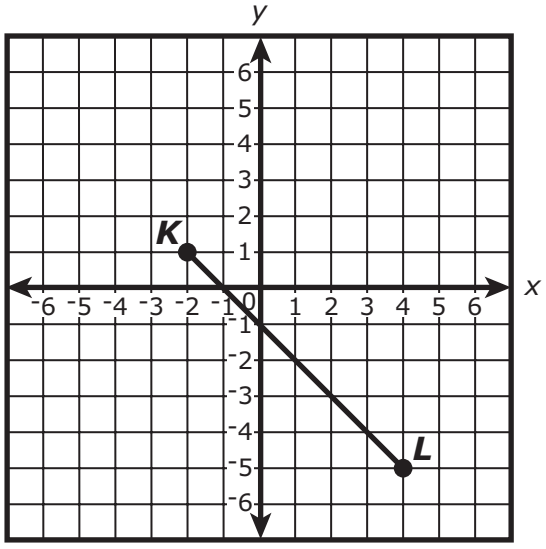
Ⓐ



Ⓑ



Ⓒ



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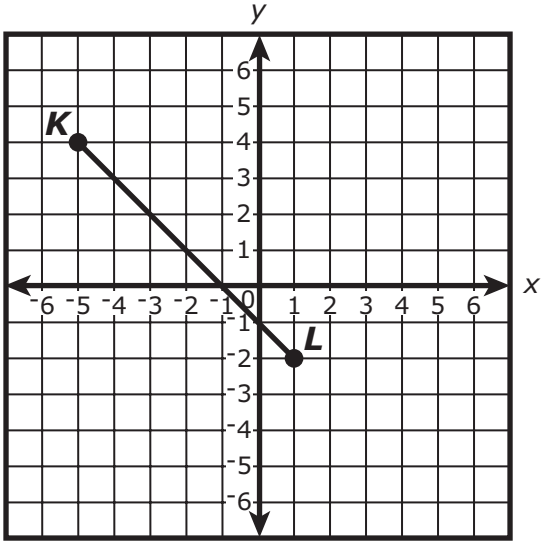


23 Consider these probabilities of events X and Y.

- P(X) = 0.4
- P(Y) = 0.6
- P(X and Y) = 0.24
- P(X or Y) = 0.76

Which of the following statements about events X and Y is true?

Ⓐ Events X and Y are dependent events because the equation 0.4 + 0.6 = 1 is true.

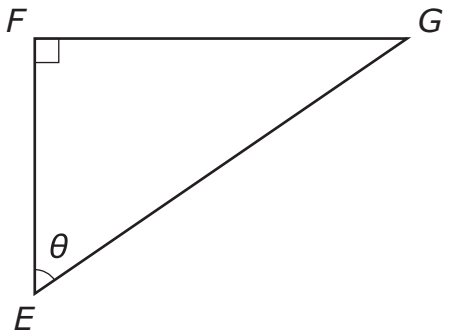
Ⓑ Events X and Y are independent events because the equation (0.4)(0.6) = 0.24 is true.

Ⓒ Events X and Y are dependent events because the equation P(X or Y) = P(X and Y) is not true.

Ⓓ Events X and Y are independent events because the equation P(X and Y) = P(X) + P(Y) is not true.

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

24 Consider right triangle *EFG*.



A. What is sin(θ) in terms of the sides of triangle *EFG*? Write your response in the answer space provided.

Ⓐ $\frac{EF}{EG}$

Ⓑ $\frac{FG}{EG}$

Ⓒ $\frac{EG}{FG}$

Ⓓ $\frac{FG}{EF}$

B. Explain the relationship between sin(θ) and cos($\angle G$).

C. If sin(30°) = $\frac{1}{2}$ and cos(θ) = $\frac{1}{2}$, what is the value of θ, in degrees? Show or explain how you got your answer.

D. Consider this incomplete equation.

$$\cos(\angle G) = \cos(\square)$$

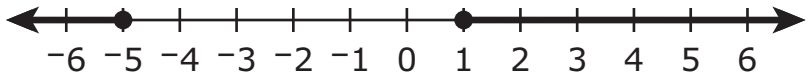
Complete the equation so that it represents cos($\angle G$) in terms of θ.

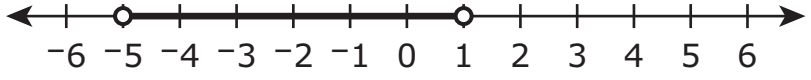
24

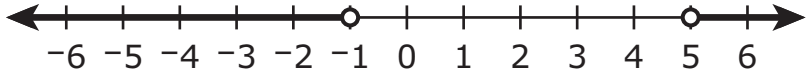
25 Consider this inequality.

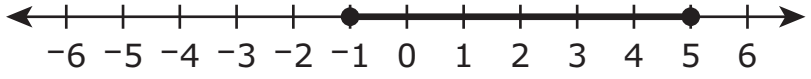
$$|4 - 2x| > 6$$

Which of the following number lines shows the solution set of the inequality?

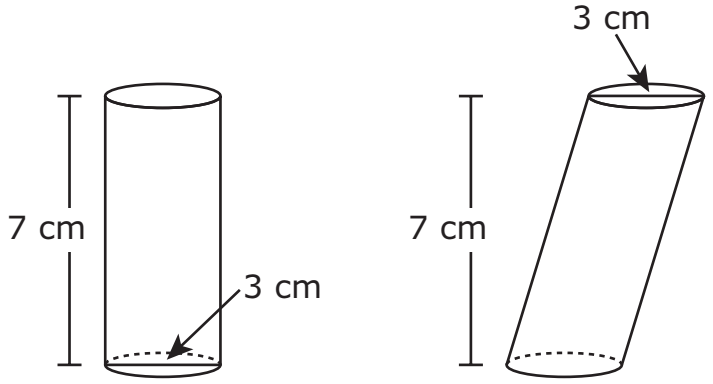
Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

26 Right circular cylinder S, oblique circular cylinder T, and some of their dimensions are shown in this diagram.



Which statement about the cylinders is true?

Ⓐ The volume of cylinder S is equal to the volume of cylinder T.

Ⓑ The volume of cylinder S is less than the volume of cylinder T.

Ⓒ The volume of cylinder S is greater than the volume of cylinder T.

Ⓓ There is not enough information to compare the volumes of the cylinders.

STOP!