Advanced Geometry
Review for the 2nd Semester Final Exam 2015

Name: Answer Key
Hour: _____

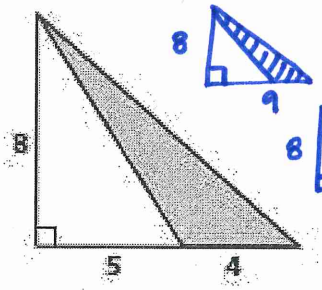
Chapter 7:

1) Find the area of each triangle, given the base b and the height h.

b = 4, h = 4

$A = \frac{1}{2}(4)(4) = \frac{1}{2} \cdot 16 =$ **8 units²**

2) Find the area of the shaded region.

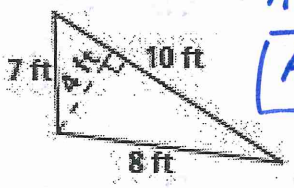


$A = \frac{1}{2} \cdot 8 \cdot 9 = 36$ units²

$A = \frac{1}{2} \cdot 8 \cdot 5 = 20$ units²

$36 - 20 =$ **16 units²**

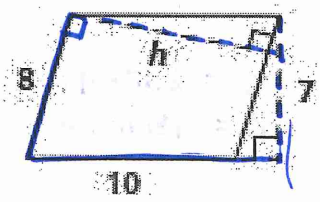
3) Find the area.



$A = \frac{1}{2}(10)(4)$

A = 20 units²

4) Find the value of h in the parallelogram below.

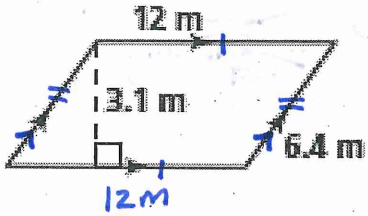


$A = 7 \cdot 10 = 70$ units²

$A = \frac{8 \cdot h}{8} = \frac{70 \text{ units}^2}{8 \text{ units}}$

h = 8.75 units

5) Find the area.



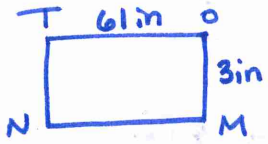
110 grams, opposite sides congruent

A =

6) Find the missing measure.

parallelogram $TQMN$

$A = 183$ in.^{2}, $b = ?$, $h = 3$ in.



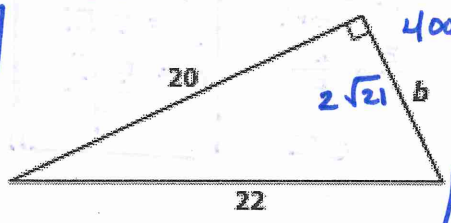
$b \cdot h = 183 \text{in}^2$

$b \cdot 3\text{in} = 183 \text{in}^2$

b = 61in

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

$a^2 + b^2 = c^2$



$20^2 + b^2 = 22^2$

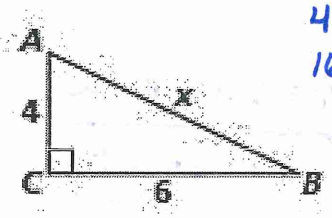
$400 + b^2 = 484$

$b^2 = 84$

$b = \sqrt{84}$

b = 2√21

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



$4^2 + 6^2 = x^2$

$16 + 36 = x^2$

$x^2 = 52$

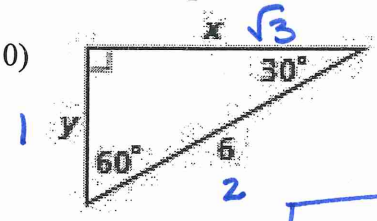
$x = \sqrt{52}$

$x = \sqrt{4} \cdot \sqrt{13}$

x = 2√13

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

10)



$1 : \sqrt{3} : 2$

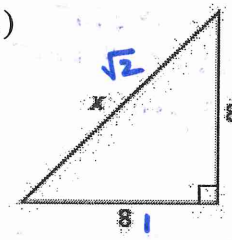
$y : x : 6$

$3 : 3\sqrt{3} : 6$

$x = 3\sqrt{3}$

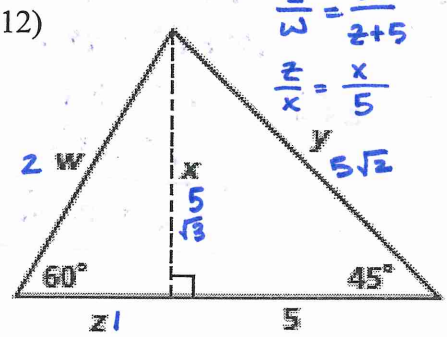
$y = 3$

11)



$x = 8\sqrt{2}$

12)



$\frac{z}{w} = \frac{w}{z+5}$

$\frac{z}{x} = \frac{x}{5}$

$w = \frac{10\sqrt{3}}{9}$

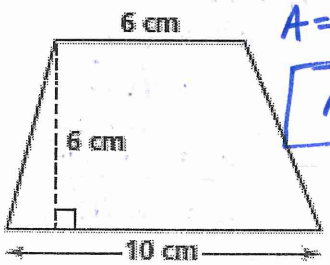
$x = 5$

$y = 5\sqrt{2}$

$z = \frac{5\sqrt{3}}{9}$

$\frac{z}{z}\sqrt{3} = \frac{5}{z}$ $\quad \sqrt{3} = \frac{5}{z}$ $\quad z = \frac{5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{5\sqrt{3}}{9}$

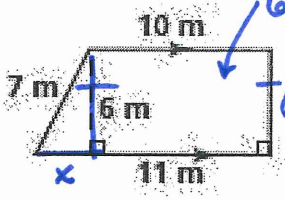
13) Find the area.



$A = 6\text{cm} \cdot 10\text{cm}$

$A = 60\text{ cm}^2$

14) Find the area.



66m^2

$A = 66 + 11.6$

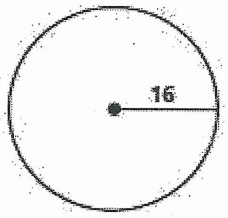
$A = 77.6$

$A = \frac{1}{2}(\sqrt{15})(6\text{m})$

$= 11.6 \text{ units}^2$

$x = \sqrt{7^2 - 6^2} = \sqrt{15}$

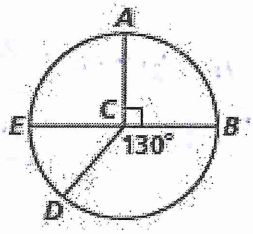
15) Find (a) the circumference and (b) the area of the circle. Leave your answers in terms of π.



$C = 2\pi r = 2\pi \cdot 16 =$ 32π units

$A = \pi(16)^2 =$ 256π units^2

In circle C below, $\overline{EB}$ is a diameter, and $\overline{AC}$ and $\overline{DC}$ are radii. Identify the following:



16) a major arc and its measure $\overset{\frown}{ABD} = 220°$

17) a minor arc and its measure $\overset{\frown}{ED} = 50°$

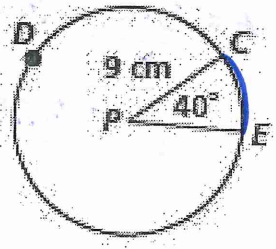
18) an acute central angle and its measure $\angle ECD = 50°$

19) an obtuse central angle and its measure

$\angle BCD = 130°$ $\quad \overset{\frown}{BD}$

20) Find the length of the indicated arc. Leave your answer in terms of π.

$\overset{\frown}{CDE}$



$C = 2\pi \cdot 9\text{ cm}$

$C = 18\pi\text{ cm}$

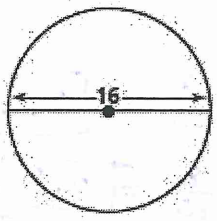
$\overset{\frown}{CDE} = \left(\frac{320°}{360°}\right) \cdot (\pi\ 18\text{cm})$ $\quad = 16\pi\text{ cm}$

320° = portion of C

C

$\frac{40}{360} \cdot 18 = 2$

21) Find (a) the circumference and (b) the area of the circle. Use $\pi = 3.14$.



$C = 16\pi$ units

$A = 3.14 \cdot (8)^2$

$A = 200.96$ units^2

22) Find the radius of a circle whose area is 36π ft.

$A = \pi r^2 = 36\pi$ ft^2

$\frac{\pi r^2}{\pi} = \frac{36\pi \text{ ft}^2}{\pi}$

$\sqrt{r^2} = \sqrt{36 \text{ ft}^2}$

$r = 6$ ft

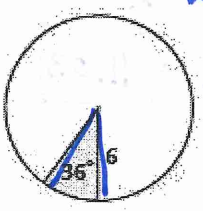
23) Find the radius of a circle whose circumference is 50π cm.

$C = 2\pi \cdot r = 50\pi$ cm

$\frac{2\pi r}{2\pi} = \frac{50\pi \text{ cm}}{2\pi}$

$r = 25$ cm

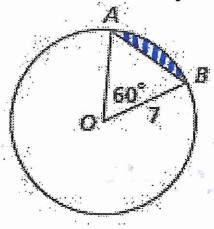
24) Find the area of each shaded sector of a circle. Leave your answer in terms of π.

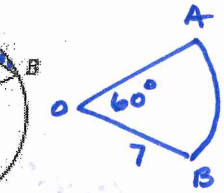


Whole ○ $= \pi(6)^2 = 36\pi$ units^2

$\frac{36^\circ}{360^\circ} \cdot \pi(6)^2 = 3.6\pi$ units^2

25) Find the area of each shaded segment of a circle. Round your answers to the nearest tenth.

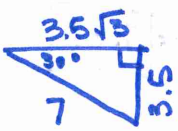


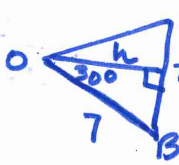


$A = \frac{60^\circ}{360^\circ} \cdot \pi \cdot 7^2$

~~$A = 8.2$ units^2~~

$A = 25.7$ units^2





$A = \frac{1}{2} \cdot 7 \cdot 3.5$

$A = 12.3$ units^2

$A = 25.7 - 12.3 = 13.4$ units^2

Chapter 8:

Solve each proportion for x.

26) $\frac{x}{4} = \frac{9}{3}$ $\quad \frac{3x}{3} = \frac{36}{3}$ $\quad x = 12$

27) $\frac{6x}{8} = \frac{x-5}{2}$ $\quad 12x = 8(x-5)$

$12x = 8x - 40$

$-8x \quad -8x$

$\frac{4x}{4} = \frac{-40}{4}$

$x = -10$

28) $\frac{x}{x+2} = \frac{3}{4}$

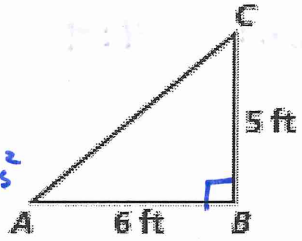
$4x = 3(x+2)$

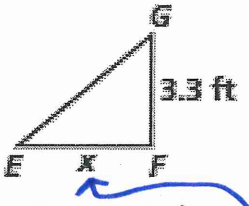
$4x = 3x + 6$

$-3x \quad -3x$

$x = 6$

29) The triangles below are similar. Find x.





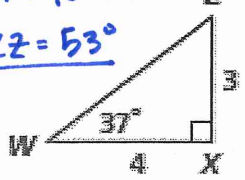
$\frac{5}{6} = \frac{3.3}{x}$ $\quad \frac{5x}{5} = \frac{3.3 \cdot 6}{5}$ $\quad x = 3.96$

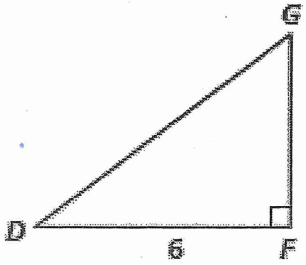
Δ WXZ ~ Δ DFG. Use the diagram below to find the following:

$\angle W + \angle X + \angle Z = 180^\circ$

$37^\circ + 90^\circ + \angle Z = 180^\circ$

$\angle Z = 53^\circ$





30) $\overline{GF}$ $\quad \frac{3}{4} = \frac{\overline{GF}}{6}$ $\quad \frac{4\overline{GF}}{4} = \frac{18}{4}$

$\overline{GF} = 4.5$ units

31) m∠G

CPCTC!

$\angle W \cong \angle D$

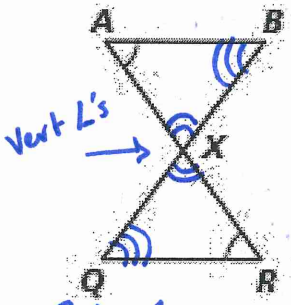
$\angle F \cong \angle F$

$\angle Z \cong \angle G$

$\angle Z = 53^\circ \rightarrow \angle G = 53^\circ$

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

32)



Vert ∠'s

$\angle R \cong \angle A$

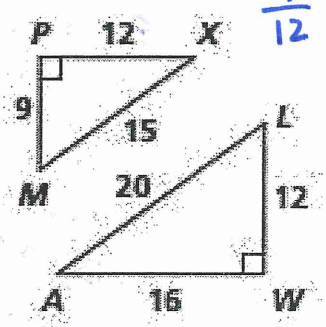
$\angle AXB \cong \angle QXR$

AND

$\angle Q \cong \angle B$ by 3rd ∠ Thm

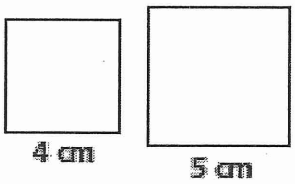
$\triangle AXB \sim \triangle RXQ$ by AA

33)



$\frac{9}{12} = \frac{12}{16}$

34) For each pair of similar figures, find (a) the ratio of the perimeters and (b) the ratio of the areas.



Perimeter: 4:5

Area: 2:3

4:9

35) The area of a triangle is 50 in^2. What is the area of a triangle with sides 3 times as long?

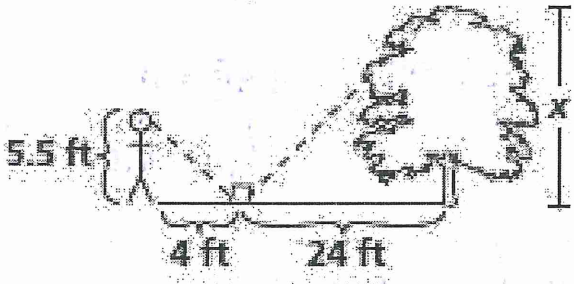
Perimeter

$\frac{50\text{in}^2}{x} = \frac{1}{3}$

$x = 150\text{in}^2$

A	B
50in^2	x
1	3

36) Natasha places a mirror on the ground 24 ft from the base of an oak tree. She walks backwards until she can see the top of the tree in the middle of the 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.

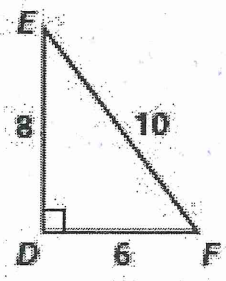


$\frac{4}{5.5} = \frac{x}{24} \Rightarrow 5.5x = 96$

$x = 17.45$ ft

Chapter 9:

37) Write the sine, cosine, and tangent ratios for ∠E.



$\sin\angle E = \frac{6}{10} = 0.6$

$\cos\angle E = \frac{8}{10} = 0.8$

$\tan\angle E = \frac{6}{8} = 0.75$

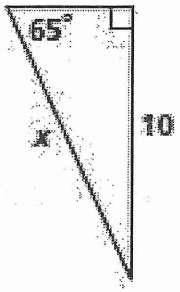
Find the value of x. Round your answers to the nearest tenth.

38)

$\tan 55° = \frac{x}{5}$

$x = 5\tan 55° = 7.14$

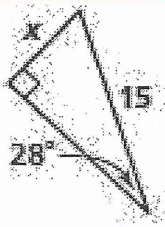
39)



$\sin 65° = \frac{10}{x}$

$x = \frac{10}{\sin 65°} = 11.03$

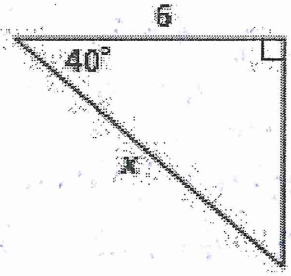
40)



$\sin 28° = \frac{x}{15}$

$x = 15\sin 28° = 9.23$

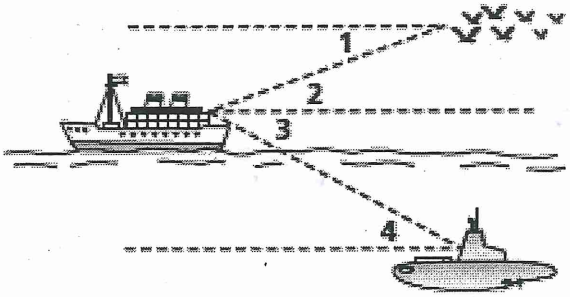
41)



$\cos 40° = \frac{6}{x}$

$x = \frac{6}{\cos 40°} = 7.83$

42) Describe each angle as it relates to the diagram.



a) ∠1

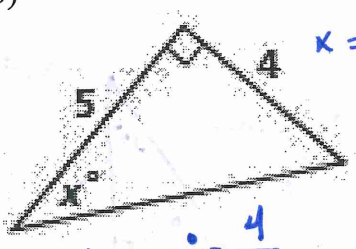
∠ of Depression
Birds → Boat

b) ∠2

∠ of Elevation
Boat → Bird

Find the value of x. Round your answers to the nearest degree.

43)

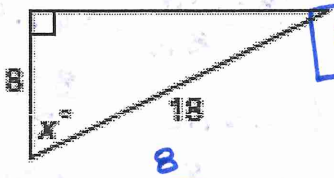


$\tan x^\circ = \frac{4}{5}$

$x = \tan^{-1}\left(\frac{4}{5}\right)$

$x = 38.66^\circ$

44)

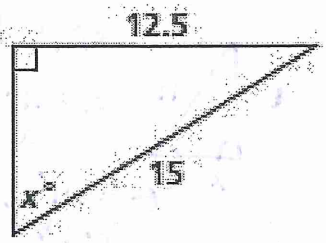


$\cos x^\circ = \frac{8}{18}$

$x = \cos^{-1}\left(\frac{8}{18}\right)$

$x = 63.61^\circ$

45)

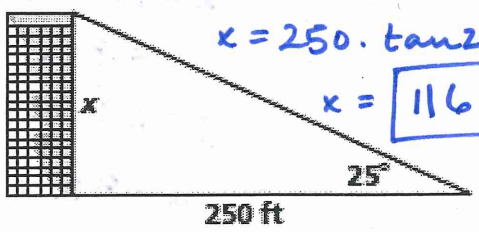


$\sin x^\circ = \frac{12.5}{15}$

$x = \sin^{-1}\left(\frac{12.5}{15}\right) = 56.44^\circ$

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

46)

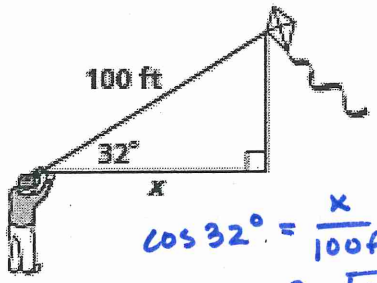


$\tan 25^\circ = \frac{x}{250}$

$x = 250 \cdot \tan 25^\circ$

$x = 116.58\text{ ft}$

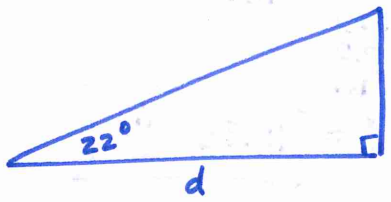
47)



$\cos 32^\circ = \frac{x}{100\text{ ft}}$

$x = 100 \cdot \cos 32^\circ = 84.8\text{ ft}$

48) The angle of elevation to a building in the distance is 22°. You know that the building is approximately 450 ft tall. Estimate the distance to the base of the building.

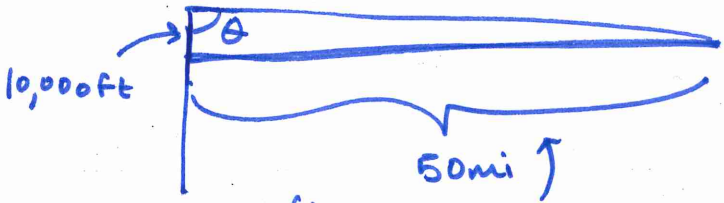


$\tan 22^\circ = \frac{450}{d}$

$d = \frac{450}{\tan 22^\circ}$

$d = 1113.79\text{ ft}$

49) An airplane is flying at an altitude of 10,000 ft. The airport at which it is scheduled to land is 50 mi away. Find the angle at which the airplane must descend for landing. (Hint: There are 5280 ft in 1 mi.)

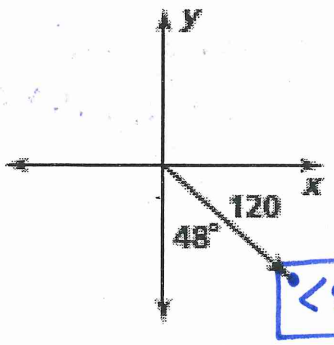


$50\text{ mi} \times \frac{5280\text{ ft}}{1\text{ mi}} = 264{,}000\text{ ft}$

$\tan\theta = \frac{264{,}000}{10{,}000}$

$\theta = \tan^{-1}\left(\frac{264{,}000}{10{,}000}\right) = 87.8^\circ$

50) Describe the vector as an ordered pair. Give the coordinates to the nearest tenth.



$x = 120\cos 48^\circ$

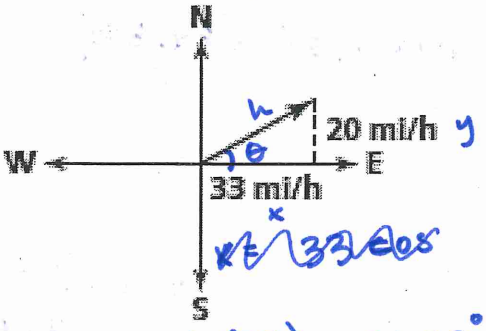
$x = 80.3$

$y = 120\sin 48^\circ$

$y = 89.2$

$\langle 80.3, 89.2 \rangle$

51) Find the magnitude and direction of the vector. Round your answers to the nearest tenth.

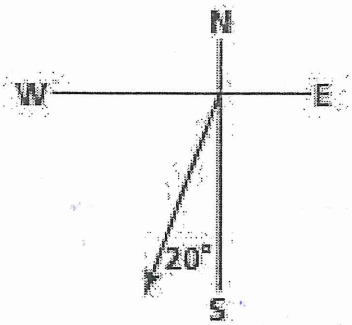


$\theta = \tan^{-1}\left(\frac{20}{33}\right) = 31.22^\circ$

$\sin 31.22^\circ = \frac{20}{h}$

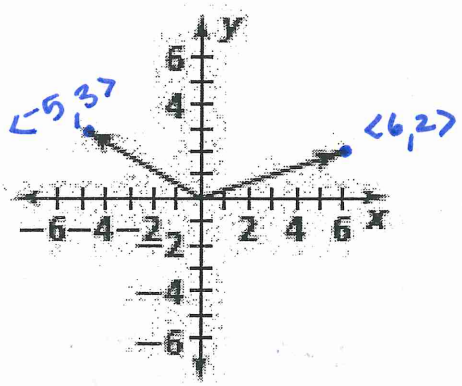
$h = 20\sin 31.22^\circ = 10.36 \frac{mi}{h}$

52) Use compass directions to describe the direction of the vector.



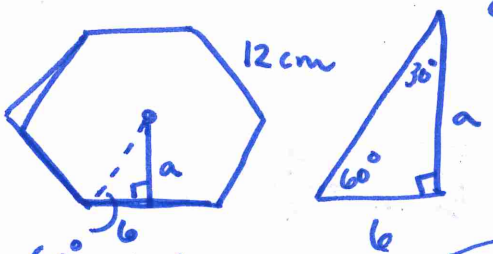
20° West of South

53) Write the resultant as an ordered pair, and draw the resultant vector.



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

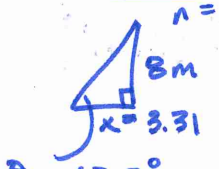
54) A regular hexagon with side length 12 cm.



$a = 6\sqrt{3}$

$A = \frac{1}{2} \cdot 6\sqrt{3} \cdot 72\,cm = 374\,cm^2$

55) A regular octagon with apothem equal to 8 m.



$\frac{(8-2)\cdot 180^\circ}{8} = 67.5^\circ$

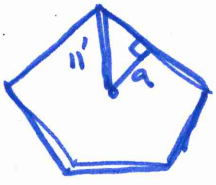
$\tan 67.5^\circ = \frac{8m}{x}$

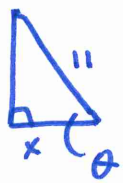
$x = \frac{8}{\tan 67.5} = 3.31$

$P = 8 \times (3.31 \times 2) = 53.02\,m$

$A = \frac{1}{2}(8m)(53.02\,m) = 212.07\,m^2$

56) A regular pentagon with radius of 11 ft.





$\frac{(5-2)\cdot 180^\circ}{10} = 54^\circ$

$\sin 54^\circ = \frac{a}{11}$

$a = 11 \cdot \sin 54^\circ$

$a = 8.9$

$\cos 54^\circ = \frac{x}{11}$

$x = 11\cos 54$

$x = 6.46$

$P = 64.66$

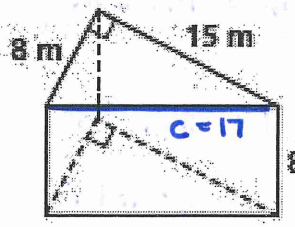
$A = \frac{1}{2}(8.9)(64.6)$

$A = 287.47\,ft^2$

Chapter 10:

Find (a) the surface area and (b) the volume of each figure. Round you answers to the nearest tenth.

57)



$8^2 + 15^2 = c^2$

$c = \sqrt{64+225}$

$c = 17$

$P = 40$

$B = \frac{1}{2}(8)(15) = 60$

$LA = 40 \cdot 8 = 320\ m^2$

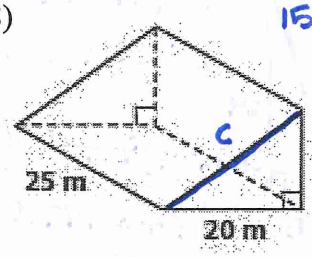
$SA = 320m^2 + 120m^2$

$SA = 440\ m^2$

$V = 320m^2 \cdot 8m$

$V = 2560\ m^3$

58)



$15^2 + 20^2 = c^2$

$c = \sqrt{225+400}$

$c = 25$

$B = \frac{1}{2}(20)(15)$

$B = 150m^2$

$V = 150m^2 \cdot 25m$

$LA = 60m \cdot 25m = 1500m^2$

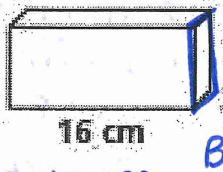
$P = 60m$

$SA = 2 \cdot 150m^2 + 1500m^2$

$SA = 1800m^2$

$V = 37500m^3$

59)



$P = 18cm$

$SA = 288cm^2 + 14cm^2$

$SA = 302cm^2$

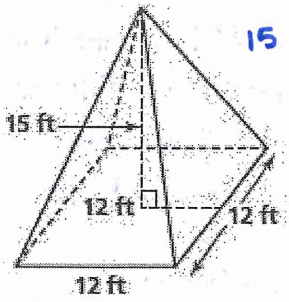
$B = 14cm^2$

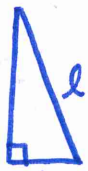
$LA = 18 \cdot 16 = 288$

$V = B \cdot h$

$V = 14cm^2 \cdot 16cm^2 = 224\ cm^3$

60)





$l = \sqrt{15^2+6^2}$

$l = 16.2\ ft$

$P = 48ft$

$LA = \frac{1}{2}(48)(16.2)$

$LA = 388.8ft^2$

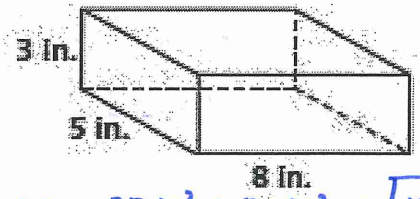
$B = 144ft^2$

$SA = 388.8ft^2 + 144ft^2$

$SA = 532.8\ ft^2$

$V = \frac{1}{3}(144)(15) = 720ft^3$

61)



$SA = 78in^2 + 80in^2 = 158in^2$

$P = 26in$

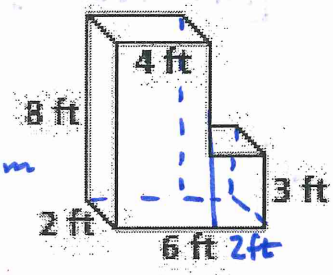
$LA = 26 \cdot 3 = 78\ in^2$

$B = 40in^2$

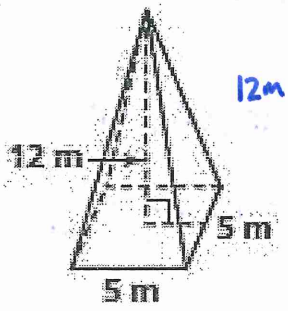
$V = 40in^2 \cdot 3in$

$V = 120in^3$

62)



63)



$l = \sqrt{144+2.5^2}$

$l = 12.26m$

$P = 20m$

$B = 25m^2$

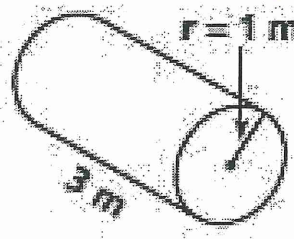
$SA = 25m^2 + \frac{1}{2}(20)(12.26m)$

$SA = 147.6\ m^2$

$V = \frac{1}{3}(25m^2)(12m) = 100m^3$

Find (a) the surface area and (b) the volume of each figure. Leave your answer in terms of π.

64)



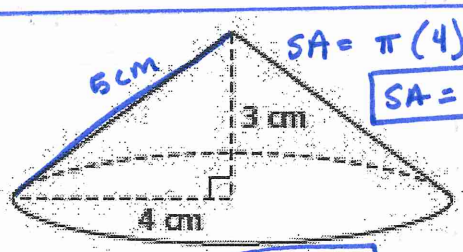
$SA = 2\pi(1)^2 + 2\pi(1)(3)$

$= 8\pi m^2$

$V = \pi(1)^2 \cdot 3$

$V = 3\pi\ m^3$

65)

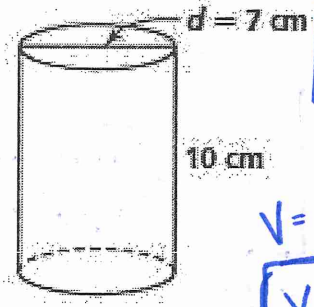


$SA = \pi(4)^2 + \pi(4)(5)$

$SA = 36\pi\ cm^2$

$V = \frac{1}{3}\pi(4)^2 \cdot 3 = 16\pi\ cm^3$

66)



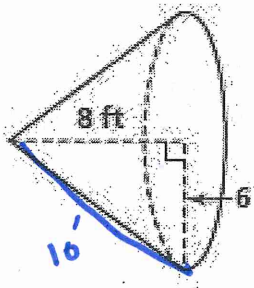
$SA = 2\pi(3.5)^2 + 2\pi(3.5)(10)$

$SA = 94.5\pi\ cm^2$

$V = \pi(3.5)^2 \cdot 10$

$V = 122.5\ cm^3$

67)



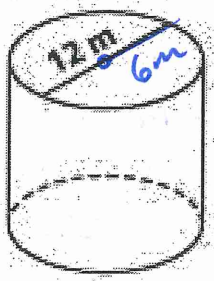
$SA = \pi(6)^2 + \pi(6)(10)$

$SA = 36\pi + 60\pi = 96\pi ft^2$

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

$V = 96\pi ft^3$

68)



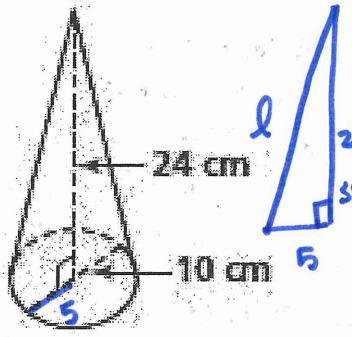
$SA = 2\pi(6)^2 + 2\pi(6)(10)$

$SA = 192\pi\ m^2$

$V = \pi(6)^2 \cdot 10$

$V = 360\pi\ m^3$

69)



$l = \sqrt{24^2 + 5^2}$

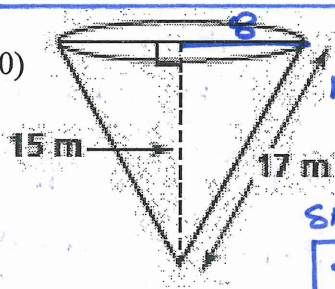
$l = 24.5\ cm$

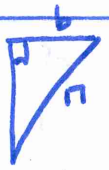
$SA = \pi(5)^2 + \pi(5)(24.5)$

$SA = 147.5\pi\ cm^2$

$V = \frac{1}{3}(\pi 5^2) \cdot 24cm = 200\pi\ cm^3$

70)





$17^2 = 15^2 + b^2$

$b = \sqrt{17^2 - 15^2}$

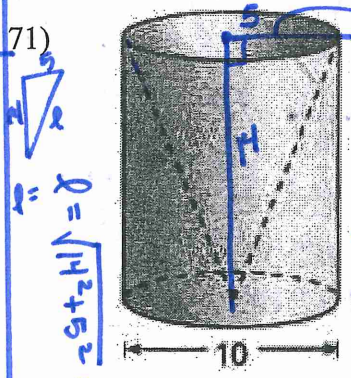
$b = 8$

$SA = \pi(8)^2 + \pi(8)(17)$

$SA = 200\pi\ m^2$

$V = \frac{1}{3}(\pi 8^2)(15) = 320\pi\ m^3$

71)



$l = 13$

$8^2 + H^2 = 13^2$

$H^2 = 13^2 - 8^2$

$H = 10.5$

empty CONE: $SA = \pi 5^2 + \pi 5 \cdot 14.8$

$SA = 100\pi\ cm^2$

$V = \frac{1}{3}(\pi 5^2)(14)$

$V = 116.\overline{6}\ cm^3$

14

CYLINDER:

$SA = \pi(5)^2 + 2\pi 5 \cdot 14$

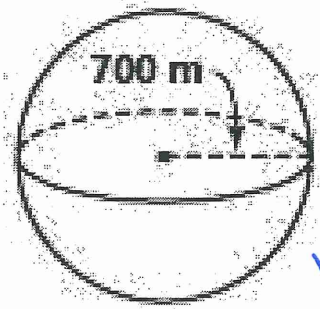
$SA = 165\ cm^2$

$V = (\pi 5^2)(14) - 116.\overline{6}\ cm^3$

$V = 233.4\pi\ cm^3$

Sim $a:b$ Area $a^2:b^2$ Volume $a^3:b^3$

72) Find (a) the surface area and (b) the volume of the sphere. Leave your answer in terms of π.



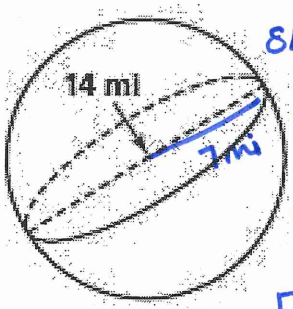
$SA = 4\pi(700)^2$

$SA = 1{,}960{,}000\pi\ m^2$

$V = \frac{4}{3}\pi(700)^3$

$V = 457{,}333{,}333\pi\ m^3$

73) Find (a) the surface area and (b) the volume of the sphere. Leave your answer in terms of π.



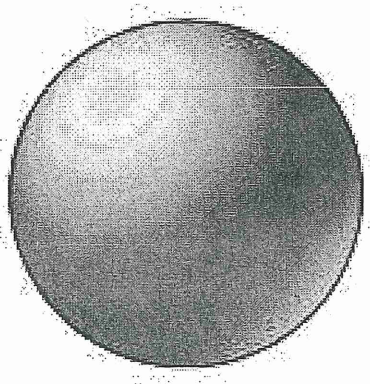
$SA = 4\pi(7mi)^2$

$SA = 196\pi\ mi^2$

$V = \frac{4}{3}\pi(7mi)^3$

$V = 457.3\pi\ mi^3$

74) Find the volume of the sphere. Round your answer to the nearest tenth.



S.A. = 45,240 yd^2

$SA = \frac{4\pi r^2}{4\pi} = \frac{45{,}240\ yd^2}{4\pi}$

$r^2 = \frac{45{,}240}{4\pi}$

$r = \sqrt{\frac{45{,}240}{4\pi}} = 188.5\ yd$

$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(188.5)^3 =$

$= 8{,}930{,}123.2\pi\ yd^3$

75) The similarity ratio of two similar prisms is 2:5.

a) What is the ratio of their surface areas?

4 : 25

b) What is the ratio of their volumes?

8 : 125

76) The ratio of the radii of two spheres is 3:7.

a) What is the ratio of their surface areas?

9 : 49

b) What is the ratio of their volumes?

27 : 343

77) The surface area of two similar pyramids are 25 ft^2 and 36 ft^2.

a) What is the similarity ratio? 5 : 6

b) What is the ratio of their volumes? 125 : 216

Sim 5 : 6 Area 25 : 36 Volume 125 : 216 ~~343~~