

# Second Semester Exam Review

## Chapter 7

Are the polygons similar? If they are, write a similarity statement, and give the similarity ratio. If they are not, explain.

<p>1.</p> <p style="margin-left: 100px;"><i>yes</i> <math>\triangle ABC \sim \triangle XYZ</math></p>	<p>2.</p> <p style="margin-left: 100px;"><i>NO</i> <math>\frac{4}{4} \neq \frac{9}{6}</math></p>
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The polygons are similar. Find the values of the variables.

<p>3.</p> <p style="margin-left: 100px;"><math>\frac{6}{x} = \frac{5}{3.3}</math> <math>5x = 19.8</math> <math>x = 3.96</math></p>	<p>4.</p> <p style="margin-left: 100px;"><math>\frac{8}{x} = \frac{5}{3}</math> <math>5x = 24</math> <math>x = 4.8</math></p>
<p>5.</p> <p style="margin-left: 100px;"><math>\frac{4}{10} = \frac{1.5}{x}</math> <math>4x = 15</math> <math>x = 3.75</math></p>	<p>6.</p> <p style="margin-left: 100px;"><math>\frac{7}{4} = \frac{12}{x}</math> <math>7x = 48</math> <math>x = 6.86</math></p>

Explain why the triangles are similar. Write a similarity statement for each pair.

<p>7.</p> <p style="margin-left: 100px;"><math>\frac{15}{20} = \frac{9}{12} = \frac{12}{16}</math> <math>\triangle PXM \sim \triangle WAL</math> SSS ~</p>	<p>8.</p> <p style="margin-left: 100px;"><math>\frac{8}{4} = \frac{4}{2}</math> SAS ~ <math>\triangle PQM \sim \triangle BAM</math></p>	<p>9.</p> <p style="margin-left: 100px;">SSS ~ Corr. sides are proportional <math>\triangle ABC \sim \triangle XYZ</math></p>
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Find the values of the variables.

10.

$$\frac{y}{12} = \frac{9}{y} \quad \frac{x}{12} = \frac{3}{x}$$

$$y^2 = 108 \quad x^2 = 36$$

$$y = \sqrt{108} = 6\sqrt{3} \quad x = 6$$

11.

$$\frac{x}{16} = \frac{5}{x} \quad \frac{y}{11} = \frac{5}{y}$$

$$x^2 = 80 \quad y^2 = 55$$

$$x = 4\sqrt{5} \quad y = \sqrt{55}$$

12.

$$\frac{x}{3} = \frac{1}{x} \quad \frac{y}{3} = \frac{2}{y}$$

$$x^2 = 3 \quad y^2 = 6$$

$$x = \sqrt{3} \quad y = \sqrt{6}$$

$$z = \sqrt{2}$$

13.

$$\frac{12}{y} = \frac{10}{6}$$

$$10y = 72$$

$$y = 7.2$$

14.

$$\frac{x + 1.5}{x} = \frac{5}{2.5} \quad 2.5x = 3.75$$

$$5x = 2.5(x + 1.5) \quad x = 1.5$$

$$5x = 2.5x + 3.75$$

15.

$$\frac{x}{6} = \frac{x + 1}{9}$$

$$9x = 6(x + 1)$$

$$9x = 6x + 6$$

$$3x = 6 \quad x = 2$$

16.

$$\frac{6}{x} = \frac{9}{8}$$

$$9x = 48$$

$$x = 5\frac{1}{3}$$

17.

$$\frac{x}{10} = \frac{10}{8}$$

$$8x = 100$$

$$x = 12.5$$

18.

$$\frac{5}{4} = \frac{x}{3} \quad x = 3.75$$

$$4x = 15$$

19. Natasha places a mirror on the ground 24 ft from the base on an oak tree. She walks backward until she can see the top of the tree in the middle of a mirror. At that point, Natasha's eyes are 5.5 ft above the ground, and her feet are 4 ft from the image in the mirror. Find the height of the oak tree.

$$\frac{4}{24} = \frac{5.5}{x}$$

$$4x = 132$$

$$x = 33$$

20. On page 370 of your Geometry text, there is a photo of a sandwich shop. The sandwich shop is 40 ft tall. The sandwich shop is an enlargement of an actual milk bottle. The scale used in construction was 5 ft = 2 cm. Find the height of the actual milk bottle.

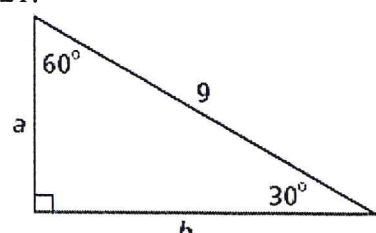
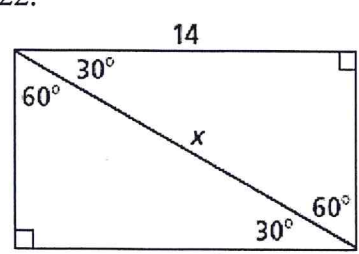
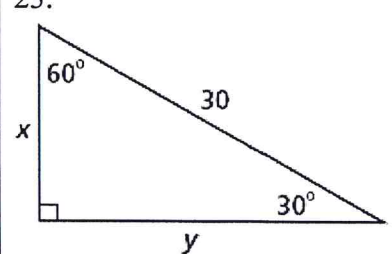
$$\frac{5 \text{ ft}}{2 \text{ cm}} = \frac{40 \text{ ft}}{x}$$

$$5x = 80$$

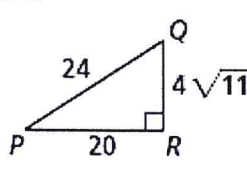
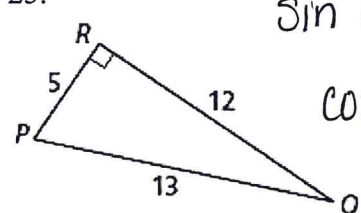
$$x = 16 \text{ cm}$$

# Chapter Eight

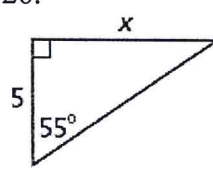
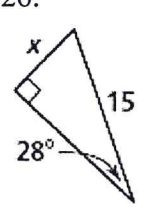
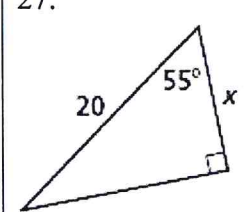
Find the value of each variable. Leave your answers in simplest radical form.

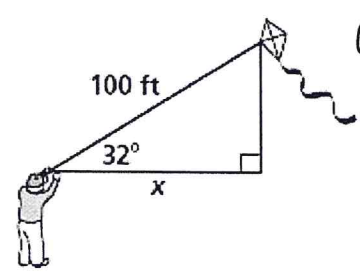
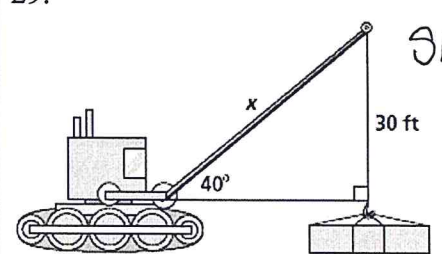
<p>21.</p>  <p><math>a = \frac{9}{2} = 4.5</math> <math>b = 4.5\sqrt{3}</math></p>	<p>22.</p>  <p><math>14 = \text{short} \sqrt{3}</math> <math>\text{short} = \frac{14}{\sqrt{3}} = \frac{14\sqrt{3}}{3}</math> <math>x = \frac{28\sqrt{3}}{3}</math></p>	<p>23.</p>  <p><math>x = \frac{30}{2} = 15</math> <math>y = 15\sqrt{3}</math></p>
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Write the ratios for  $\sin P$  and  $\cos P$ .

<p>24.</p>  <p><math>\sin P = \frac{4\sqrt{11}}{24} = \frac{\sqrt{11}}{6}</math> <math>\cos P = \frac{20}{24} = \frac{5}{6}</math></p>	<p>25.</p>  <p><math>\sin P = \frac{12}{13}</math> <math>\cos P = \frac{5}{13}</math></p>
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Find the value of  $x$ . Round your answers to the nearest tenth.

<p>26.</p>  <p><math>\tan 55 = \frac{x}{5}</math> <math>x = 7.1</math></p>	<p>26.</p>  <p><math>\sin 28 = \frac{x}{15}</math> <math>x = 7.0</math></p>	<p>27.</p>  <p><math>\cos 55 = \frac{x}{20}</math> <math>x = 11.5</math></p>
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<p>28.</p>  <p><math>\cos 32 = \frac{x}{100}</math> <math>x = 84.8 \text{ ft}</math></p>	<p>29.</p>  <p><math>\sin 40 = \frac{30}{x}</math> <math>x = 46.7 \text{ ft}</math></p>
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30. A person standing 30 ft from a flagpole can see the top of the pole at a  $35^\circ$  angle of elevation. Draw a diagram. The person's eye level is 5 ft from the ground. Find the height of the flagpole to the nearest foot.

	<p><math>\tan 35 = \frac{x}{30}</math> <math>x = 21</math> <b>Flagpole = 26 ft</b></p>
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Describe each vector as an ordered pair. Give the coordinates to the nearest tenth.

31.  $\cos 28 = \frac{x}{42}$   
 $x = 37$   
 $\sin 28 = \frac{y}{42}$   
 $y = 19.7$   
 $\langle -37, -19.7 \rangle$

32.  $\cos 42 = \frac{x}{120}$   
 $x = 89.2$   
 $\sin 42 = \frac{y}{120}$   
 $y = 80.3$   
 $\langle 89.2, 80.3 \rangle$

Write the resultant as an ordered pair, and draw the resultant.

33.  $\langle -5, 3 \rangle + \langle 6, 2 \rangle = \langle 1, 5 \rangle$

34.  $\langle -4, 3 \rangle + \langle -3, -4 \rangle = \langle -7, -1 \rangle$

35. A boat sailed 12 miles east and 9 miles south. The trip can be described by the vector  $\langle 12, -9 \rangle$ . Use distance and direction to describe this vector another way.

$$d = \sqrt{(12-0)^2 + (-9-0)^2}$$

$$= \sqrt{12^2 + (-9)^2}$$

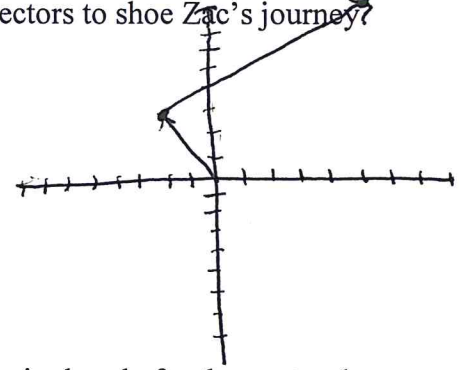
$$= \sqrt{225}$$

$$= 15$$

$\tan x = \frac{9}{12}$   
 $x = 36.9$

15 mi. at  $36.9^\circ$  S of E

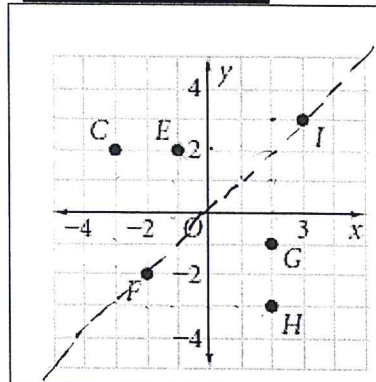
36. From school, Zac walks 3 blocks north and 2 blocks west to Brenna's house, and then he walks 5 blocks north and 7 blocks east to Taco Bell. a. Draw vectors to show Zac's journey?



b. Write a single rule for the vector that goes from school to Taco Bell.

$$\langle -2, 3 \rangle + \langle 5, 8 \rangle = \langle 3, 11 \rangle$$

### Chapter Nine



Each point is reflected as indicated. Find the coordinates of the images.

37. C across the x-axis  
~~(-3, 2)~~  $(-3, -2)$

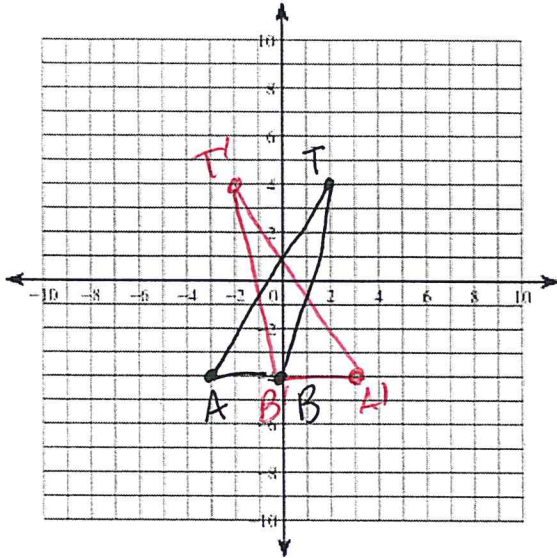
38. H across the y-axis  
 $(-2, -3)$

39. G across the line  $y=x$ .  
~~(2, -2)~~  $(-2, 2)$

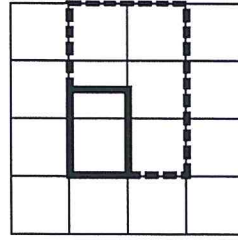
40. F across the line  $y=x$ .  
 $(-2, -2)$

41. C across the line  $y=x$ .  
 $(2, -3)$

42. Given points  $T(2, 4)$ ,  $A(-3, -4)$ , and  $B(0, -4)$ , draw the triangle and its reflection image over the  $y$  axis.



43. Find the scale factor for the dilation that maps the solid-line figure onto the dashed-line figure.



Which is the preimage?

Solid

Which is the image?

Dashed

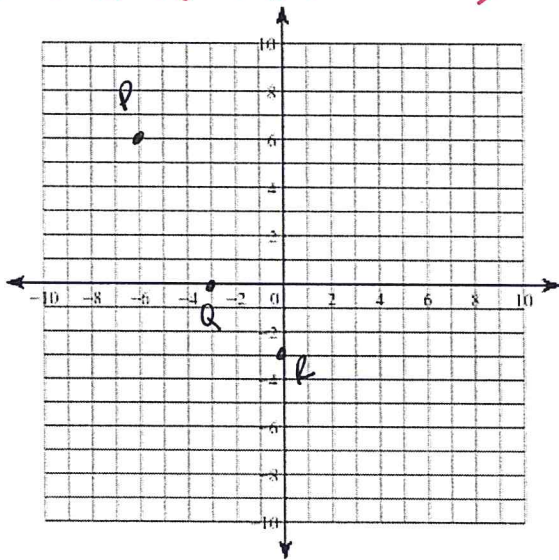
So, what is the scale factor?

2

44. Find the image of the triangle with these vertices for a dilation with center  $(0, 0)$  and the given scale factor.

$P(-6, 6)$ ,  $Q(-3, 0)$ , and  $R(0, -3)$ ; Scale factor 2

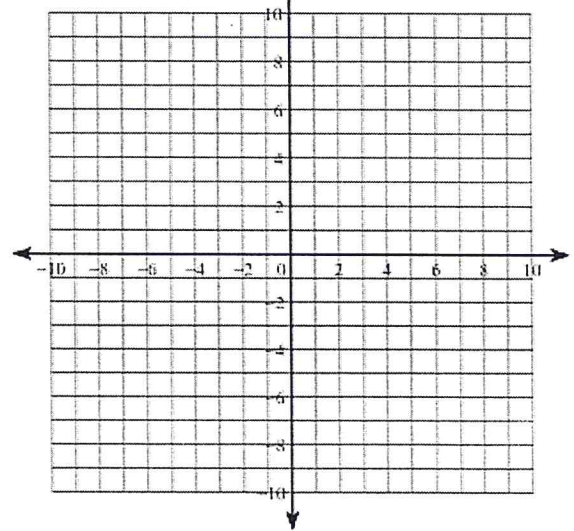
$P'(-12, 12)$ ,  $Q'(-6, 0)$ ,  $R'(0, -6)$



45. Find the image of the triangle with these vertices for a dilation with center  $(0, 0)$  and the given scale factor.

$P(-10, 5)$ ,  $Q(-5, 0)$ , and  $R(0, 5)$ ; Scale factor  $\frac{1}{5}$

$P'(-2, 1)$ ,  $Q'(-1, 0)$ ,  $R'(0, 1)$



46. Match the figure on the left with one of the following isometries: reflections, rotation, translation, glide reflection

PUSH  $\rightarrow$

I.  $\uparrow$

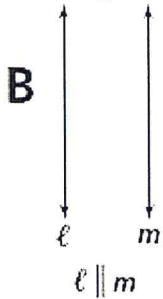
II. PUSH  $\rightarrow$   
Translation

III. PUSH  $\rightarrow$   
Rotation

IV.  $\leftarrow$  PUSH  
Reflection

Glide  
Reflection

47. Find the image of B through a reflection across line  $l$  and then a reflection across line  $m$ . Describe the resulting translation.



Translation twice the distance between the parallel lines

## Chapter Ten

48. Find the length of the missing leg of a right triangle with one leg 6 cm and hypotenuse 13 cm. Leave your answer in simplest radical form.

$$6^2 + x^2 = 13^2$$

$$x^2 = 133$$

$$x = \sqrt{133}$$

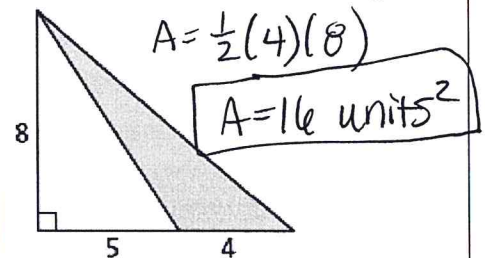
49. Find the length of the hypotenuse of a right triangle with legs 8 m and 7 m. Leave your answer in simplest radical form.

$$8^2 + 7^2 = x^2$$

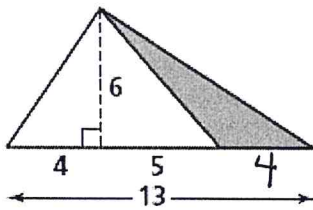
$$x^2 = 113$$

$$x = \sqrt{113}$$

50. Find the area of the shaded region.



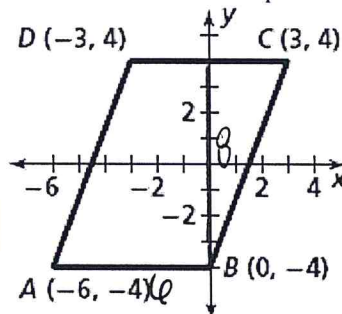
51. Find the area of the shaded region.



$$A = \frac{1}{2}(4)(6)$$

$$A = 12 \text{ units}^2$$

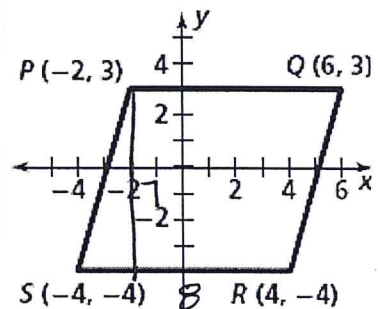
52. Find the area of the parallelogram.



$$A = 6 \times 8$$

$$A = 48 \text{ units}^2$$

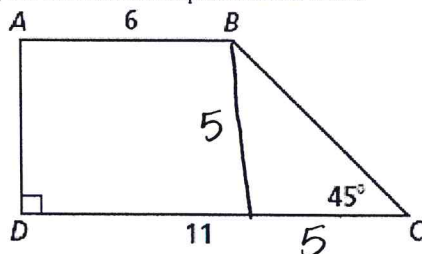
53. Find the area of the parallelogram.



$$A = 8 \times 7$$

$$A = 56 \text{ units}^2$$

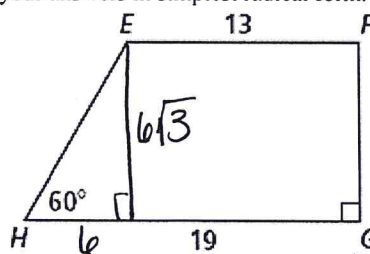
54. Find the area of the trapezoid. Leave your answers in simplest radical form.



$$A = \frac{1}{2}(5)(6 + 11)$$

$$A = 42.5 \text{ units}^2$$

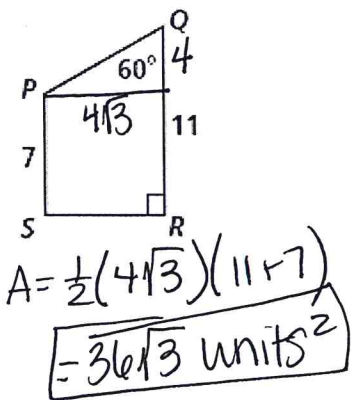
55. Find the area of the trapezoid. Leave your answers in simplest radical form.



$$A = \frac{1}{2}(6\sqrt{3})(19 + 13)$$

$$A = 96\sqrt{3} \text{ units}^2$$

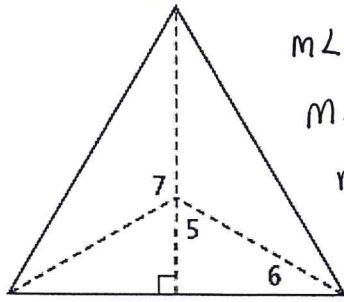
56. Find the area of the trapezoid. Leave your answers in simplest radical form.



$$A = \frac{1}{2}(4\sqrt{3})(11 + 7)$$

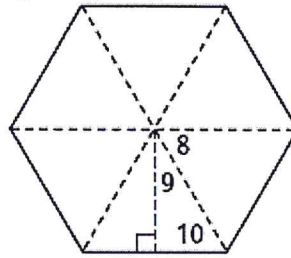
$$A = 36\sqrt{3} \text{ units}^2$$

57. Find the measure of each numbered angle in the regular polygon with radii and apothem as shown.



$$\begin{aligned} m\angle 7 &= 120 \\ m\angle 5 &= 60 \\ m\angle 6 &= 30 \end{aligned}$$

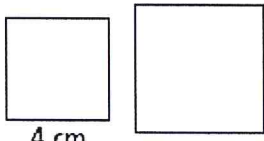
58. Find the measure of each numbered angle in the regular polygon with radii and apothem as shown.



$$\begin{aligned} m\angle 8 &= 60 \\ m\angle 9 &= 30 \\ m\angle 10 &= 60 \end{aligned}$$

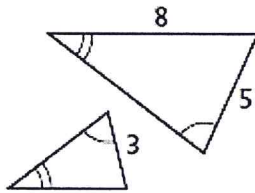
For each pair of similar figures, find the ratio of the perimeters and the ratio of their areas.

59.



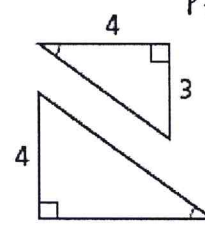
$$\begin{aligned} \text{Ratio of Perim.} &= \frac{4}{5} \\ \text{Ratio of Areas} &= \frac{16}{25} \end{aligned}$$

60.



$$\begin{aligned} \text{Ratio of Perim.} &= \frac{3}{5} \\ \text{Areas} &= \frac{9}{25} \end{aligned}$$

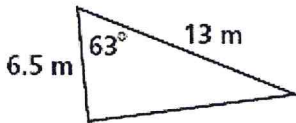
61.



$$\begin{aligned} \text{Perim.} &= \frac{3}{4} \\ \text{Areas} &= \frac{9}{16} \end{aligned}$$

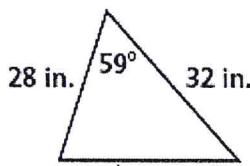
Find the area of each triangle. Round your answers to the nearest tenth.

62.



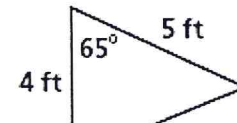
$$\begin{aligned} A &= \frac{1}{2}(6.5)(13)\sin 63 \\ A &= 37.6 \text{ m}^2 \end{aligned}$$

63.



$$\begin{aligned} A &= \frac{1}{2}(28)(32)(\sin 59) \\ A &= 384.0 \text{ in}^2 \end{aligned}$$

64.

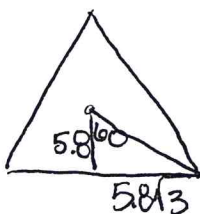


$$\begin{aligned} A &= \frac{1}{2}(4)(5)\sin 65 \\ A &= 9.1 \text{ ft}^2 \end{aligned}$$

Find the area of each polygon. Round your answers to the nearest tenth.

65. an equilateral triangle with apothem 5.8 cm

$$\begin{aligned} A &= \frac{1}{2}ap \\ &= \frac{1}{2}(5.8)(3 \times 11.6\sqrt{3}) \\ &= 174.8 \text{ cm}^2 \end{aligned}$$



66. a square with radius 17 ft

$$\begin{aligned} A &= \frac{1}{2}ap \\ &= \frac{1}{2}\left(\frac{17}{\sqrt{2}}\right)\left(4 \times \frac{34}{\sqrt{2}}\right) \\ &= 578 \text{ ft}^2 \end{aligned}$$



67. a regular octagon with radius 20 in.

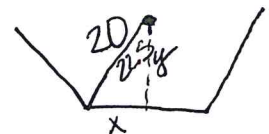
$$\begin{aligned} A &= \frac{1}{2}ap \\ &= \frac{1}{2}(18.5)(8 \times 7.7\sqrt{2}) \\ &= 1139.6 \text{ in}^2 \end{aligned}$$

$$\cos 22.5 = \frac{y}{20}$$

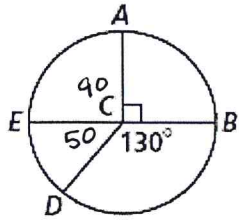
$$y = 18.5$$

$$\sin 22.5 = \frac{x}{20}$$

$$x = 7.7$$

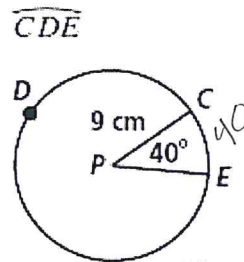


68. Find the measure of each arc in  $\odot C$ .



- a.  $\widehat{DBA} = 220^\circ$
- b.  $\widehat{AED} = 140^\circ$
- c.  $\widehat{ABD} = 220^\circ$
- d.  $\widehat{BD} = 130^\circ$

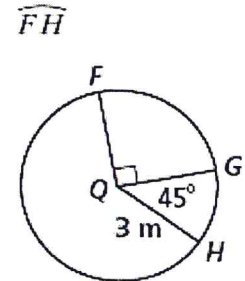
69. Find the length of the arc. Leave your answer in terms of  $\pi$ .



$$\text{length} = \frac{320}{360} * 2\pi * 9$$

$$= 16\pi \text{ cm}$$

70. Find the length of the arc. Leave your answer in terms of  $\pi$ .



$$\text{length} = \frac{135}{360} * 2\pi * 3$$

$$= 2\frac{1}{4}\pi \text{ m}$$

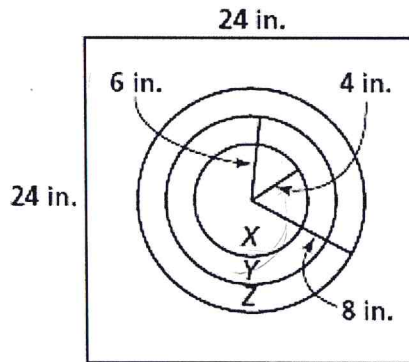
71. If a dart hits the board at the right, find the probability that it will land in region X.

$$P = \frac{4^2\pi}{24 * 24}$$

$$= \frac{16\pi}{576}$$

$$= .0873$$

$$= 8.7\%$$



72. If a dart hits the board at the right, find the probability that it will land in region Y.

$$P = \frac{6^2\pi - 4^2\pi}{576}$$

$$= .109$$

$$= 10.9\%$$

73. Find the circumference and area of a circle with radius 5 cm. Leave your answers in terms of  $\pi$ .

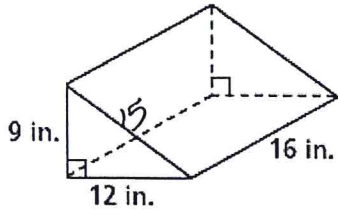
$$C = 2\pi * 5 = 10\pi \text{ cm}$$

$$A = 5^2\pi = 25\pi \text{ cm}$$



# Chapter 11

74. Find the lateral area and the surface area of the prism.

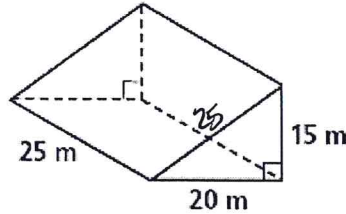


$$\begin{aligned} 9^2 + 12^2 &= c^2 \\ 225 &= c^2 \\ c &= 15 \end{aligned}$$

Lateral Area:  $LA = ph$   
 $= (9 + 12)(16)$   
 $= 576 \text{ in}^2$

Surface Area:  $SA = LA + 2B$   
 $= 576 + 2\left(\frac{1}{2} \cdot 9 \cdot 12\right)$   
 $= 684 \text{ in}^2$

75. Find the lateral area and the surface area of the prism.

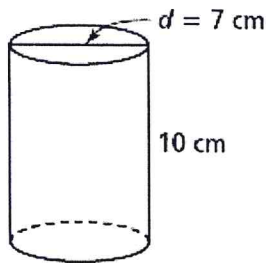


$$\begin{aligned} 15^2 + 20^2 &= c^2 \\ 625 &= c^2 \\ c &= 25 \end{aligned}$$

Lateral Area:  $LA = ph$   
 $= (25 + 20 + 15)(15)$   
 $= 1500 \text{ m}^2$

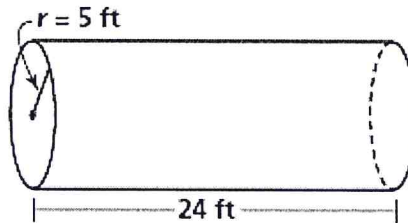
Surface Area:  $SA = LA + 2B$   
 $= 1500 + 2\left(\frac{1}{2} \cdot 15 \cdot 20\right)$   
 $= 1800 \text{ m}^2$

76. Find the surface area of each cylinder in terms of  $\pi$ .



$$\begin{aligned} SA &= LA + 2B \\ &= 7\pi \cdot 10 + 2(3.5^2\pi) \\ &= 70\pi + 24.5\pi \\ &= 94.5\pi \text{ cm}^2 \end{aligned}$$

77. Find the surface area of each cylinder in terms of  $\pi$ .



$$\begin{aligned} SA &= (2 \cdot 5\pi)(24) + 2(5^2\pi) \\ &= 240\pi + 50\pi \\ &= 290\pi \text{ ft}^2 \end{aligned}$$

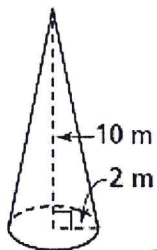
78. Find the surface area of a square pyramid with base length 16 cm and slant height 20 cm.

$$\begin{aligned} SA &= LA + B \\ &= \frac{1}{2}(20)(16 \cdot 4) + (16 \cdot 16) \\ &= 640 + 256 \\ &= 896 \text{ cm}^2 \end{aligned}$$

79. Find the surface area of a square pyramid with base length 10 in. and height 15 in.

$$\begin{aligned} 5^2 + 15^2 &= l^2 & SA &= \frac{1}{2}(\sqrt{250})(10 \cdot 4) + (10 \cdot 10) \\ l^2 &= 250 & & \\ l &= \sqrt{250} & & \\ & & & = 416.2 \text{ in}^2 \end{aligned}$$

80. Find the lateral area of the cone to the nearest whole number.



$$2^2 + 10^2 = l^2$$

$$l^2 = 104$$

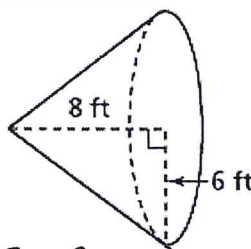
$$l = \sqrt{104}$$

$$LA = \frac{1}{2} l p$$

$$= \frac{1}{2} (\sqrt{104}) (2 \cdot 2\pi)$$

$$\approx 64 \text{ m}^2$$

81. Find the lateral area of the cone to the nearest whole number.



$$6^2 + 8^2 = l^2$$

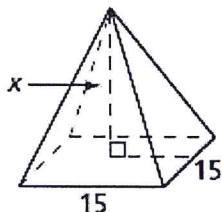
$$l^2 = 100$$

$$l = 10$$

$$LA = \frac{1}{2} (10) (2 \cdot 6 \cdot \pi)$$

$$\approx 188 \text{ ft}^2$$

82. Find the value of the variable in each figure.



Volume = 1500

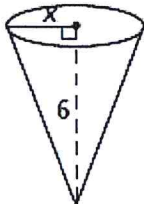
$$V = \frac{1}{3} B h$$

$$1500 = \frac{1}{3} (15 \cdot 15) x$$

$$1500 = 75x$$

$$x = 20 \text{ units}$$

83. Find the value of the variable in each figure.



Volume =  $8\pi$

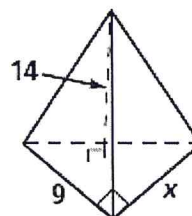
$$8\pi = \frac{1}{3} (x^2 \pi) (6)$$

$$8\pi = 2\pi x^2$$

$$x^2 = 4$$

$$x = 2 \text{ units}$$

84. Find the value of the variable in each figure.



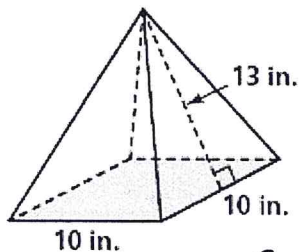
Volume = 126

$$126 = \frac{1}{3} (\frac{1}{2} \cdot 9 \cdot x) (14)$$

$$126 = 21x$$

$$x = 6 \text{ units}$$

85. Find the volume of the pyramid.



$$5^2 + h^2 = 13^2$$

$$h^2 = 144$$

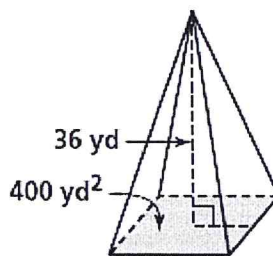
$$h = 12$$

$$V = \frac{1}{3} B h$$

$$= \frac{1}{3} (10 \cdot 10) (12)$$

$$= 400 \text{ in}^3$$

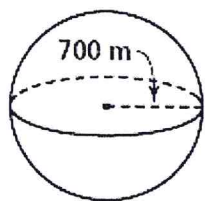
86. Find the volume of the pyramid.



$$V = \frac{1}{3} (400) (36)$$

$$= 4800 \text{ yd}^3$$

87. Find the surface area of each sphere. Round your answers to the nearest tenth.

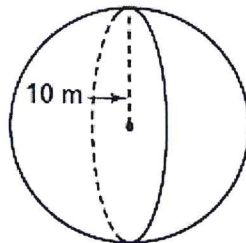


$$SA = 4\pi r^2$$

$$= 4(\pi)(700)^2$$

$$= 6157521.6 \text{ m}^2$$

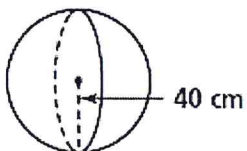
88. Find the surface area of each sphere. Round your answers to the nearest tenth.



$$SA = 4\pi(10^2)$$

$$= 1256.6 \text{ m}^2$$

89. Find the volume of each sphere. Round your answers to the nearest tenth.

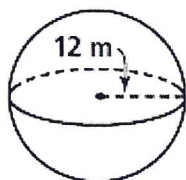


$$V = \frac{4}{3}\pi r^3$$

$$= \frac{4}{3}\pi(40^3)$$

$$= 268082.6 \text{ cm}^3$$

90. Find the volume of each sphere. Round your answers to the nearest tenth.

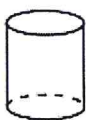


$$V = \frac{4}{3}\pi r^3$$

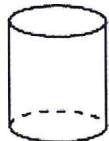
$$= \frac{4}{3}\pi(12^3)$$

$$= 7238.2 \text{ m}^3$$

91. The figures in each pair are similar. Use the given information to find the similarity ratio of the smaller figure to the larger figure.



$$\text{S.A.} = 49 \text{ cm}^2$$

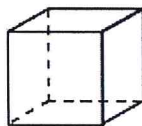


$$\text{S.A.} = 81 \text{ cm}^2$$

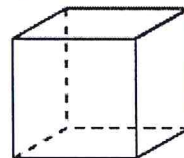
$$\text{Area ratio} = \frac{49}{81}$$

$$\text{Sim. Ratio} = \frac{7}{9}$$

92. The figures in each pair are similar. Use the given information to find the similarity ratio of the smaller figure to the larger figure.



$$V = 125 \text{ in.}^3$$



$$V = 512 \text{ in.}^3$$

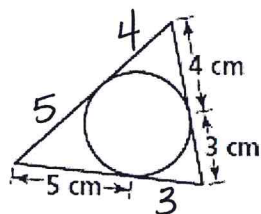
$$\text{Volume Ratio} = \frac{125}{512}$$

$$\text{Sim Ratio} = \frac{5}{8}$$

## Chapter 12

In each diagram, a polygon circumscribes a circle. Find the perimeter of each polygon.

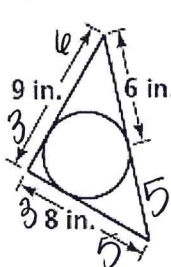
93.



$$P = 4 + 4 + 3 + 3 + 5 + 5$$

$$= 24 \text{ cm}$$

94.

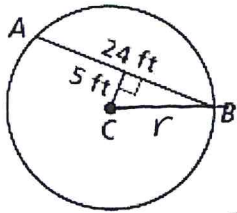


$$P = 6 + 6 + 5 + 5 + 3 + 3$$

$$= 28 \text{ in}$$

Find the radius.

95.

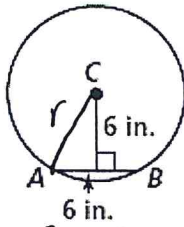


$$5^2 + 12^2 = r^2$$

$$169 = r^2$$

$$r = 13 \text{ ft}$$

96.

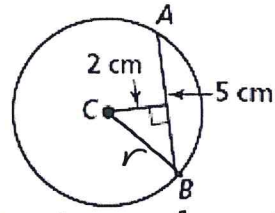


$$3^2 + 6^2 = r^2$$

$$45 = r^2$$

$$r = \sqrt{45} \approx 6.7 \text{ in}$$

97.



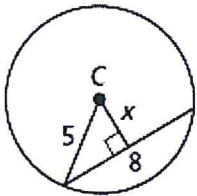
$$2^2 + 2.5^2 = r^2$$

$$10.25 = r^2$$

$$r = 3.2 \text{ cm}$$

Find the value of  $x$  to the nearest tenth.

98.

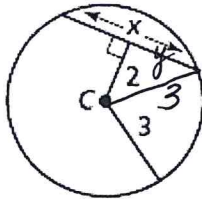


$$x^2 + 4^2 = 5^2$$

$$x^2 = 9$$

$$x = 3$$

99.



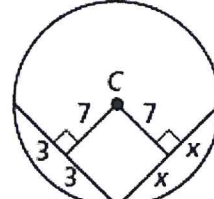
$$2^2 + y^2 = 3^2$$

$$y^2 = 5$$

$$y = \sqrt{5}$$

$$x = 2\sqrt{5} \approx 4.5$$

100.



$$x = 3$$

Write an equation for each circle with the given center that passes through the given point.

101. center (5,9); point(2,9)

$$(2-5)^2 + (9-9)^2 = r^2$$

$$(-3)^2 + 0^2 = r^2$$

$$r^2 = 9$$

$$(x-5)^2 + (y-9)^2 = 9$$

102. center (-4,-3); point(2,2)

$$(2+4)^2 + (2+3)^2 = r^2$$

$$6^2 + 5^2 = r^2$$

$$r^2 = 61$$

$$(x+4)^2 + (y+3)^2 = 61$$

103. center (7,-2); point(-1,-6)

$$(-1-7)^2 + (-6+2)^2 = r^2$$

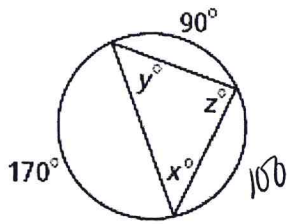
$$(-8)^2 + (-4)^2 = r^2$$

$$r^2 = 80$$

$$(x-7)^2 + (y+2)^2 = 80$$

Find the value of each variable.

104.

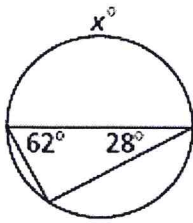


$$x = 45^\circ$$

$$y = 50^\circ$$

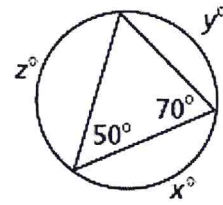
$$z = 85^\circ$$

105.



$$x = 180^\circ$$

106.

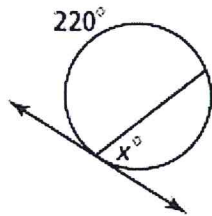


$$x = 120$$

$$y = 100$$

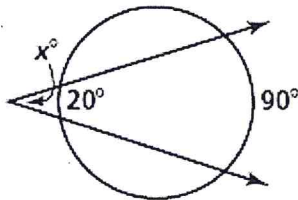
$$z = 140$$

107.



$$x = 20$$

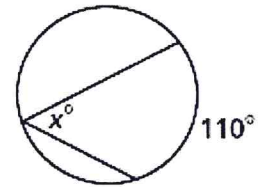
108.



$$x = \frac{1}{2}(90 - 20)$$

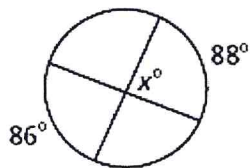
$$x = 35^\circ$$

109.



$$x = 55^\circ$$

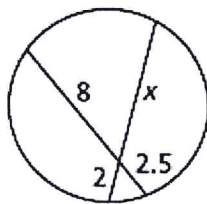
110.



$$x = \frac{1}{2}(88 + 86)$$

$$x = 87^\circ$$

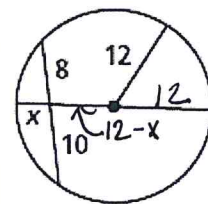
111.



$$2x = 20$$

$$x = 10$$

112.



$$8 \cdot 10 = (12 + 12 - x)x$$

$$80 = (24 - x)x$$

$$80 = 24x - x^2$$

$$x^2 - 24x + 80 = 0$$

$$x = 20 \quad \boxed{x = 4}$$