

TEST NAME: Math Geometry FAIM 2016 Form 1-B

TEST ID: 1549484

GRADE: Ninth Grade - Twelfth Grade

SUBJECT: Mathematics

TEST CATEGORY: State Interim Assessment

Student:

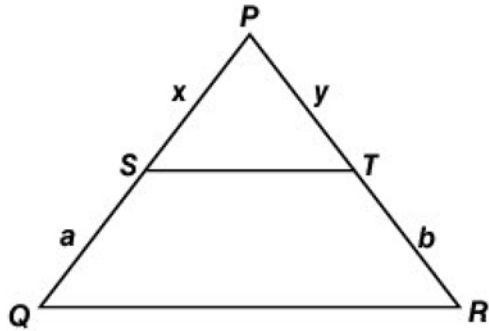
Class:

Date:

Instructions

Use your Response Document to answer question 21.

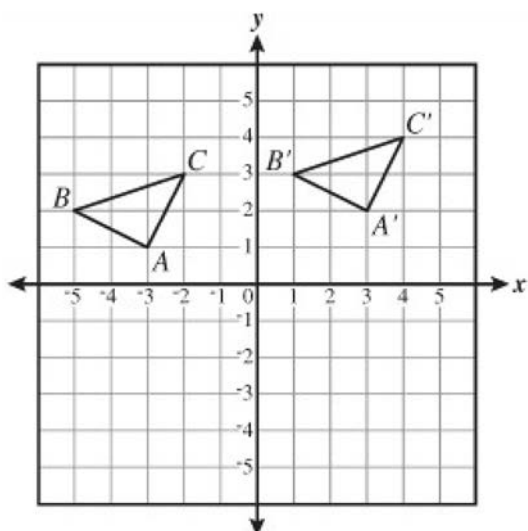
1. In the figure below, $\overline{ST} \parallel \overline{QR}$.



Which relationship can be proven knowing that $\overline{ST} \parallel \overline{QR}$?

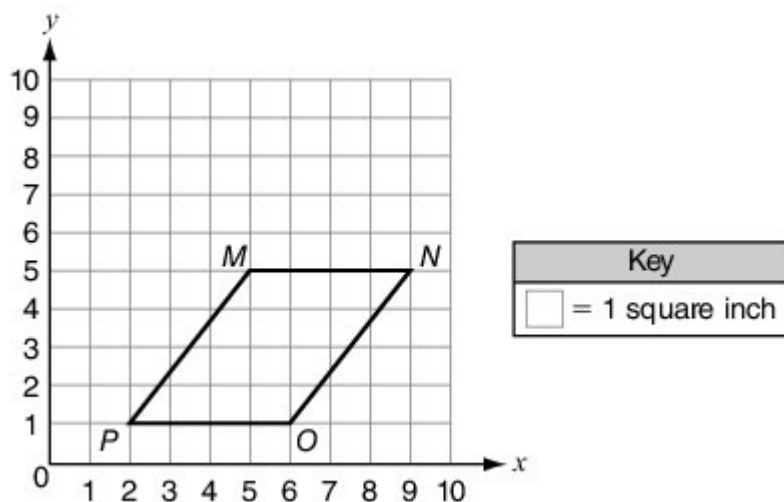
- A. $x = y$
- B. $a = b$
- C. $\frac{x}{a} = \frac{y}{b}$
- D. $\frac{x}{y} = \frac{b}{a}$

2. $\triangle ABC$ is translated to form $\triangle A'B'C'$ as shown on the coordinate plane.



What are the translations applied to $\triangle ABC$ to form $\triangle A'B'C'$?

3. How many square inches is the area of parallelogram MNOP, shown on the coordinate plane below?



4. $\triangle AEB \cong \triangle BFC$. Which statement must be true?

A. $\overline{AE} \cong \overline{BC}$

B. $\overline{AB} \cong \overline{BC}$

C. $\angle AEB \cong \angle FBC$

D. $\angle BEA \cong \angle BCF$

5. Isabella graphed a quadrilateral with coordinates $W(1,1)$, $X(4,0)$, $Y(6,-2)$, and $Z(3,-1)$ on a coordinate plane.

Part A. Use the coordinates of the points to prove that $WXYZ$ is a parallelogram.

Part B. Isabella thinks that quadrilateral $WXYZ$ is also a rectangle. Is she correct? Explain.

Use words and/or numbers to show your work.

6. Dwayne considers a square drawn in the xy -coordinate plane with vertices $T(-5,-3)$, $U(-3,3)$, $V(3,1)$, and $W(1,-5)$.

Dwayne finds square $T'U'V'W'$ by dilating $TUVW$ with a scale factor of 2, and with a center of dilation at $P(-4,1)$. What is the slope of $\overline{U'V'}$?

A. $-\frac{2}{3}$

B. $-\frac{1}{3}$

C. $-\frac{1}{6}$

D. $\frac{4}{3}$

7. Alex needs to bisect $\angle ABC$ using a compass and straightedge. He starts by performing the following steps.

Step 1: Place the compass on vertex B of the angle.

Step 2: Draw an arc that intersects both sides of the angle.

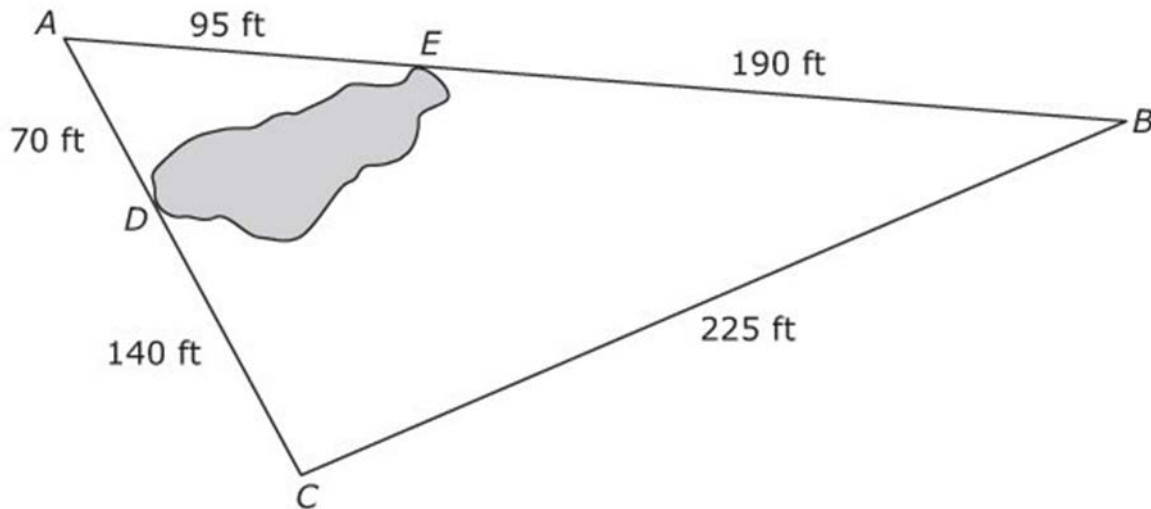
Step 3: Label these intersections as point D and point E .

Step 4: Place the compass at point D and draw an arc in the interior of the angle.

What are the next steps Alex should take in his construction?

- A. Adjust the compass width to be half the distance between point B and point E , and then place the compass on point E and draw an arc in the interior of the angle that crosses the other arc.
 - B. Without adjusting the compass width, place the compass at point E and draw an arc in the interior of the angle that crosses the other arc.
 - C. Adjust the compass width to be half the distance between point B and point E , and then place the compass on point E and draw an arc on the exterior of the angle.
 - D. Without adjusting the compass width, place the compass at point E and draw an arc on the exterior of the angle that is opposite the other arc.
8. Given points $M(4, 5)$, $N(-6, 10)$, and $L(-2, 8)$, what is the value of the ratio $ML:LN$?

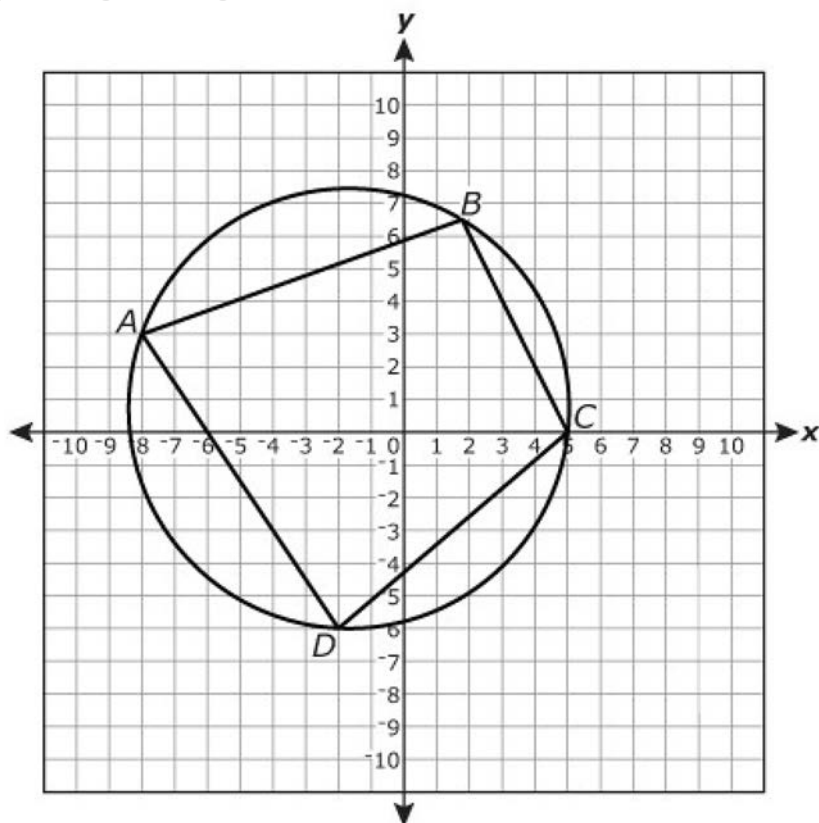
9. Kayla measured the distances surrounding a lake, as shown in the diagram below.



Kayla used the diagram to determine the distance across the lake. If $\overline{DE} \parallel \overline{BC}$, what is the distance across the lake?

- A. 75 ft
- B. 95 ft
- C. 112.5 ft
- D. 165.8 ft

10. Quadrilateral ABCD is considered a cyclic quadrilateral because there is a circle passing through all four of its vertices.



What is the sum, in degrees, of $\angle A$ and $\angle C$? Explain your answer.

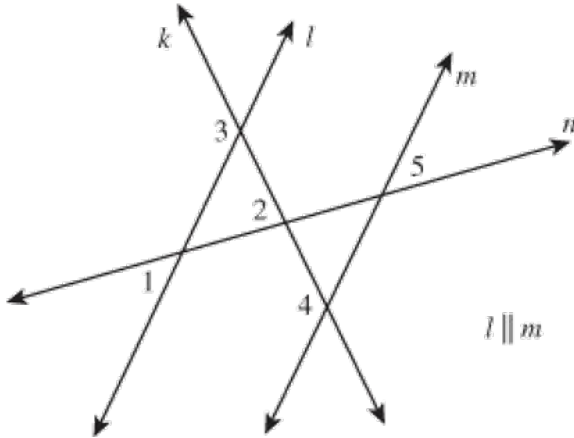
11. Consider the diagram and angle measurements shown below.

$$m\angle 1 = (x + 14)^\circ$$

$$m\angle 3 = (3y + 7)^\circ$$

$$m\angle 4 = (5y - 73)^\circ$$

$$m\angle 5 = (3x - 54)^\circ$$

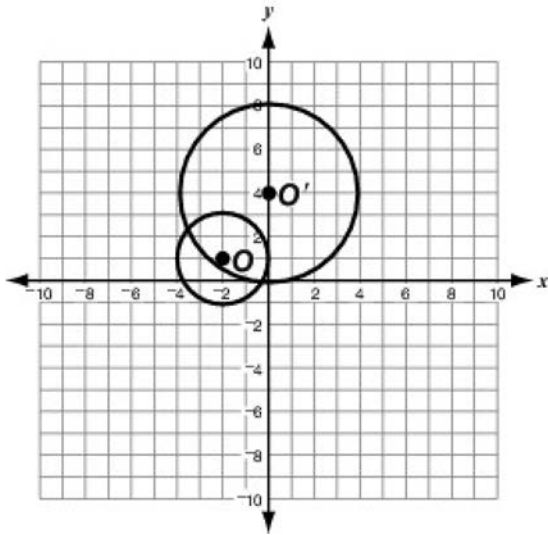


What is $m\angle 2$?

- A. $m\angle 2 = 79^\circ$
- B. $m\angle 2 = 90^\circ$
- C. $m\angle 2 = 93^\circ$
- D. $m\angle 2 = 127^\circ$

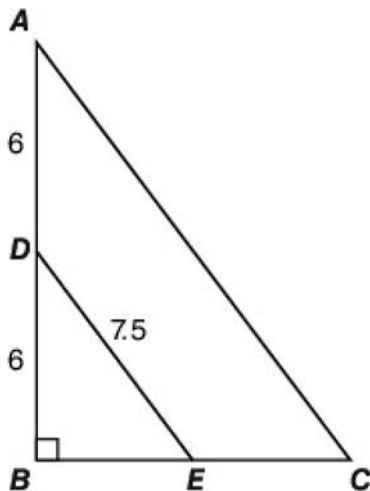
12. A flat, rectangular television screen has a height of 25 inches and a diagonal of 32 inches. What is the width of the television screen? Round your answer to the nearest hundredth of an inch.

13. The figure below shows the circles O and O' . Which of these statements can be used to prove that the circles are similar?



- A. The circles O and O' are similar because O can be mapped onto O' by a translation two units to the right and three units up followed by a dilation about its center by a scale factor of $\frac{1}{2}$.
- B. The circles O and O' are similar because O can be mapped onto O' by a translation two units to the right and three units up followed by a dilation about its center by a scale factor of 2.
- C. The circles O and O' are similar because O can be mapped onto O' by a translation two units to the left and three units down followed by a dilation about its center by a scale factor of $\frac{1}{2}$.
- D. The circles O and O' are similar because O can be mapped onto O' by a translation two units to the left and three units down followed by a dilation about its center by a scale factor of 2.

14. In the figure below, $\triangle DBE \sim \triangle ABC$.



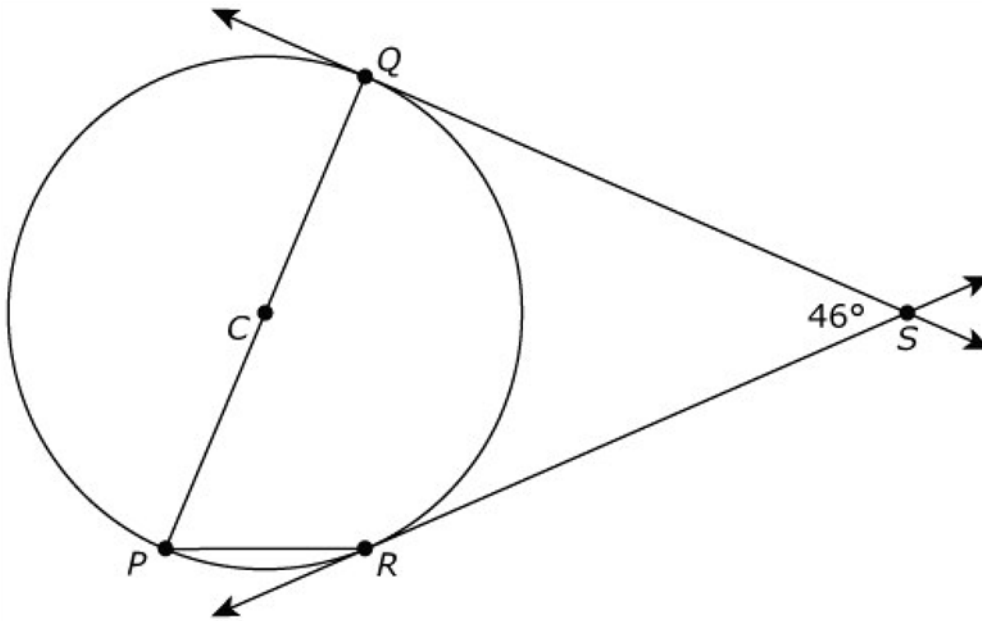
Write a proportion using the side lengths of the triangles that can be used to prove that $\cos D = \cos A$.

15. Part A. A cone is carved from a cylinder so that the cone has a volume of $4\pi \text{ ft}^3$ and a diameter of 4 ft. If the cylinder has the same height and base as the cone, find the height and the volume of the cylinder. Show your work.

Part B. A cone is carved from a cylinder. If the cylinder has the same height and base as a cone, explain how to determine the volume of the cylinder without determining the height or the size of the base.

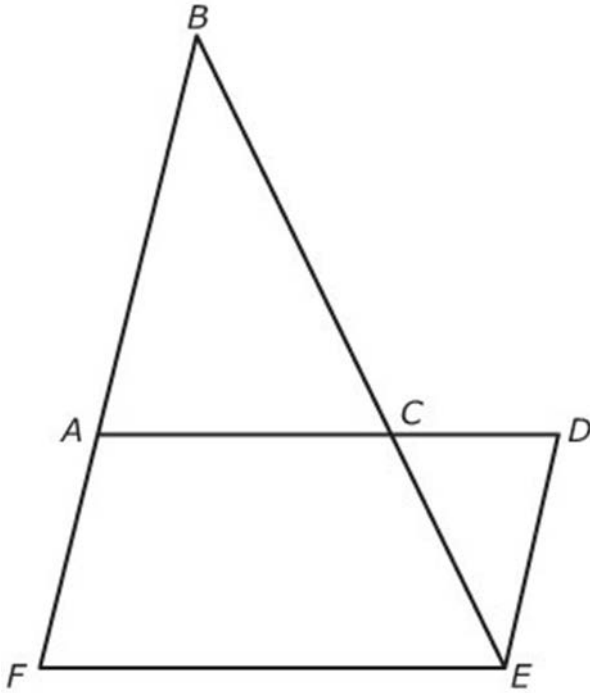
Use words and/or numbers to show your work.

16. In the figure below, Circle C has tangent lines \overline{SR} and \overline{SQ} and diameter \overline{PQ} .



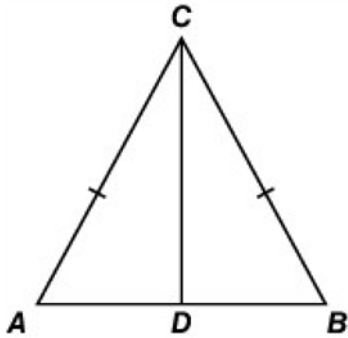
- A. 23°
- B. 44°
- C. 46°
- D. 67°

17. In the diagram below, $\triangle ABC \sim \triangle DEC$.



- What is the most precise classification for quadrilateral $ADEF$?
18. The radius and slant height of a right cone are 3 cm and 5 cm, respectively. To the nearest tenth of a cubic centimeter, what is the volume of the cone?

19. The figure below shows isosceles triangle ABC , with $\overline{AC} \cong \overline{BC}$ and \overline{CD} bisecting $\angle ACB$.



Which is a valid proof that shows $\angle A \cong \angle B$?

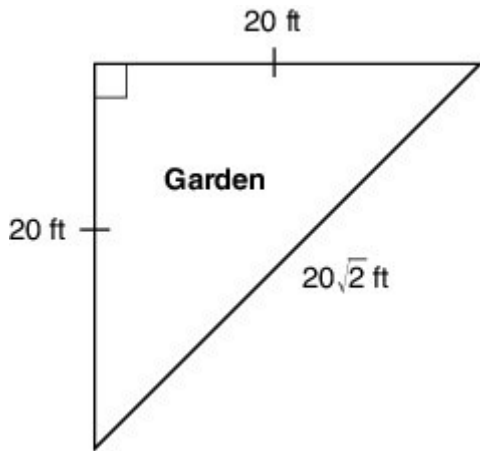
- A.
- | Statements | Reasons |
|--|---------------------------------|
| 1. $\overline{AC} \cong \overline{BC}$ | 1. Given |
| 2. $\angle ACD \cong \angle BCD$ | 2. Definition of angle bisector |
| 3. $\overline{CD} \cong \overline{CD}$ | 3. Reflexive property |
| 4. $\triangle ACD \cong \triangle BCD$ | 4. CPCTC |
| 5. $\angle A \cong \angle B$ | 5. SAS postulate |
- B.
- | Statements | Reasons |
|--|---------------------------------|
| 1. $\overline{AC} \cong \overline{BC}$ | 1. Given |
| 2. $\angle ACD \cong \angle BCD$ | 2. Definition of angle bisector |
| 3. $\overline{CD} \cong \overline{CD}$ | 3. CPCTC |
| 4. $\triangle ACD \cong \triangle BCD$ | 4. SAS postulate |
| 5. $\angle A \cong \angle B$ | 5. Reflexive property |
- C.
- | Statements | Reasons |
|--|---------------------------------|
| 1. $\overline{AC} \cong \overline{BC}$ | 1. Given |
| 2. $\angle ACD \cong \angle BCD$ | 2. CPCTC |
| 3. $\overline{CD} \cong \overline{CD}$ | 3. Reflexive property |
| 4. $\triangle ACD \cong \triangle BCD$ | 4. SAS postulate |
| 5. $\angle A \cong \angle B$ | 5. Definition of angle bisector |
- D.
- | Statements | Reasons |
|--|---------------------------------|
| 1. $\overline{AC} \cong \overline{BC}$ | 1. Given |
| 2. $\angle ACD \cong \angle BCD$ | 2. Definition of angle bisector |
| 3. $\overline{CD} \cong \overline{CD}$ | 3. Reflexive property |
| 4. $\triangle ACD \cong \triangle BCD$ | 4. SAS postulate |
| 5. $\angle A \cong \angle B$ | 5. CPCTC |

20. Soda cans are made out of aluminum and are shaped like a cylinder. The formula for the surface area of a cylinder can be used to find the amount of aluminum, in square centimeters, that is needed to make a soda can. The formula is provided below:

$$SA = 2\pi r^2 + 2\pi rh$$

A typical soda can measures 12 centimeters tall and has a volume of 235.5 cubic centimeters. To the nearest whole number, how many square centimeters of aluminum are required to make a can?

- A. 39 square centimeters
B. 188 square centimeters
C. 208 square centimeters
D. 228 square centimeters
21. Mark is planting a garden in a corner of his backyard. He wants to divide the garden into different sections for different vegetables, and he wants the sections to be congruent to each other so that he is sure that the different types of plants have the same amount of space.



Part A. Sketch one segment that would divide the garden to produce two congruent triangles.

Part B. Use a paragraph proof to explain how you know that the two triangles are congruent.

Part C. Now, Mark wants to divide each of the two triangular sections in half so the garden will have a total of four congruent triangles. Sketch one possible way Mark can do this, and label the side lengths and angle measures.

Part D. Explain how you know that all four triangles are congruent, using a paragraph proof and a different congruence postulate than used in part A.

Part E. How does the side length of the original garden relate to the side length of the four small triangles? Explain, using a paragraph proof and geometric postulates to support your answer.

Place an "X" in the answer box below.

Answer the question on the Response Document provided.

Click next.

22. What is the center of a circle given by the equation: $x^2 + y^2 + 4y = 0$?
23. Line segment \overline{AB} is drawn in the first quadrant. Its image, line segment $\overline{A'B'}$ is formed by reflecting \overline{AB} over the x -axis. Which statement will always be **true**?
- A. Line segments \overline{AB} and $\overline{A'B'}$ are parallel to each other.
 - B. Line segments \overline{AB} and $\overline{A'B'}$ are perpendicular to each other.
 - C. Corresponding points on \overline{AB} and $\overline{A'B'}$ are equidistant from the x -axis.
 - D. Corresponding points on \overline{AB} and $\overline{A'B'}$ can be connected to form a line segment perpendicular to both \overline{AB} and $\overline{A'B'}$.

24. Which words correctly complete the statement below?

$\triangle PQR$ is dilated with the center of dilation at the origin and a scale factor of 0.5 to obtain $\triangle P'Q'R'$. The triangles' corresponding angles are _____ and their corresponding sides are _____; therefore, the triangles are _____.

- A. congruent; proportional; similar
- B. congruent; congruent; congruent
- C. proportional; proportional; similar
- D. proportional; congruent; congruent

25. What is the y-intercept of the line perpendicular to the line $y = -\frac{5}{2}x + \frac{4}{5}$ that includes the point $(-3, -1)$?