PARCC

Partnership for Assessment of
Readiness for College and Careers

Math
Spring Operational 2015

Geometry
Performance Based Assessment
Released Items

1. $\triangle ABC$ is dilated from center A by a factor not equal to 1 to form $\triangle AKL$. Which of the statements must be true?

Select **all** that apply.

☐ A. $\overline{AB}$ and $\overline{AK}$ lie on the same line.

☐ B. The line containing $\overline{BC}$ is parallel to the line containing $\overline{KL}$.

☐ C. $\angle ABC \cong \angle ACB$

☐ D. $\angle ABC \cong \angle AKL$

☐ E. $\triangle ABC \sim \triangle AKL$

☐ F. $\triangle ABC \cong \triangle AKL$

2. A square has sides that are each 90 feet long. Which equations can be used to calculate d, the length of a diagonal of the square, in feet?

Select **all** that apply.

☐ A. $d = \frac{1}{2}(90 \times 90)$

☐ B. $d = \sqrt{90^2 + 90^2}$

☐ C. $d = \sqrt{4 \times 90^2}$

☐ D. $\cos 45° = \frac{90}{d}$

☐ E. $\sin 45° = \frac{90}{d}$

☐ F. $\tan 45° = \frac{90}{d}$

3. Select from the drop-down menus to correctly complete each sentence.

The set of all points in a plane that are equidistant from a given point is called a [Choose... ▼].

| square |
| sphere |
| segment |
| circle |

The given point is called the [Choose... ▼].

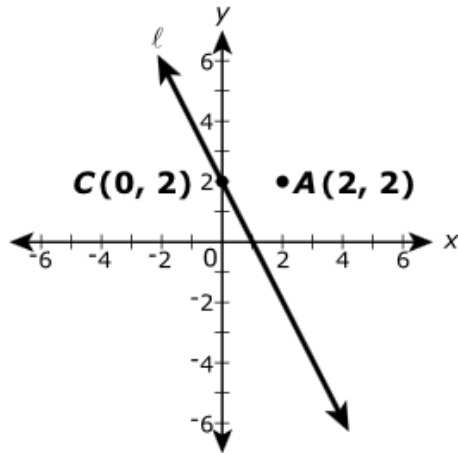| vertex |
| center |
| axis |
| radius |

4. Triangle P is dilated from center A by a scale factor of 2 to form triangle Q. The vertices for triangle P are $(-2, 1), (2, 4)$ and $(2, 1)$. The vertices for triangle Q are $(-1, -3), (7, 3)$ and $(7, -3)$. Graph point A, the center of dilation.

Select the place on the coordinate plane to plot the point.
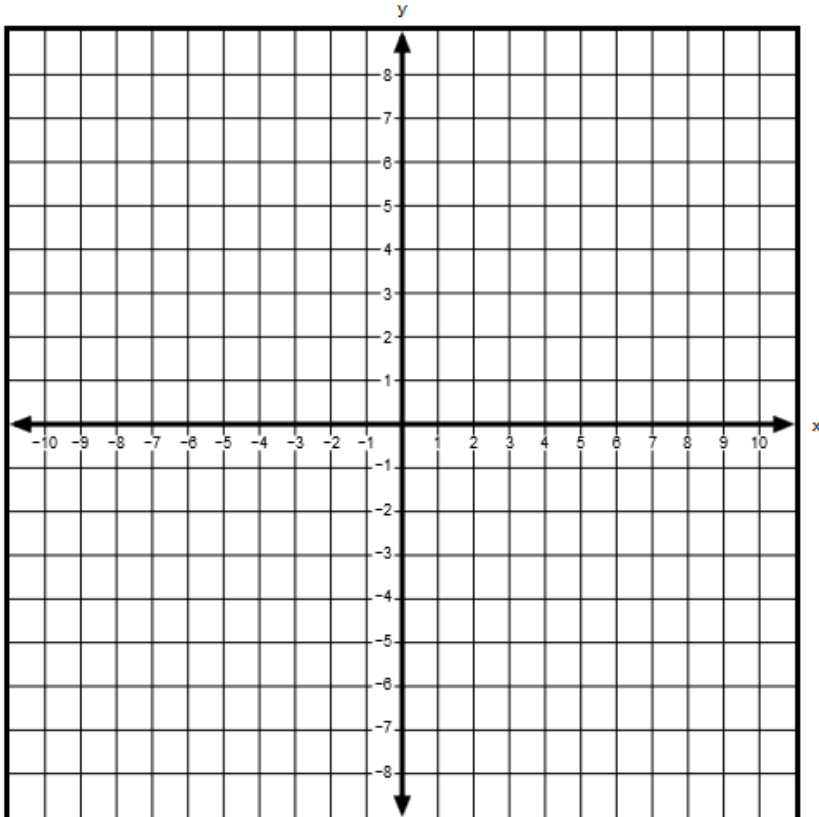
5. In the *xy*-coordinate plane shown, line ℓ passes through point *C* and has a slope of -2.
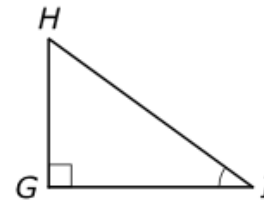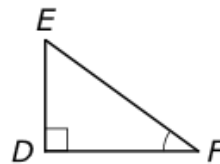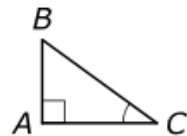

Enter your answers in the boxes.

A dilation of line ℓ with center *A* and a scale factor of 3 will produce a new line through point C', the image of point *C*, with coordinates

([ ] , [ ]) and with a slope of [ ] .

6. In the three right triangles shown, $m\angle C = m\angle F = m\angle I = 36°$.

Complete the statements about the triangles by dragging the correct choices into the proper locations. Not all choices will be used.

Drag and drop the choices into the appropriate boxes.

| AA similarity | adjacent leg | ASA | congruent | cosine | CPCTC | GH/GI | GI/GH | hypotenuse | similar | sine | tangent |

Because each triangle contains a right angle and a $36°$ angle, the triangles are [ ] by [ ] , and $\frac{AB}{AC} = \frac{DE}{DF} = $ [ ] . The proportion shows that the ratio of the length of the leg opposite the $36°$ angle to the length of the [ ] will be the same for any right triangle with a $36°$ angle. The value of the ratio is defined to be the [ ] of $36°$.

7. Triangle *ABC* has sides with lengths of 3, 6, and 8. Classify each of the transformations described as producing a triangle **similar** to triangle *ABC* or a triangle **not similar** to triangle *ABC*.

Drag and drop each transformation into the appropriate box.

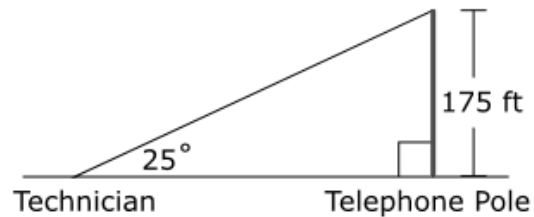| Multiply each side length by 3.5. | Add 12 to each side length. | Subtract 2 from each side length. | Divide each side length by 0.75. |

| Similar to Triangle *ABC* | Not Similar to Triangle *ABC* |

8. A maintenance technician sights the top of a telephone pole at a **25°** angle of elevation as shown.

Determine the horizontal distance between the technician and the base of the telephone pole to the nearest tenth of a foot.
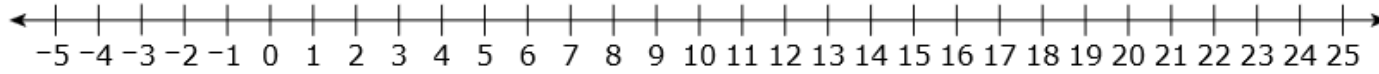
Enter your answer in the box.

[ ] feet

9. Point A is located at -3, and point B is located at 19.

Select a point on the number line between A and B such that the distance from A to the point is $\frac{3}{11}$ of the distance from A to B.

Select a place on the number line to plot the point.

```
 -5 -4 -3 -2 -1  0  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
```

10. Select from the drop-down menu to correctly complete the sentence.

Given distinct noncollinear points A, B, and C, the set of all points between A and C including A and C is

Choose... .

- a ray
- a circle
- an angle
- a line segment

11. A queen-sized mattress is 20 inches longer than it is wide. A king-sized mattress is 16 inches wider than the queen-sized mattress but has the same length. The area of the king-sized mattress is 1,280 square inches more than that of the queen-sized mattress.

Part A

Write an equation that can be used to determine the area of the king-sized mattress. Define all variables used.

Enter your equation in the space provided.

[toolbar: undo, redo, delete, [A], [π]]

- ▸ Math symbols
- ▸ Relations
- ▸ Geometry
- ▸ Groups
- ▸ Trigonometry
- ▸ Statistics
- ▸ Greek

Part B

Determine the dimensions of the king-sized and queen-sized mattresses. Show your work.

Enter your answer and your work in the space provided.

[toolbar: undo, redo, delete, [A], [π]]

- ▸ Math symbols
- ▸ Relations
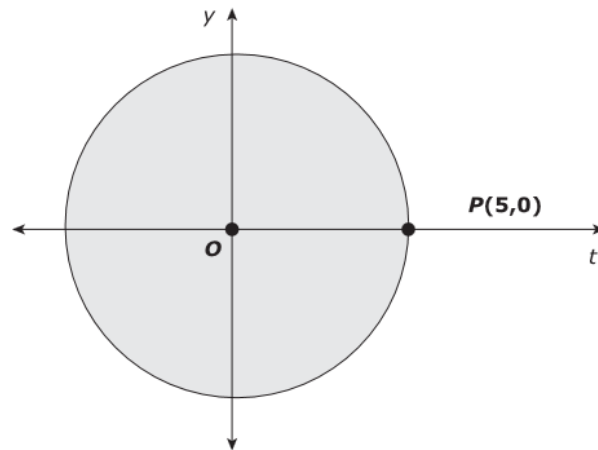- ▸ Geometry
- ▸ Groups
- ▸ Trigonometry
- ▸ Statistics
- ▸ Greek

12. **Part A**

A merry-go-round is set up at a local fair. The merry-go-round moves continuously at a rate slow enough for riders to step on and off of the ride. The pink horse, P, moves along the circumference of the ride.

Hal used a coordinate grid to make a rough sketch of the merry-go-round, with the center at the origin. Initially, P is at $P(5,0)$. It takes 30 seconds for P to return to the same place.

Each unit = 1 foot

What is the rate at which the merry-go-round is turning, in feet per minute? Show your work.

Enter your answer and your work in the space provided.

| | | | [A] | [π] |

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- Relations
- Geometry
- Groups
- Trigonometry
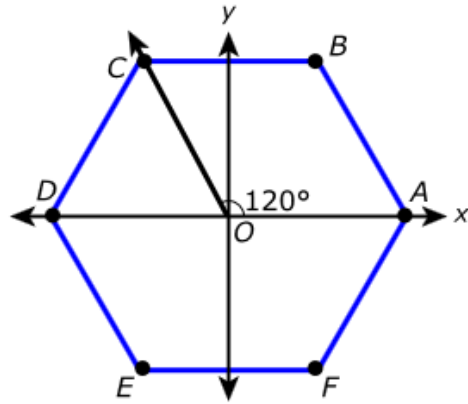- Statistics
- Greek

Part B

What would be the coordinates of P on Hal's sketch after 8.25 minutes?

Enter your answers in the boxes.

(☐ , ☐)

13. This diagram shows regular hexagon *ABCDEF* with center at *O*.

Justine made these claims.

• The only lines of symmetry for regular hexagon *ABCDEF* are the lines that contain one vertex and *O*.

• The only angle of rotation that shows rotational symmetry is 120°.

Explain why Justine is correct or incorrect.

Enter your explanation in the space provided.

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▸ Relations

▸ Geometry

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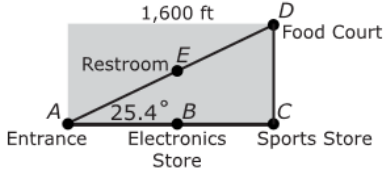
▸ Trigonometry

▸ Statistics

▸ Greek

14. **Part A**

Alex is visiting a local shopping mall that has a rectangular shape with a diagonal walkway that goes from the entrance of the mall to the food court. The floor plan is shown.

Alex needs to stop at the sports store on the way to the food court. How much longer, in feet, does he walk than if he walks directly from the entrance to the food court along the diagonal walkway? Show work to justify your answer.

Enter your answer and your work in the space provided.

| ▶ Math symbols |
| ▶ Relations |
| ▶ Geometry |
| ▶ Groups |
| ▶ Trigonometry |
| ▶ Statistics |
| ▶ Greek |

Part B

A walkway connects the restroom and the sports store. The restroom and electronics store are both at the midpoints of their respective walkways. A separate walkway, which is perpendicular to the walkway between the entrance and the sports store, connects the restroom to the electronics store.

What is the distance, in feet, of the walkway that connects the restroom to the electronics store? Show work to justify your answer.

Enter your answer and your work in the space provided.

| ▶ Math symbols |
| ▶ Relations |
| ▶ Geometry |
| ▶ Groups |
| ▶ Trigonometry |
| ▶ Statistics |
| ▶ Greek |

15. City workers will be hanging cable between two poles. The poles are 20 feet apart and perpendicular to the ground. The cable will cross back and forth between equally spaced anchors placed on the poles and will be pulled tight. A section of the design is shown in the figure.
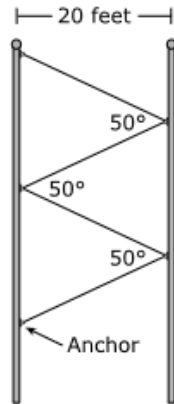
Let n represent the total number of anchors placed on the two poles. Create an expression to represent the length, in feet, of cable needed for n anchors.

Explain how you determined the values in your expression.

Enter your expression and your explanations in the space provided.

[A] [π]

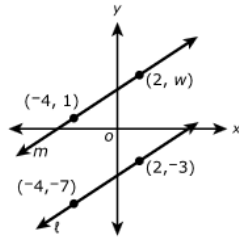▶ Math symbols

▶ Relations

▶ Geometry

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▶ Trigonometry

▶ Statistics

▶ Greek

16. Part A

Line ℓ passes through the points $(-4, -7)$ and $(2, -3)$ on the coordinate plane.
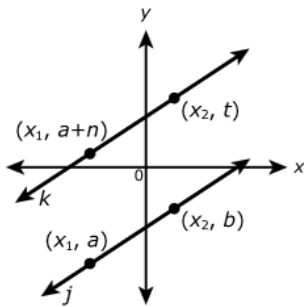
Line m passes through the points $(-4, 1)$ and $(2, w)$.

For what value of w is line m parallel to line ℓ ?

Enter your answer in the box.

Part B

Given the figure, write an expression that can replace t and will guarantee that lines j and k are parallel.

Support your answer.

Enter your expression and your support in the space provided.

↩ ↪ 🗑 [A] [π]

▸ Math symbols

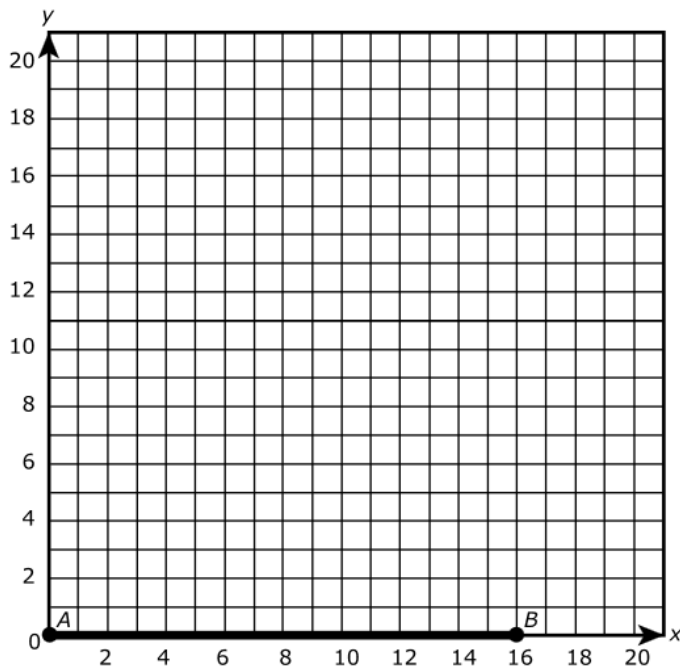▸ Relations

▸ Geometry

▸ Groups

▸ Trigonometry

▸ Statistics

▸ Greek

17. Part A

$\triangle\,ABC$ meets the given criteria:

- The perimeter of $\triangle\,ABC$ is 50 units.
- Only two of the sides have the same length.
- The third side is 16 units long, given in the diagram.

What are the coordinates of point C that will meet the criteria for $\triangle\,ABC$?

- ⊙ A. $(6.25,\ 8)$

- ⊙ B. $(8,\ 6.25)$

- ⊙ C. $(8,\ 15)$

- ⊙ D. $(15,\ 8)$

Part B

Point C is placed at $(12,\ 16)$ and point B is moved along the x-axis. Triangle ABC is still an isosceles triangle and point A is still at the origin. What is the new perimeter of $\triangle\,ABC$? Provide valid mathematical reasoning and calculations to support your answer.

Enter your answer, your reasoning, and your calculations in the space provided.

[A] [π]

- ▸ Math symbols
- ▸ Relations
- ▸ Geometry
- ▸ Groups
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- ▸ Greek

18. The above-ground swimming pool in Lien's backyard is shaped like a right circular cylinder with diameter 12 feet and height 4 feet. The pool is filled with water to a height of 3.5 feet. One person who is completely in the water will displace about 18 gallons of water. (Note: 1 cubic foot is approximately 7.48 gallons.)

Lien is inviting high school classmates to swim in the pool. Create a model to determine the greatest number of classmates who can be in the pool before the water overflows. Explain your reasoning.

Enter your model and your explanation in the space provided.

↶ ↷ 🗑 [A] [π]

▸ Math symbols

▸ Relations

▸ Geometry

▸ Groups

▸ Trigonometry

▸ Statistics

▸ Greek