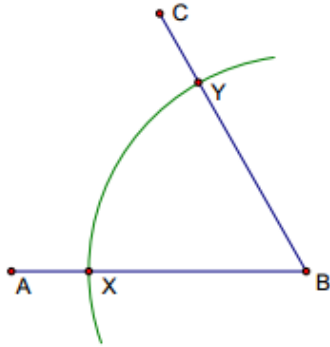
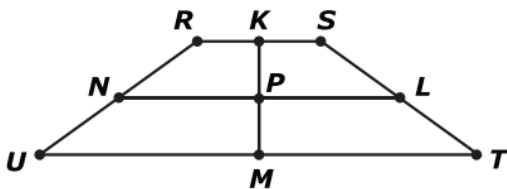


## Geometry Magic 20 - Set 4

1. Amanda is constructing an angle bisector. What is her next step?

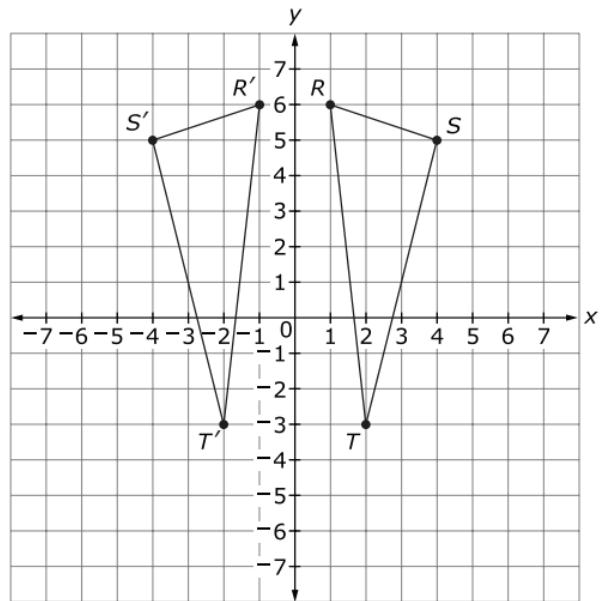


- Draw  $\overline{XY}$ .
  - Place the center of her compass on  $X$  and construct an arc in the interior of  $\angle ABC$ . Repeat from  $Y$ .
  - Place the center of her compass on  $X$  and construct an arc intersecting  $A$ . Repeat on  $Y$ , with the arc intersecting  $C$ .
  - Place the center of her compass on  $A$  and construct an arc in the interior on  $\angle ABC$ . Repeat on  $C$ .
2. Isosceles trapezoid  $RSTU$ , with  $K$  as midpoint of  $\overline{RS}$ ,  $L$  as midpoint of  $\overline{ST}$ ,  $M$  as midpoint of  $\overline{TU}$ , and  $N$  as midpoint of  $\overline{RU}$ , is shown. Point  $P$  is the intersection of  $\overline{KM}$  and  $\overline{NL}$ .



Which transformation carries the trapezoid onto itself?

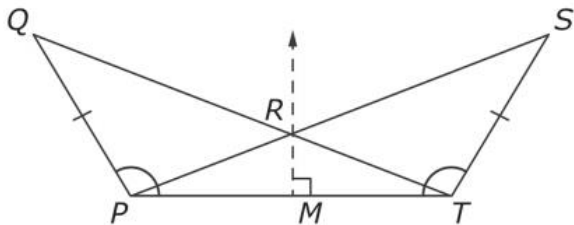
- a  $90^\circ$  rotation clockwise about  $P$
  - a  $180^\circ$  rotation clockwise about  $P$
  - a reflection over  $KM$
  - a reflection over  $NL$
3. In  $\triangle DEF$ ,  $m\angle D = 3x + 5$ ,  $m\angle E = 4x - 15$ , and  $m\angle F = 2x + 10$ . Which statement is true?
- $DF = FE$
  - $DE = FE$
  - $m\angle E = m\angle F$
  - $m\angle D = m\angle F$
4. Triangle  $RST$  and triangle  $R'S'T'$  are shown.



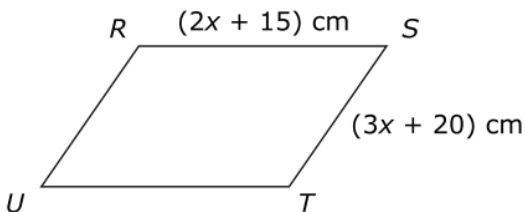
For which transformation would triangle  $RST$  have image  $R'S'T'$ ?

- a  $180^\circ$  rotation
  - a translation left 8 units
  - a reflection over the  $y$ -axis
  - a reflection over the  $x$ -axis
5. Quadrilateral  $LMNO$  has coordinates  $L(5, 6)$ ,  $M(9, 8)$ ,  $N(11, 12)$ , and  $O(7, 10)$ . How can quadrilateral  $LMNO$  be classified?
- Square
  - rhombus but not a square
  - rectangle but not a square
  - parallelogram but neither a rhombus nor a rectangle

6. The triangles  $QTP$  and  $SPT$  are shown. Line  $RM$  is the perpendicular bisector of line segment  $PT$  and intersects line segment  $PT$  at point  $M$ . Which transformation would imply that  $\triangle QTP \cong \triangle SPT$ ?



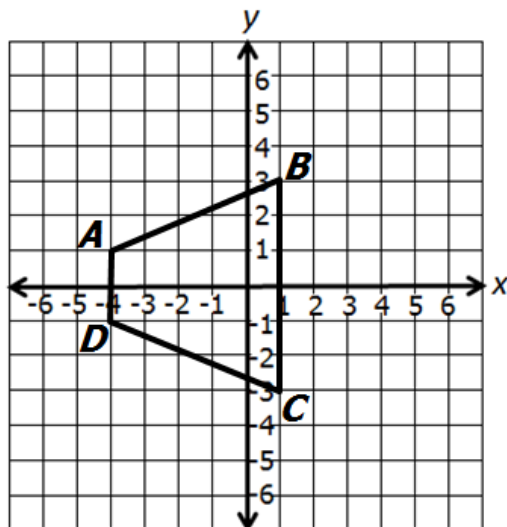
- A. horizontal translation the length of  $\overline{PR}$   
 B. horizontal translation the length of  $\overline{PT}$   
 C. reflection over  $\overline{RM}$   
 D. reflection over  $\overline{SP}$
7. Parallelogram  $RSTU$  is shown. The perimeter of parallelogram  $RSTU$  is 50 centimeters.



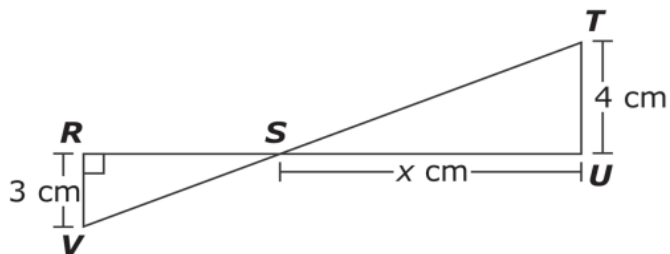
What is the value of  $x$ ?

- A. -5  
 B. -2  
 C. 3  
 D. 12
8. Select **two** equations of lines that are perpendicular to the line whose equation is  $x + 5y = 50$ .
- A.  $y = 5x + 2$   
 B.  $y = -\frac{1}{7}x + 4$   
 C.  $y = -5x + 8$   
 D.  $y = \frac{1}{5}x + 7$   
 E.  $5y = 25x + 13$

9. Identify each true statement.



- A. Area of  $ABCD$  is 30 square units  
 B. Area of  $ABCD$  is 17 square units  
 C. Perimeter of  $ABCD$  is  $8 + 2\sqrt{29}$  units  
 D. Perimeter of  $ABCD$  is  $8 + \sqrt{58}$  units  
 E. Area of  $ABCD$  is 20 square units
10.  $\triangle RSV \sim \triangle UST$



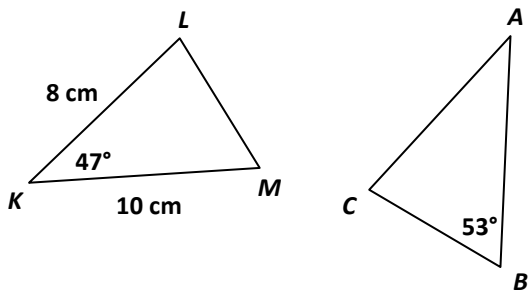
Select all statements that are true.

- A.  $\triangle STU$  is a right triangle.  
 B.  $\overline{RS}$  is  $\frac{4}{3}x$  cm in length.  
 C.  $\angle VRS \cong \angle STU$   
 D. The area of  $\triangle RSV$  is  $\frac{9}{8}x$  cm<sup>2</sup>  
 E.  $m\angle RSV + m\angle UST = 90^\circ$

11. Which of the following best describes a ray?

- A. An exact location in space
- B. A collection of points continuing infinitely in both directions
- C. Part of a line with one endpoint continuing on in one direction
- D. Two endpoints and all of the points in between

12. In the figure below,  $\triangle KLM \cong \triangle ABC$ .



Which statement must be true?

- A.  $AC = 8 \text{ cm}$
- B.  $BC = 6 \text{ cm}$
- C.  $m\angle A = 53^\circ$
- D.  $m\angle C = 80^\circ$

13. In isosceles triangle  $HMS$ ,  $\angle M$  is the vertex angle. If  $m\angle M = (2x + 6)^\circ$  and  $m\angle H = (9x + 7)^\circ$ , what is  $m\angle M$ ?

- A.  $10^\circ$
- B.  $22^\circ$
- C.  $79^\circ$
- D.  $80^\circ$

14. What is the equation of the line parallel to  $4x - 3y = 8$  and passing through the point  $(5, -1)$ ?

- A.  $y - 5 = \frac{4}{3}(x + 1)$
- B.  $y + 1 = \frac{4}{3}(x - 5)$
- C.  $y + 1 = -\frac{3}{4}(x - 5)$
- D.  $y - 5 = -\frac{3}{4}(x + 1)$

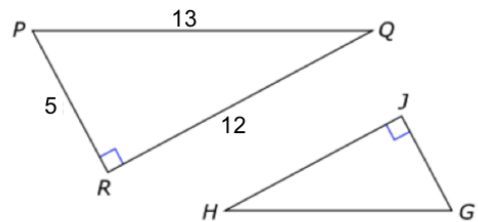
15. What is the radius and center for  $x^2 + 4x + 4 + y^2 = 43$ ?

- A.  $r = \sqrt{39}$ ; center is  $(2, 0)$
- B.  $r = \sqrt{43}$ ; center is  $(-2, 0)$
- C.  $r = \sqrt{39}$ ; center is  $(-2, 0)$
- D.  $r = \sqrt{43}$ ; center is  $(2, 0)$

16. The degree measure of an angle in a right triangle is  $x$ , and  $\sin x = \frac{\sqrt{2}}{2}$ . Which of these expressions are also equal to  $\frac{\sqrt{2}}{2}$ ? Select all that apply.

- A.  $\cos(x)$
- B.  $\cos(x - 45^\circ)$
- C.  $\cos(45^\circ - x)$
- D.  $\cos(60^\circ - x)$
- E.  $\cos(90^\circ - x)$

17. In this figure,  $\triangle GHJ$  is similar to  $\triangle PQR$ .



Based on this information, which ratio represents  $\sin H$ ?

- A.  $\frac{5}{12}$
- B.  $\frac{5}{13}$
- C.  $\frac{12}{5}$
- D.  $\frac{13}{5}$

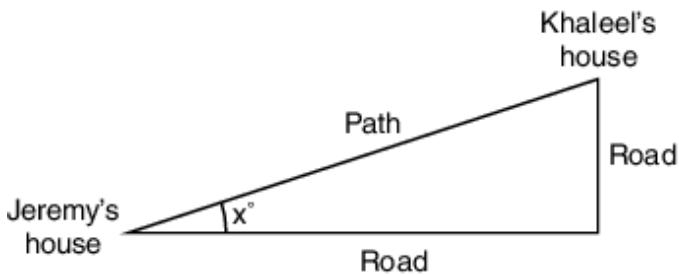
18. Grammage is the mass per unit area of paper. Suppose the printer paper used in an office has a grammage of 80 grams per square meter. To the nearest hundredth of a gram, what is the mass of a single sheet of letter-size printer paper?

- A. 4.84 g
- B. 7.56 g
- C. 48.39 g
- D. 75.60 g

19. What transformation maps a circle with radius  $r$  onto a congruent circle with radius  $s$  and the same center?

- A.  $(x, y) \rightarrow (sx, sy)$
- B.  $(x, y) \rightarrow (rx, ry)$
- C.  $(x, y) \rightarrow \left(\frac{sx}{r}, \frac{sy}{r}\right)$
- D.  $(x, y) \rightarrow \left(\frac{rx}{s}, \frac{ry}{s}\right)$

20. Jeremy likes to ride his bike to his friend Khaleel's house. If he takes the road, he rides 3.6 miles east and then 1.5 miles north. There is also a path that goes through the woods directly from Jeremy's house to Khaleel's house.



Part A. To the nearest degree, what is the angle shown between the road and the path?

Part B. To the nearest tenth of a mile, how much farther is it to go by the road than to go by the path?