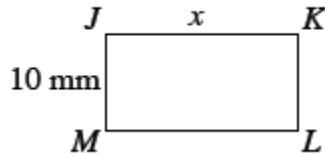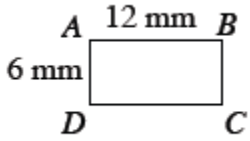**Geometry Final Exam Review Packet**
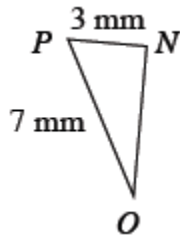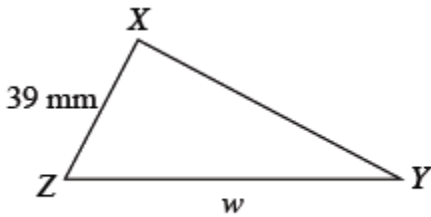
Chapter 3

1. Solve for the missing lengths in the sets of similar figures below.
a. ABCD ~ JKLM

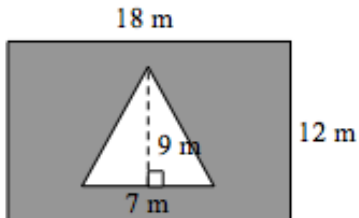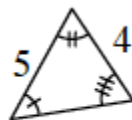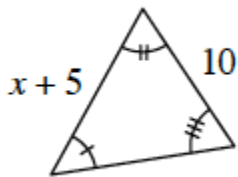b. *ΔNOP ~ ΔXYZ*

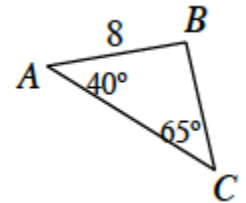## Chapter 4

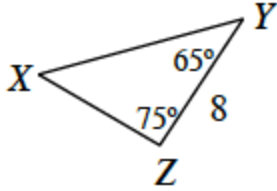**2.** Find the area of the shaded region.

Chapter 6

3. Examine the triangles below. Solve for *x*.

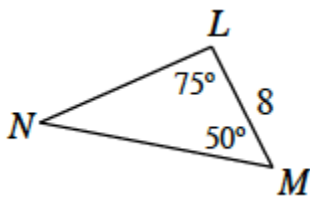**4.** Decide if each triangle below is congruent to △ABC at right, similar but not congruent to △ABC, or neither. Justify each answer. If you decide that they are congruent, organize your reasoning into a flowchart.

Triangle ABC: A with 40° angle, side AB = 8, B at top, C at bottom with 65° angle.

a.

Triangle XYZ: angle Y = 65°, angle Z = 75°, side ZY = 8, X at left.

b.

Triangle with L at top (75°), N at left, M at bottom right (50°), side LM = 8.

c.

Triangle with R at top, P at left (75°), angle at Q = 40°, side PQ = 8, Q at bottom.
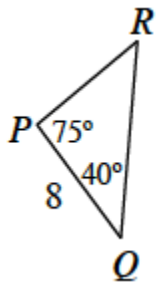
5. The two shapes to the right are similar.
a. Find the value of *x*. Show all work.

First shape: 6 (top), 4 (left), 12 (right), 10 (bottom).

Second shape: 15 (top), 30 (right), 10 (left), *x* (bottom).
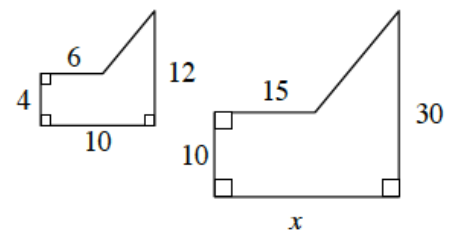
b. Find the area of each shape.

6. Determine whether or not the two triangles in each part below are congruent. If they are congruent, show your reasoning in a flowchart. If the triangles are not congruent or you cannot determine that they are, justify your conclusion.

a.

b.

c.

d.
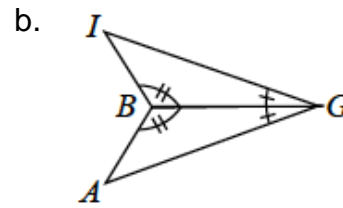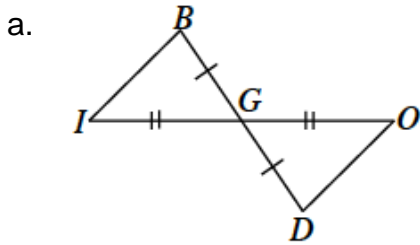
7. Examine the triangles below. Solve for x and name which tool you used. Show all work.

8. Determine if each pair of triangles below are congruent, similar but not congruent, or if they are neither. If they are congruent, organize your reasoning into a flowchart. Remember that the triangles below not be drawn to scale.
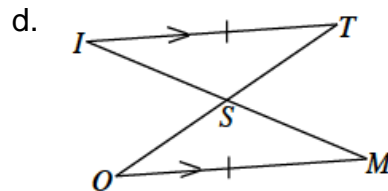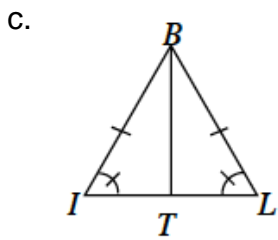
a.

b.
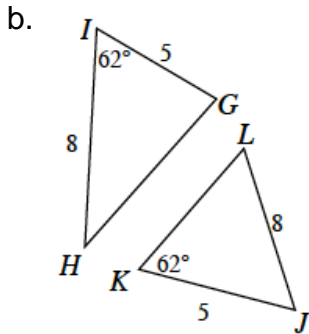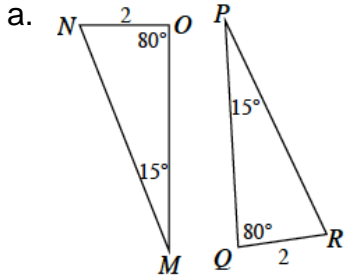
9. In the diagram below, △ABC ~ △ADE.
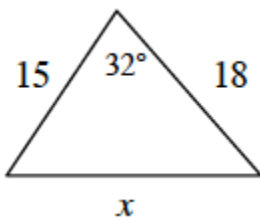
a. Draw each triangle separately on your paper. Be sure to include all measurements in your diagrams.
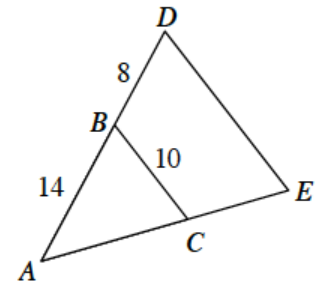
b. Find the length of $\overline{DE}$.

10. Use your triangle tools to solve for x in the triangle below.

11. Jester started to prove that the triangles below are congruent. He was only told that point *E* is the midpoint of segments $\overline{AC}$ and $\overline{BD}$. Complete his flowchart below. Be sure that a reason is provided for every statement.

12. Kelly started the proof below to show that if $\overline{TC} \cong \overline{TM}$ and $\overline{AT}$ bisects $\angle CTM$, then $\overline{CA} \cong \overline{MA}$. Complete her proof.
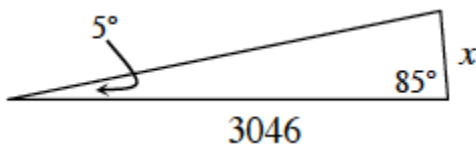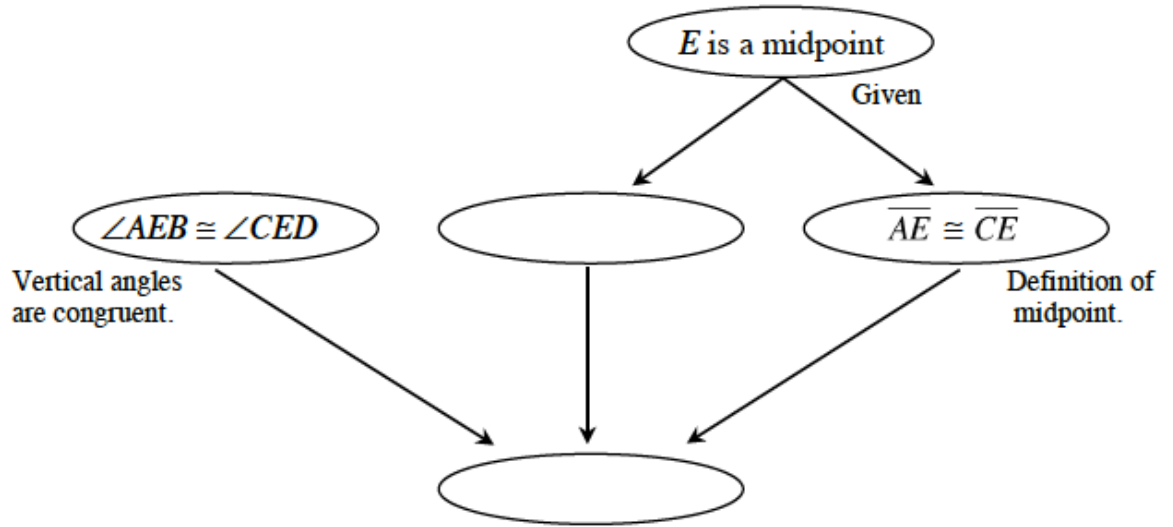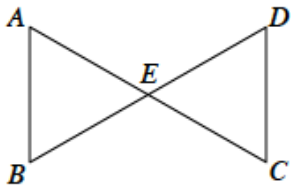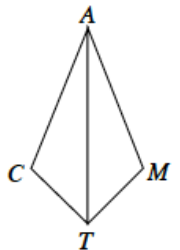
Statements	Reasons
1. $\overline{TC} \cong \overline{TM}$ and $\overline{AT}$ bisects $\angle CTM$	1.
2.	2. Definition of bisect
3. $\overline{AT} \cong \overline{AT}$	3.
4.	4.
5.	5. If triangles are congruent, then corresponding parts are congruent.

13. MUST BE / COULD BE
Here are some more challenges from Mr. Quincey. For each description of a quadrilateral below, say what special type the quadrilateral *must be* and/or what special type the quadrilateral *could be*. Look out:

a. My quadrilateral has a pair of equal sides and a pair of parallel sides.

b. The diagonals of my quadrilateral bisect each other.

14. Troy is thinking of a shape. He says that it has four sides and that no sides have equal length. He also says that no sides are parallel. What is the best name for his shape?

15. Jamal used a hinged mirror to create a regular polygon like you did in Lesson 7.1.4.

a. If his hinged mirror formed a 72° angle and the core region in front of the mirror was isosceles, how many sides did his polygon have?

b. Now Jamal has decided to create a regular polygon with 9 sides, called a nonagon. If his core region is again isosceles, what angle is formed by his mirror?

16. Graph and connect the points $G(-2, 2)$, $H(3, 2)$, $I(6, 6)$, and $J(1, 6)$ to form $GHIJ$.

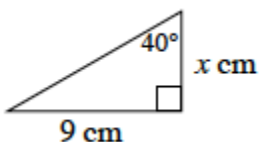a. What specific type of shape is quadrilateral $GHIJ$? Justify your conclusion.

b. Find the equations of the diagonals $\overline{GI}$ and $\overline{HJ}$.

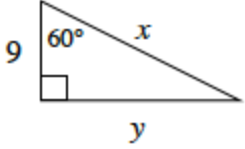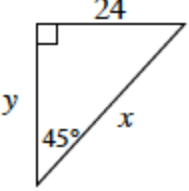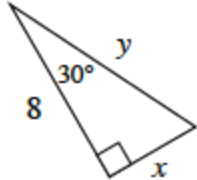c. Compare the slopes of the diagonals. How do the diagonals of a rhombus appear to be related?
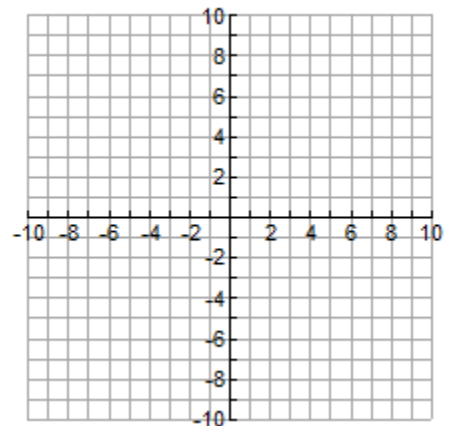
17. Joanne claims that (2, 4) is the midpoint of the segment connecting the points (−3, 5) and (7, 3). Is she correct? Explain how you know.

18. Examine the triangles below. For each, solve for x and name which tool you use. Show all work.
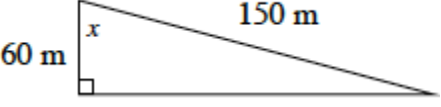
40°
x cm
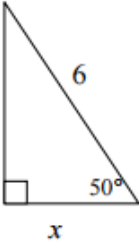
9 cm
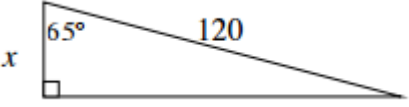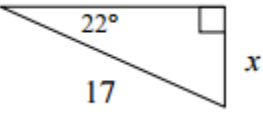
19. Without using your calculator, find the exact values of *x* and *y* in each diagram below.

a.	b.	c.

20. Find the perimeter of the shape below. Show all work.
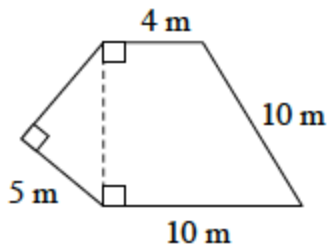
21. Solve for *x* in each of the triangles below using trig.

a.	b.
c.	d.

22. The exterior angle of a regular polygon is 20°.

a. What is the measure of an interior angle of this polygon? Show how you know.
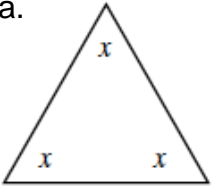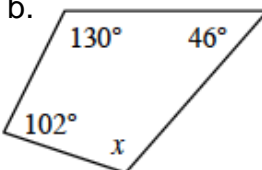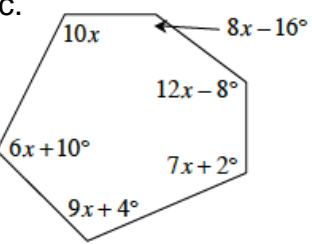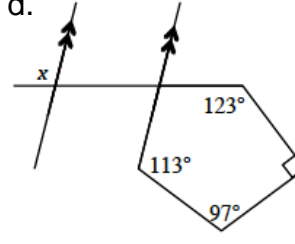
b. How many sides does this polygon have? Show all work.

23. An exterior angle of a regular polygon measures 18°.

a. How many sides does the polygon have?
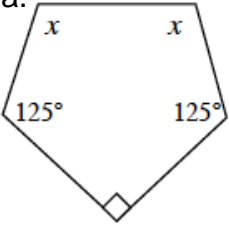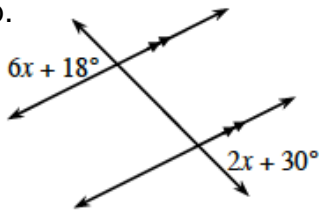
b. If the length of a side of the polygon is 2 units, what is the area of the polygon?

24. Solve for *x* in each diagram below.

a.	b.
	130° 46° 102° *x*
c. 10*x* 8*x* – 16° 12*x* – 8° 6*x* + 10° 7*x* + 2° 9*x* + 4°	d. *x* 123° 113° 97°

25. For each diagram below, write and solve an equation to find *x*.

a.	b.

26. Answer the following questions about polygons. If there is not enough information or the problem is impossible, explain why.

a. Find the sum of the interior angles of a dodecagon.

b. Find the number of sides of a regular polygon if its central angle measures 35°.

c. If the sum of the interior angles of a regular polygon is 900°, how many sides does the polygon have?

d. If the exterior angle of a regular polygon is 15°, find its central angle.

e. Find the measure of an exterior angle of a regular polygon with 10 sides.

27. Multiple Choice: Find the perimeter of the sector below.

a. 12π ft
b. 3π ft
c. $6 + 3\pi$ ft
d. $12 + \pi$ ft
e. None of these
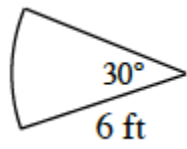
28. Find the missing angle(s) in each problem below using the geometric relationships shown in the diagram below. Be sure to write down the conjecture that justifies each calculation.

a. If $d = 110°$ and $k = 5x - 20°$, write an equation and solve for x.

b. If $b = 4x - 11°$ and $n = x + 26°$, write an equation and solve for x.
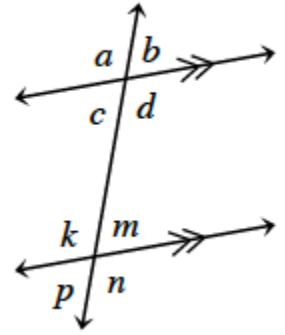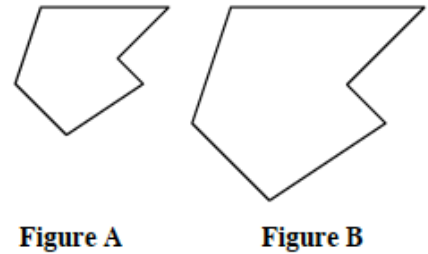Then find the measure of $\angle n$.

29. Assume Figure A and Figure B, below, are similar.
a. If the ratio of similarity is $\frac{3}{4}$ then what is the ratio of the perimeters of A and B?

b. If the perimeter of Figure A is p and the linear scale factor is r, what is the perimeter of Figure B?

Figure A   Figure B

c. If the area of Figure A is a and the linear scale factor is r, what is the area of Figure B?

30. Use what you know about the area and circumference of circles to answer the questions below. Show all work. Leave answers in terms of π (exact form).

a. If the radius of a circle is 14 units, what is its circumference? What is its area?

b. If a circle has diameter 10 units, what is its circumference? What is its area?

c. If a circle has circumference 100π units, what is its area?

31. Always a romantic, Marris decided to bake his girlfriend a cookie in the shape of a regular dodecagon (12-gon) for Valentine's Day.

a. If the edge of the dodecagon is 6 cm, what is the area of the top of the cookie?

b. His girlfriend decides to divide the cookie into 12 congruent pieces. After 9 of the pieces have been eaten, what area of the cookie is left?

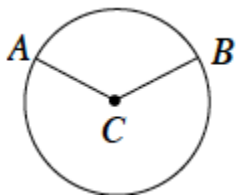**32.** Review what you know about the angles and arcs of circles below.

a. A circle is divided into nine congruent sectors. What is the measure of each central angle?

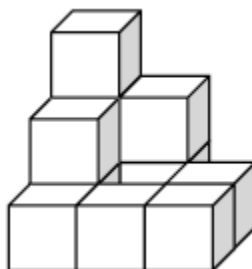b. In the diagram below, find $m\widehat{AD}$ and $m\angle C$ if $m\angle B = 97^{\circ}$.
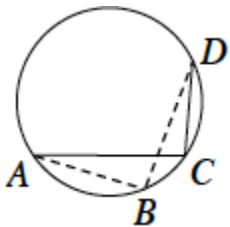
c. In $\odot C$ below, $m\angle ACB = 125^{\circ}$ and $r = 8$ inches. Find $m\widehat{AB}$ and the length of the arc. Then find the area of the smaller sector
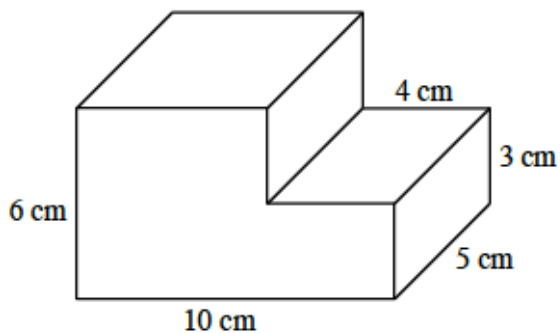
33. Examine the solid below.

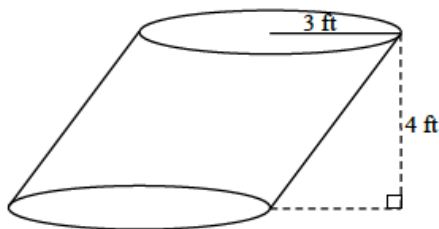a. Draw a possible mat plan for this solid.

b. Find the volume of this solid.

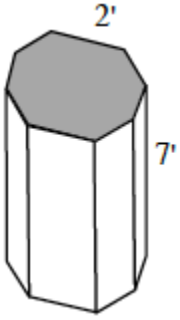**34.** Compute the volume of the figure below.

35. Cindy's cylindrical paint bucket has a diameter of 12 inches and a height of 14.5 inches. If 1 gallon ≈ 231 in^3, how many gallons does her paint bucket hold?

36. Compute the volume of the figure below.

37. Find the volume of the regular octagonal prism.

2'

7'

38. Assume that two figures on a flat surface, *A* and *B*, are similar.

a. If the linear scale factor is $\frac{2}{5}$, then what is the ratio of the areas of *A* and *B*?

b. If the ratio of the perimeters of *A* and *B* is 14:1, what is the ratio of the areas?

c. If the area of *A* is 81 times that of *B*, what is the ratio of the perimeters?

39. Draw a cylinder. Assume the radius of the cylinder is 6 inches and the height is 9 inches.

a. What is the surface area of the cylinder? What is the volume?

b. If the cylinder is enlarged with a linear scale factor of 3, what is the volume of the enlarged cylinder? How do you know?

40. Multiple Choice: A solid with a volume of 26 in^3 was enlarged to create a similar solid with a volume of 702 in^3. What is the linear scale factor between the two solids?

a. 1

b. 2

c. 3

d. 4

41. At the band's peak of popularity, a personally signed Black Diamond poster sold for $500. Three years later the band was almost forgotten and the poster was worth only $10. What were the annual multiplier and annual percent of decrease?

42. Multiple Choice: Examine $\odot L$ below. Which of the mathematical statements below is not necessarily true?
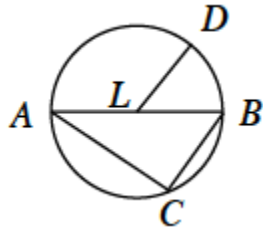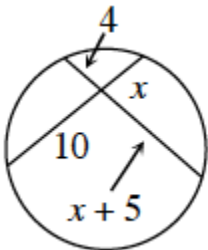
a. $LD = AL$

b. $m\angle DLB = m\widehat{DB}$

c. $\overline{LD} \parallel \overline{CB}$

d. $m\widehat{BC} = 2m\angle BAC$

e. $2AL = AB$

43. A circle has two intersecting chords as shown in the diagram below. Find the value of x.

44. This problem is a checkpoint for finding angles in and areas of regular polygons.

a. What is the measure of each interior angle of a regular 20-gon?

b. Each angle of a regular polygon measures $157.5°$. How many sides does this polygon have?

c. Find the area of a regular octagon with sides 5 cm.

45. A pyramid has a volume of 108 cubic inches and a base area of 27 square inches. Find its height.

46. Find the volume and surface area of a square-based right pyramid if the base edge has length 6 units and the height of the pyramid is 4 units. Assume the diagram at right is not to scale.
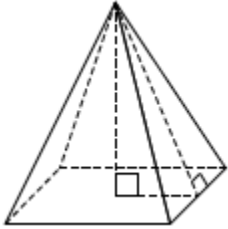
47. Draw a diagram of a square-based pyramid if the side length of the base is 9 cm and the height of the pyramid is 12 cm.
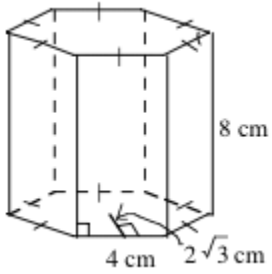
a. Find the volume of the pyramid.

b. If a smaller pyramid is similar to the pyramid in part (a), but has a linear scale factor of $\frac{1}{3}$, find its volume.

48. Find the volume and lateral surface area of a cone if the circumference of the base is 28π inches and the height is 18 inches.
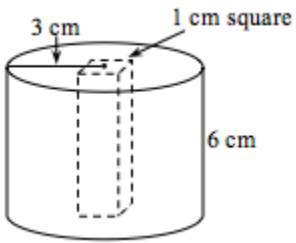
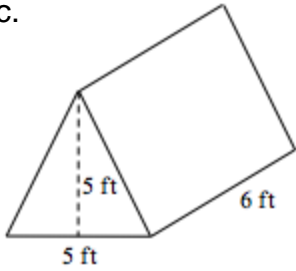**49.** Find the volume of the solids below.

a.

8 cm

4 cm $2\sqrt{3}$ cm

b. The rectangular prism is hollow
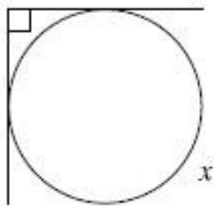

3 cm   1 cm square

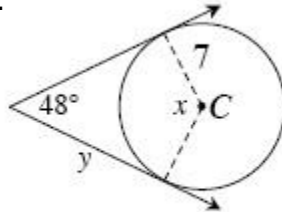6 cm

c.

5 ft

6 ft

5 ft

50. Solve for the variables in each of the diagrams below. Assume point C is the center of the circle in part (b).
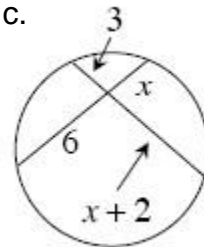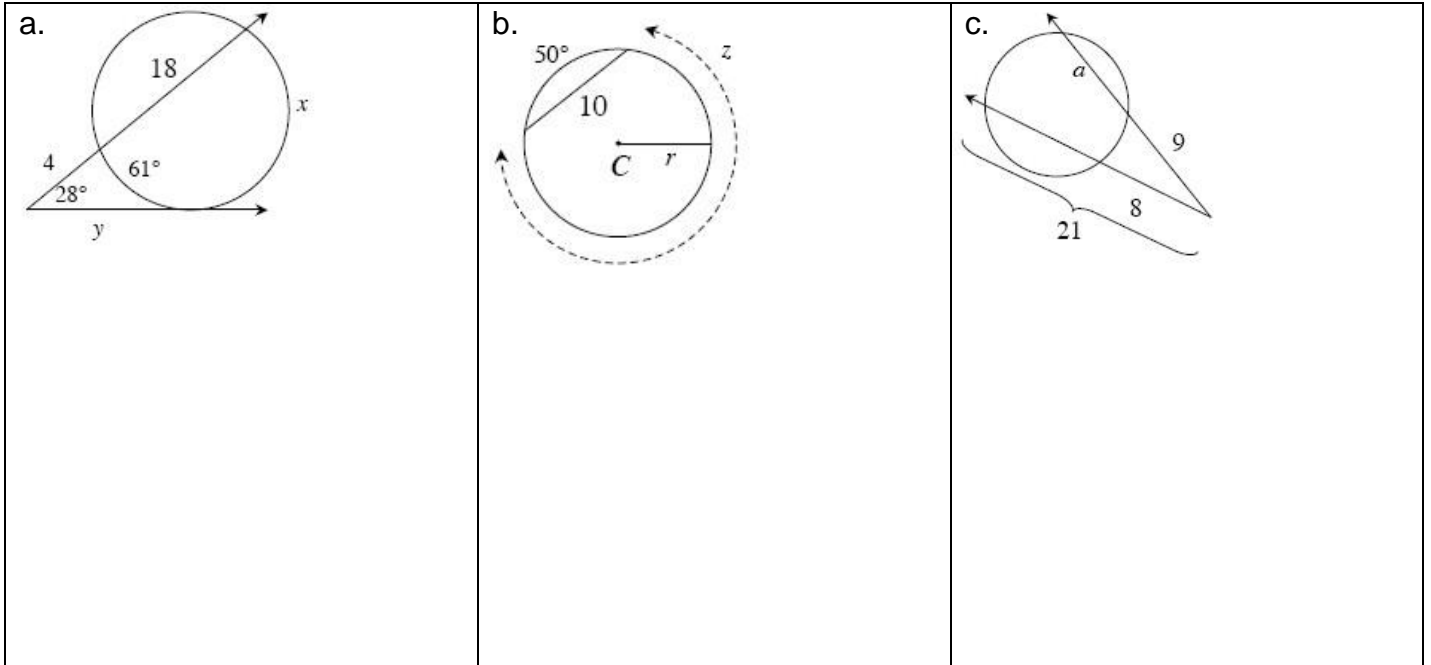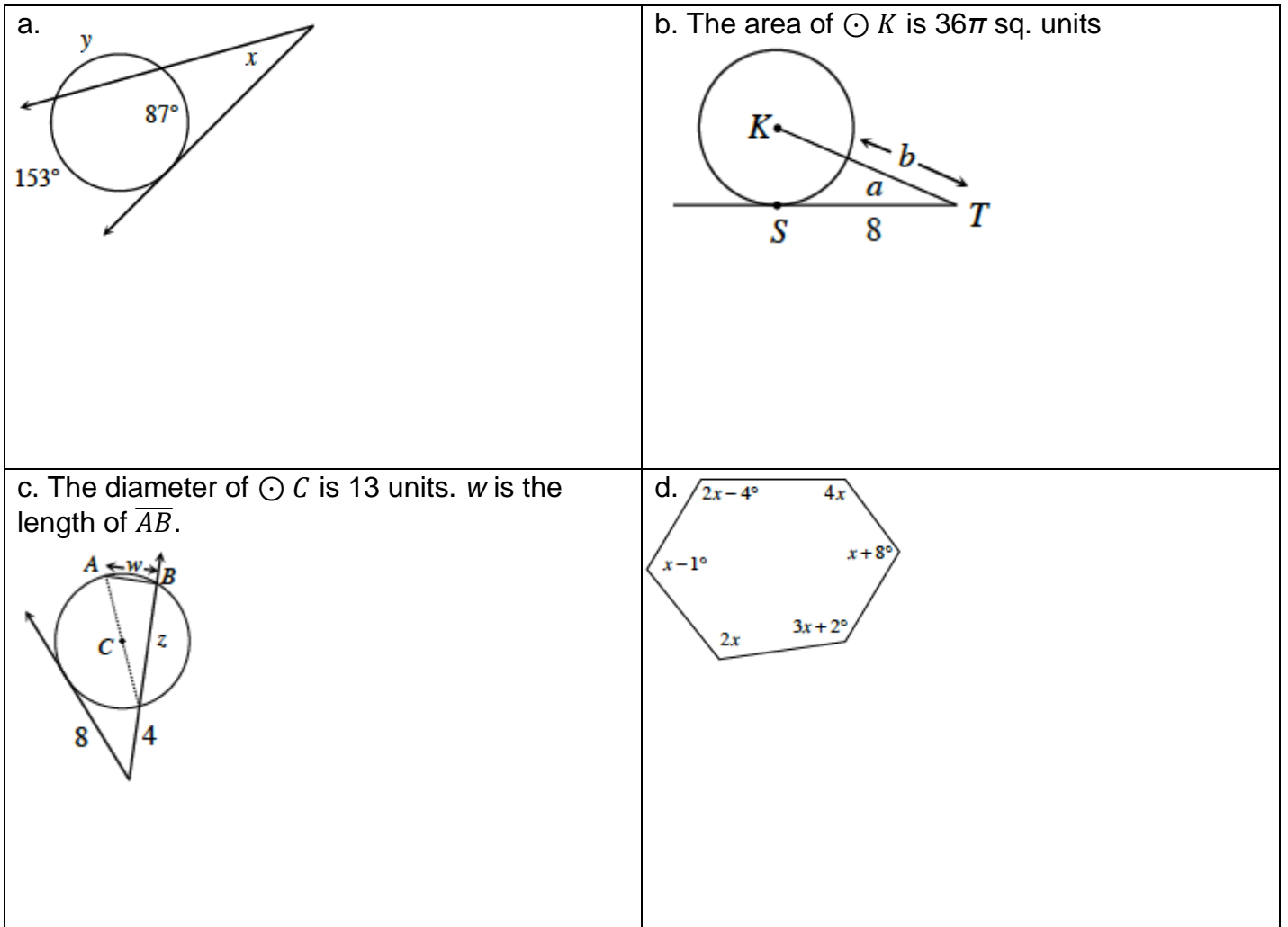
a.

x

b.

7

48°

x C

y

c.

3

x

6

$x+2$

51. Solve for the variables in each of the diagrams below. Assume that point C is the center of the circle in part (b).

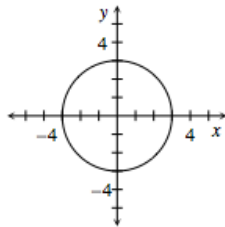| a.	b.	c.

52. Use the relationships in each diagram below to solve for the given variables.

a.	b. The area of $\odot K$ is 36π sq. units
c. The diameter of $\odot C$ is 13 units. w is the length of $\overline{AB}$. 	d.

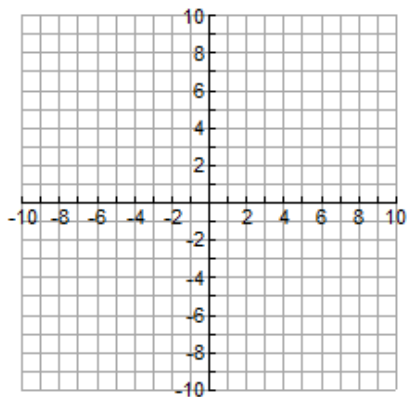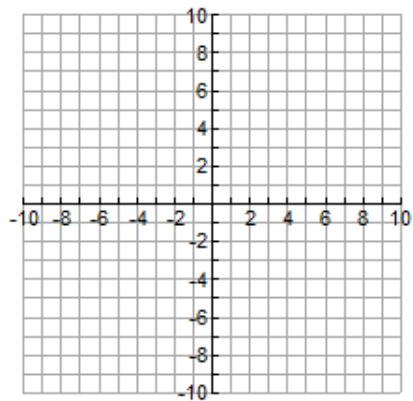**53.** Examine the graph of the circle at right.

a. Find the equation of the circle.

b. Sketch the graph of the equation $x^2 + y^2 = 49$. What is the radius?

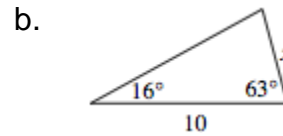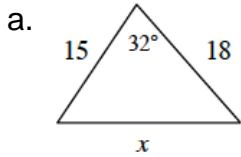**54.** Graph the equation $x^2 + (y - 3)^2 = 25$. State the x- and y-intercepts.

55. Multiply each polynomial. That is, change each product to a sum.

a. $(2x + 1)(3x - 2)$

b. $(2x + 1)(3x^2 - 2x - 5)$

56. Examine the triangles below. For each one, solve for *x* and name which tool you used. Show all work.

a.

15   32°   18

x

b.

x

16°   63°

10

57. For each triangle below, write an equation relating the reference angle (the given acute angle) with the two side lengths of the right triangle. Then solve your equation for *x*.

a.	b.	c.
22° *x* 17	*x* 49° 7	6 60° *x*

58. While shopping at his local home improvement store, Chen noticed that the directions for an extension ladder state, "*This ladder is most stable when used at a 75° angle with the ground.*" He wants to buy a ladder to paint a two-story house that is 26 feet high. How long does his ladder need to be? Draw a diagram and set up an equation for this situation. Show all work.
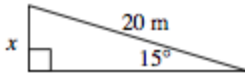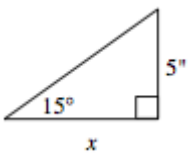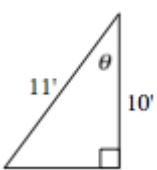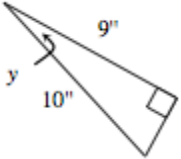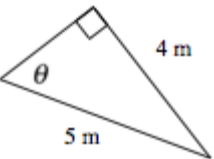
59. Eugene wants to use the cosine ratio to find *y* on this triangle.

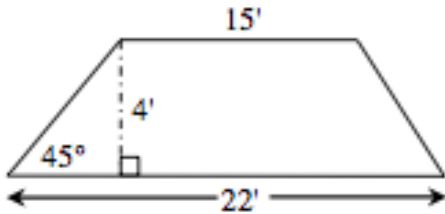a. Which angle should he use to write an equation and solve for *y* using the cosine ratio? Why?

61°

*y*

42

29°

b. Set up an equation, and solve for *y* using cosine.
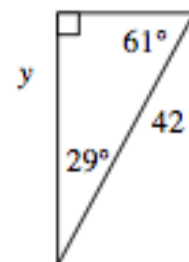
60. For each diagram, write an equation and solve to find the value for each variable.

|		
a. 20 m / 15° / x	**b.** 5" / 15° / x	**c.** 11' / θ / 10'
d. 9" / y / 10"	**e.** 5 cm / 8 cm / x	**f.** 4 m / θ / 5 m

61. Find the trapezoid's perimeter. (Note: The diagram is not drawn to scale.)

15'
4'
45°
22'

62. Find the area of $\triangle ABC$ below. Use 45-45-90 and 30-60-90 triangles to get the side lengths. Then when finding the area round two decimal places in your answer.

B
4
A 45° 30° C
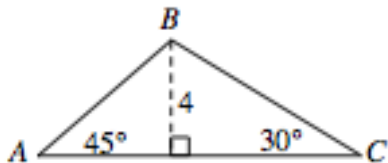
63. The spinner below has three regions: A, B, and C. To play the game, you must spin it *twice*. If the game were played 80 times, how many times would you expect to get A on both spins? Use a tree diagram or area model to help you answer the question.
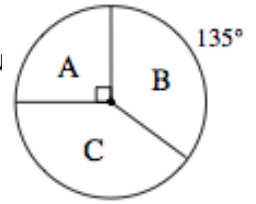
64. Use your knowledge of special right triangles to find the missing side lengths and angle measures exactly.

a.	b.	c.

65. Solve the following equations for the given variable, if possible. Remember to check your answers.

a. $6x^2 = 150$	b. $3p^2 + 10p - 8 = 0$
c. $y^2 - 2y = 15$	d. $x^2 + 8x - 33 = 0$