18 April 2019 Name:

10-4 Test: Volumes, circles, similar triangles, dilation ratios, transformations

You may leave your results in terms of π or a decimal.

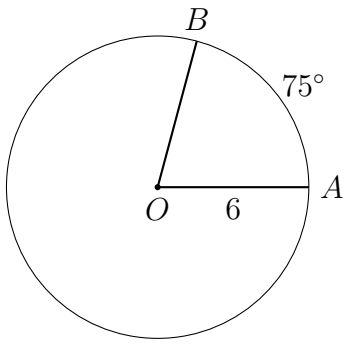
1. Find the volume of a rectangular prism (box) that is 3.2 units long, 1.8 units wide, and 2.5 units high.

2. Find the area of a circle with diameter of 8.

3. Find the volume of a sphere with a radius of 14 cm.

4. Find the volume of a cone with radius 11 and a height of 18.

5. Circle O has a radius $AO = 6$, as shown below, and arc measure $m\overset{\frown}{AB} = 75°$.



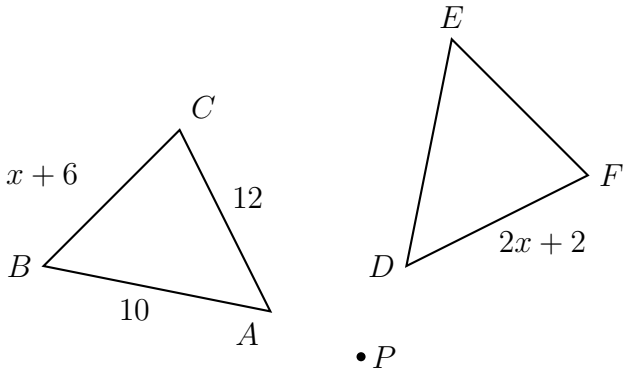
   (a) Find the $m\angle AOB$.

   (b) Find the length of the arc $\overset{\frown}{AB}$.

   (c) Find the area of the sector AOB.

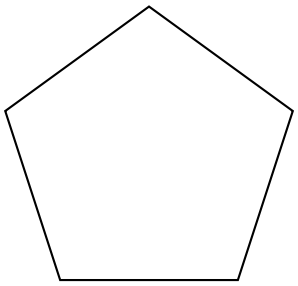
6. After a dilation with center $P(1, 2)$, the image of $\overline{RS}$ is $\overline{R'S'}$. If $RS = 6$ and $R'S' = 15$, find the scale factor of this dilation.

7. In the diagram below, $\triangle ABC$, with sides of 10, $x+6$, and 12, is mapped onto $\triangle DEF$ after a clockwise rotation of 90° about point P.



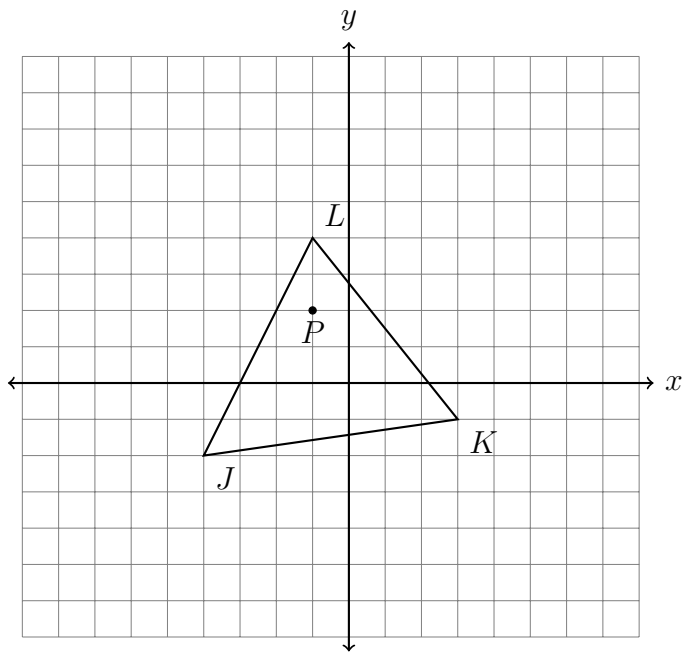
If $DF = 2x + 2$, what is the value of x?

8. How many degrees is the smallest rotation around its center that would map the pentagon onto itself?



9. The vertices of $\triangle JKL$ have the coordinates $J(-4,-2)$, $K(3,-1)$, and $L(-1,4)$, and the point $P(-1,2)$ is marked, as shown.

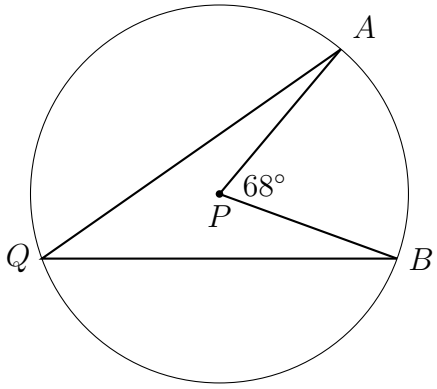
   Apply a dilation to $\triangle JKL \to \triangle J'K'L'$, centered at P and with a scale factor $k = 2$. Draw the image $\triangle J'K'L'$ on the set of axes below, labeling the vertices.



10. Given circle P with $m\angle APB = 68°$.

    (a) Write down the $m\overset{\frown}{AB}$.

    (b) Find the $m\angle AQB$.



11. Write down the center and radius of each circle. Leave radii as simplified radicals if necessary (not decimals).

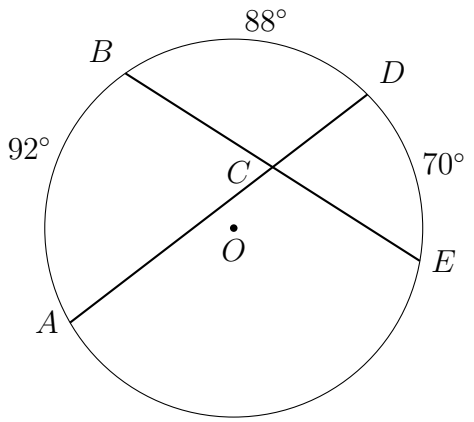
    (a) $x^2 + (y+1)^2 = 32$

    (b) $(x-1)^2 + (y-3)^2 = 7^2$

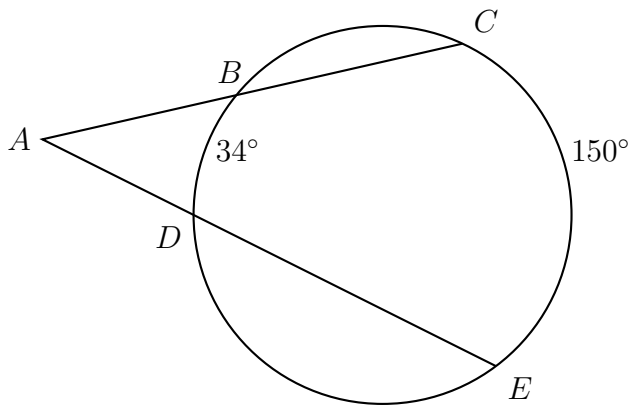
12. Given circle O with chords $\overline{AD}$ and $\overline{BE}$ intersecting at C, as shown in the diagram. Given $m\widehat{AB} = 92°$, $m\widehat{BD} = 88°$, and $m\widehat{DE} = 70°$.

    (a) Find the $m\angle ACB$.

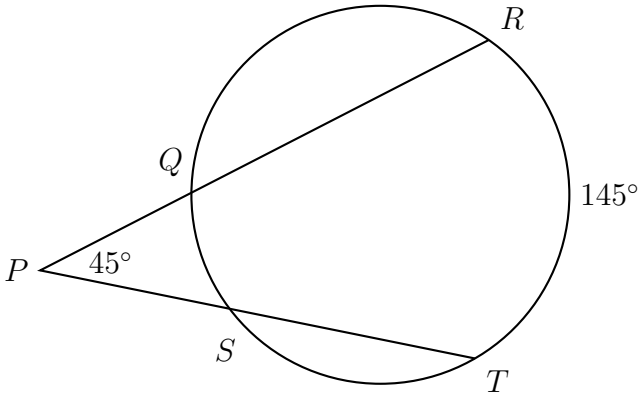
    (b) Find the measure of the minor arc, $m\widehat{AE}$.



13. The secants $\overline{ABC}$ and $\overline{ADE}$ intersect the circle O, as shown in the diagram. Given $m\widehat{BD} = 34°$ and $m\widehat{CE} = 150°$. Find the $m\angle A$.

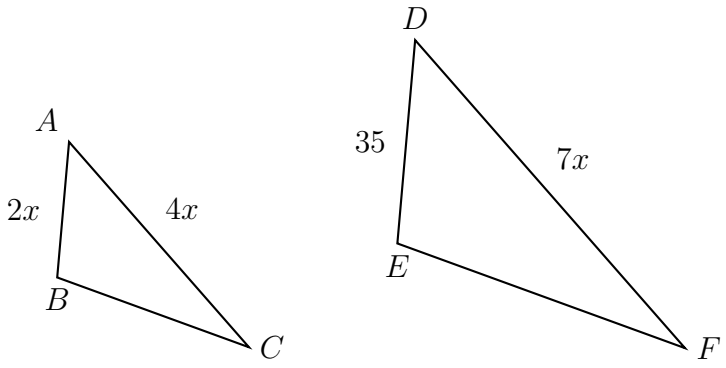


14. The secants $\overline{PQR}$ and $\overline{PST}$ intersect the circle O, as shown in the diagram. Given $m\angle P = 45°$ and $m\widehat{RT} = 145°$. Find the $m\widehat{QS}$.

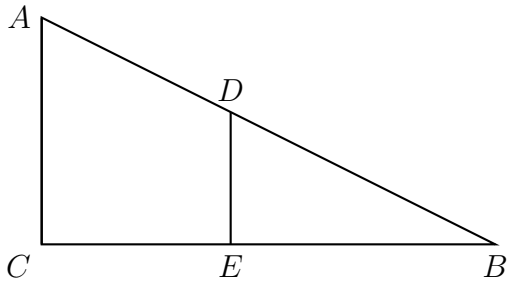


15. Given $P(7, -4)$ and $Q(4, -1)$, find the length of $\overline{PQ}$. Simplify the radical.

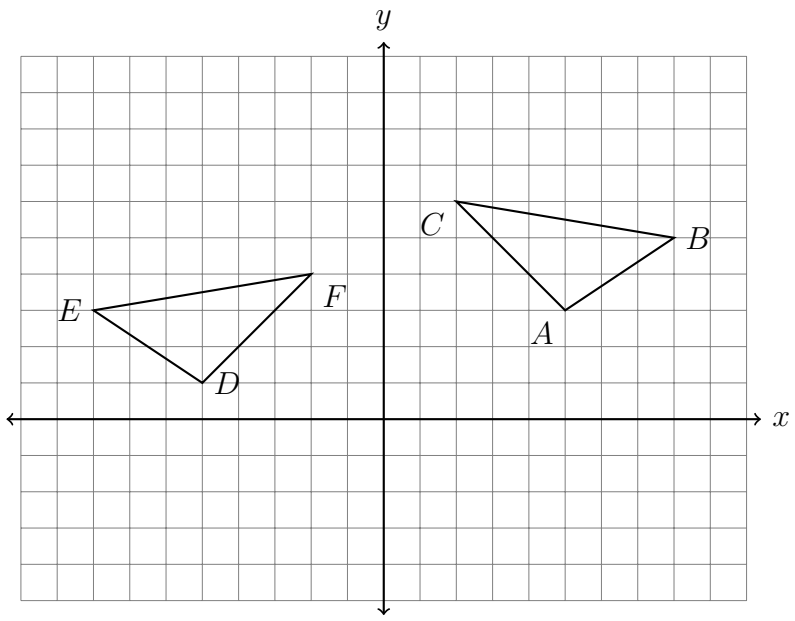
16. In the diagram below, $\triangle ABC \sim \triangle DEF$, $DE = 35$, $AB = 2x$, $AC = 4x$, and $DF = 7x$. Find x.



17. In right triangle ABC shown below, point D is on $\overline{AB}$ and point E is on $\overline{BC}$ such that $\overline{AC} \parallel \overline{DE}$. If $AB = 20$, $BC = 15$, and $AD = 8$, what is the length of $\overline{BE}$?

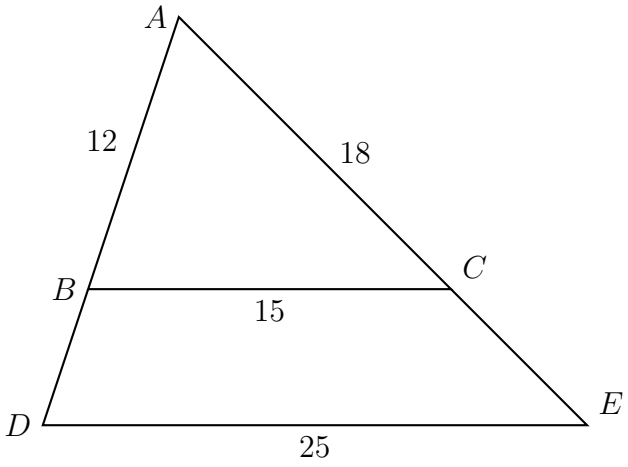


18. What series of transformations map $\triangle ABC$ onto $\triangle DEF$, shown below? Fully specify the transformations.



19. Triangle ABC is dilated with a scale factor of k centered at A, yielding $\triangle ADE$, as shown. Given $AB = 12$, $BC = 15$, $AC = 18$, and $DE = 25$.

    Find BD, AE, and k (the scale factor).



20. What is the length of the segment $A(2, 10)$, $B(-4, 2)$?

21. What is the equation of a line through the point $A(3, -5)$ and parallel to the line $y = \frac{3}{5}x + 1$? (hint: use the point-slope formula, $y - y_A = m(x - x_A)$)

22. The line l has the equation $y = \frac{4}{3}x + 3$. To each line below, circle whether l is parallel, perpendicular, or neither.

    (a) parallel perpendicular neither $y = \frac{3}{4}x - 5$

    (b) parallel perpendicular neither $y = -\frac{4}{3}x - 9$

    (c) parallel perpendicular neither $3x + 4y = -15$

    (d) parallel perpendicular neither $4x - 3y = 6$

23. Simplify each expression. (Leave it in radical form if necessary, not a decimal.)

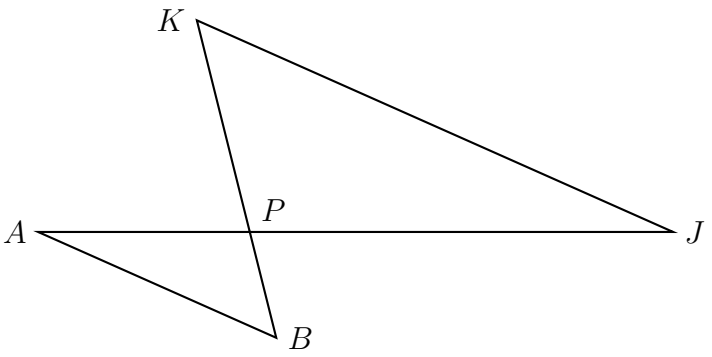
    (a) $\sqrt{144}$

    (b) $\sqrt{50}$

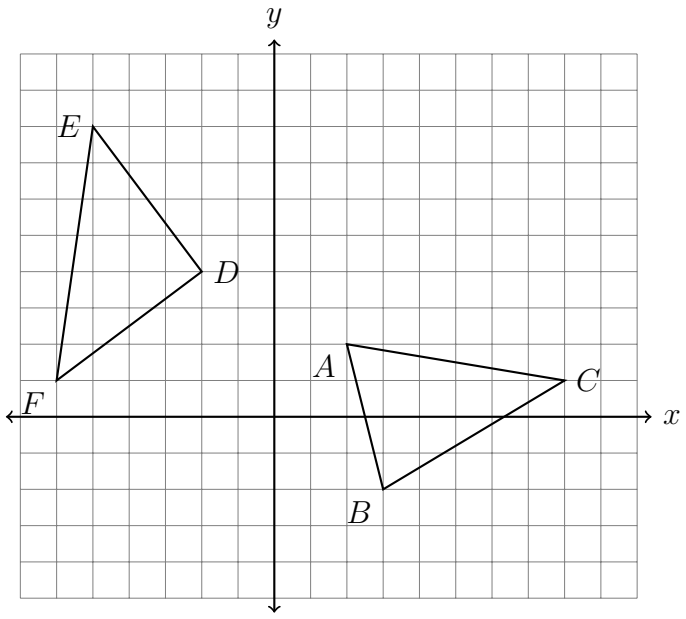
    (c) $\sqrt{32}$

    (d) $\sqrt{\frac{49}{16}}$

24. Given $\triangle ABP$ and $\triangle JKP$ as shown below. $\overline{AB} \parallel \overline{JK}$. $AP = 6$, $JP = 14$, and $JK = 21$. Find AB.

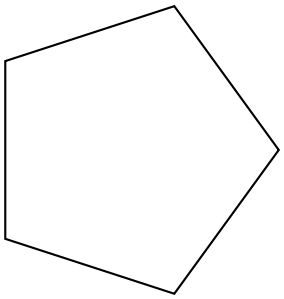


25. The grid shows $\triangle ABC$ and $\triangle DEF$.



Let $\triangle A'B'C'$ be the image of $\triangle ABC$ after a rotation about point A. Determine and state the location of B' if the location of point C' is $(1, -4)$. Explain your answer, supported by stating the transformation applied.

26. What is the smallest non-zero angle of rotation about its center that would map the pentagon onto itself?

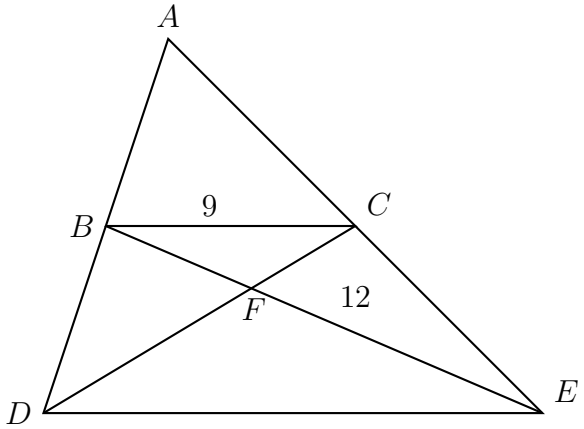


27. Triangle ADE and its midline $\overline{BC}$ are drawn, with B the midpoint of $\overline{AD}$ and C the midpoint of $\overline{AE}$. The two medians $\overline{BE}$ and $\overline{CD}$ are drawn, as shown, intersecting in point F, the centroid.

    $\triangle FCB \sim \triangle FDE$ with scale factor $k = 2$.

    Given $BC = 9$, find DE.

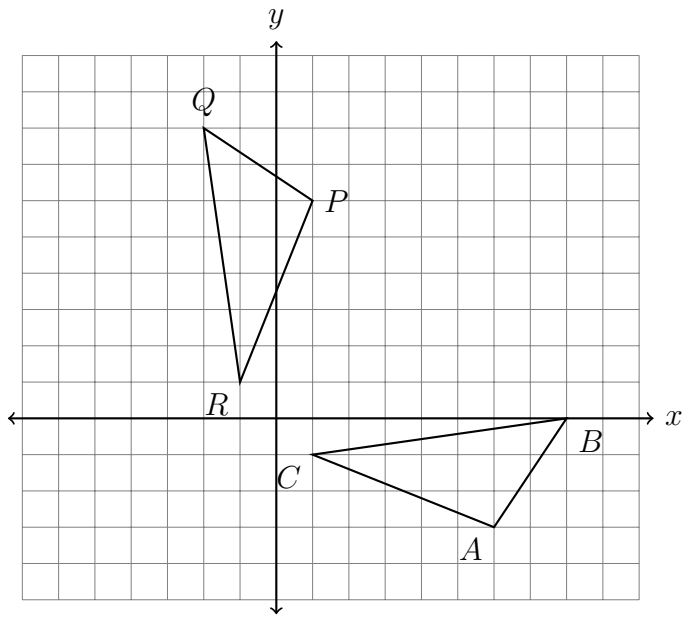
    Given $FE = 12$, find BF.



28. Write down the center and radius of each circle.

    (a) $(x+1)^2 + (y-1)^2 = 16$ (b) $(x-2)^2 + (y-7)^2 = 25$

29. Determine and state the transformation or sequence of transformations applied to $\triangle ABC$, mapping it onto $\triangle PQR$, as shown.



30. The diagram below shows $\triangle ABC$, with $\overline{AEB}$, $\overline{ADC}$, and $\angle ACB \cong \angle AED$. $AB = 14$, $AD = 8$, and $DE = 4$.

(a) $\overline{AE} \rightarrow$ _____

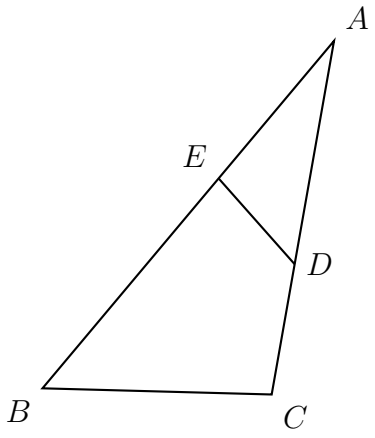
(b) $\overline{AD} \rightarrow$ _____

(c) $\triangle ADE \sim$ _____

(d) What is the scale factor?

$k =$ _____

(e) What is the length of $\overline{BC}$?



31. Given $\triangle JKL \sim \triangle MNO$. $m\angle J = 43°$ and $m\angle L = 92°$.
Find the measure of $\angle N$.

32. A translation maps $A(3, 5) \rightarrow A'(-2, 7)$. What is the image of $B(-4, 1)$ under the same translation?

33. Given $A(-3, 5)$ and $B(0, -1)$, find the length of $\overline{AB}$. Leave the result in simplified radical form (not a decimal).

Early finishers

34. In the diagram below, the chords $\overline{AE}$ and $\overline{BD}$ intersect at C, with $\triangle ABC \sim \triangle DEC$, $BC = 3$, $AC = 4$, and $AE = 11$. Determine the length of $\overline{CD}$.