

Geo Sem 2 Final Study Guide

Name: Answer Key

1. Convert 4.27 meters into kilometers

K H R B D C M

4.27

0.00427 km

2. Calculate the number of gallons in 32 cups of water.

$32 \text{ c} \cdot \frac{1 \text{ gal}}{16 \text{ c}} = 2 \text{ gallons}$

$\frac{32 \text{ c}}{1} \cdot \frac{1 \text{ gal}}{16 \text{ c}} = 2 \text{ gallons}$

3. Convert 32 feet/sec into mi/hr

$\frac{32 \text{ ft}}{1 \text{ sec}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = 21.82 \text{ mi/hr}$

4. The ratio between a pair of **supplementary** angles is 9:5. Calculate the measure of the **smallest** angle.

$9x + 5x = 180$

$14x = 180$

$x = 12.86$

$5(12.86) = 64.29^\circ$

5. Boston Store is closing and everything is 40% off. A pair of sneakers originally cost \$76.00. What is the price of the sneakers after the discount is accounted for?

$\frac{40 \text{ off}}{100} = \frac{x \text{ off}}{76 \text{ total}}$

$x = 30.4$

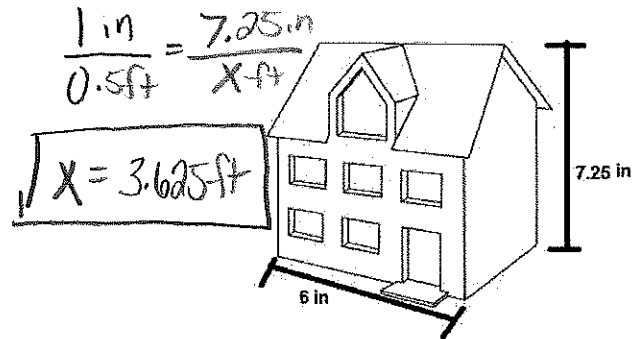
$76 - 30.4 = 45.6$

\$45.60

6. When polygons are **similar**, corresponding **side** lengths are proportional

7. When polygons are **similar**, corresponding **angle** measures are congruent

8. You want to build a doll house. The ratio between the blueprint measurements and the actual doghouse measurements are 1 in: 1/2 ft. On the blueprints, the doll house is 6 inches wide and 7.25 inches tall. How tall is the actual doll house house (in feet)?

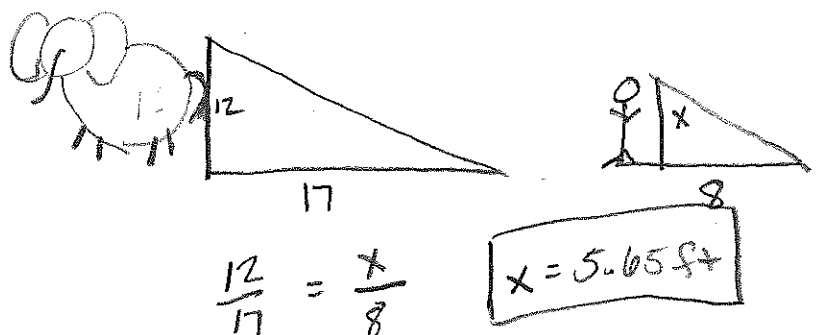


9. The Brewers baseball team is on a winning streak. They have won 36 out of their 47 games this year. What is their win to losses ratio?

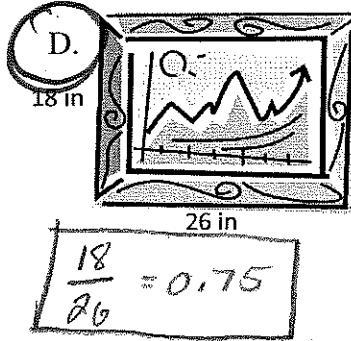
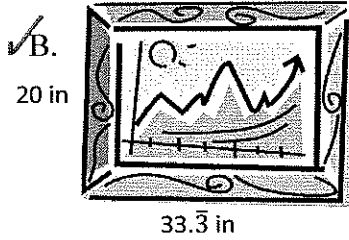
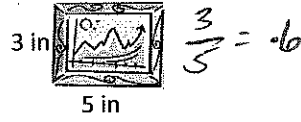
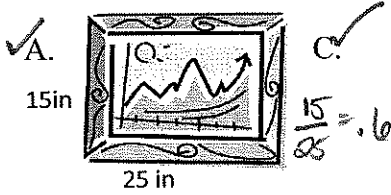
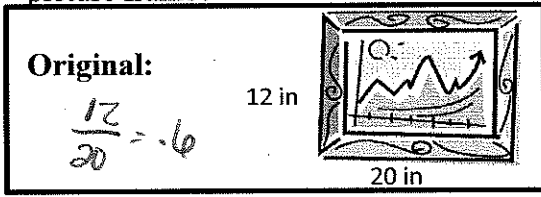
$W:L \quad L = 47 - 36 = 11$

36:11

10. An elephant is 12 feet tall and casts a shadow of 17 feet. The zookeeper casts a shadow of 4 feet. How tall is the zookeeper?



11. Which picture is **not similar** to the "Original" picture frame?



12. Evaluate the expression: $(3\sqrt{6})^3$

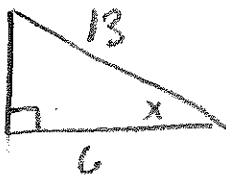
$$3^3 \cdot (\sqrt{6})^3$$

$$27 \cdot (\sqrt{6} \cdot \sqrt{6} \cdot 6)$$

$$162\sqrt{6}$$

13. If $\cos x = \frac{6}{13}$, then $\tan x = ?$

S_H C_H T_A



$$a^2 + 6^2 = 13^2$$

$$a^2 + 36 = 169$$

$$a^2 = 133$$

$$a = 11.53$$

$$\tan x = \frac{11.53}{6}$$

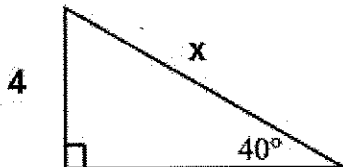
14. Determine the value of x. Round to nearest tenth.

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

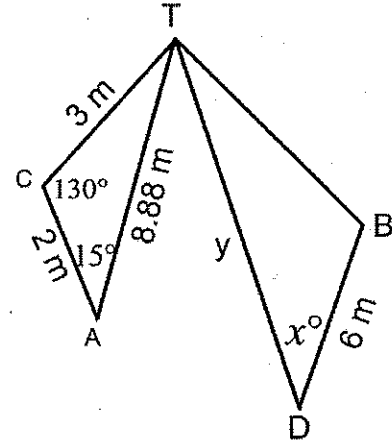
$$x \sin 40 = 4$$

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

$$x = 6.28$$



Use the figure below to answer #15-16



15. Given $\triangle ACT \sim \triangle DBT$, calculate the value of x and y.

ACT
DBT

$$x = 15^\circ$$

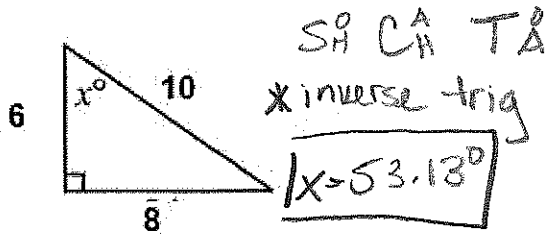
small
big

$$\frac{2}{6} = \frac{8.88}{y}$$

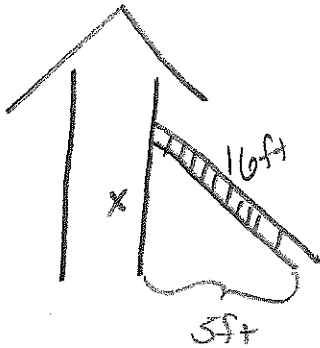
$$\frac{2y}{20} = \frac{53.28}{2}$$

$$y = 26.64$$

16. Use the given side lengths to determine the measurement of angle x.



17. A 16 foot ladder is leaning against the side of your house. The base of the ladder is 5 feet from the house. How high up the side of the house does the ladder reach? (Hint: draw a picture) (3 pts)



$$5^2 + x^2 = 16^2$$

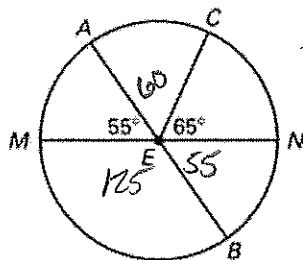
$$25 + x^2 = 256$$

$$x^2 = 231$$

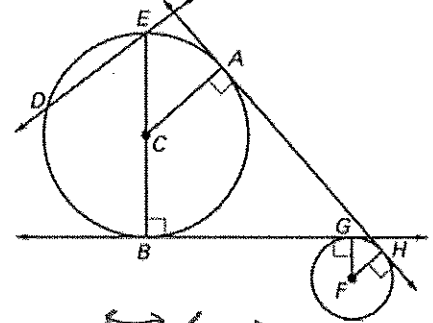
$$x = 15.2$$

Use the diagram to the right for #18-20

18. $m\widehat{CB} = 120^\circ$
 19. $m\angle MEC = 115^\circ$
 20. $m\widehat{ANM} = 305^\circ$



Use the diagram below for #21-25



21. Name ~~2~~ tangent lines AH BG
 22. Name 3 radii. AC CE CB FG FH
 23. Name 2 centers. C, F
 24. Name a diameter. EB
 25. Name 3 points of tangency. A, B, G, H

26. Find the exact circumference of a circle if the area of the circle is $144\pi \text{ in}^2$.

$$A = \pi r^2$$

$$C = 2\pi r$$

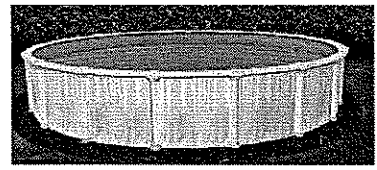
$$\frac{144\pi}{\pi} = \frac{\pi r^2}{\pi}$$

$$144 = r^2 \quad r = 12$$

$$C = 2\pi(12)$$

$$C = 24\pi \text{ in}$$

27. Sally and her family have bought a circular, above-ground pool. She wants to hang a string of lights around the outside of the pool for her next pool party. If the volume of the pool is 17.4 cubic meters and the pool is 1.2 meters tall, how long will the string of lights need to be? Round to nearest whole number.



A string of lights looks like (below)...

$$V = 17.4$$

$$V = h(\pi r^2)$$

$$\frac{17.4}{1.2} = \frac{1.2(\pi r^2)}{1.2}$$

$$14.5 = \frac{\pi r^2}{\pi}$$

$$4.618 = r^2 \quad r = 2.149$$

$$C = 2\pi r$$

$$C = 2\pi(2.149)$$

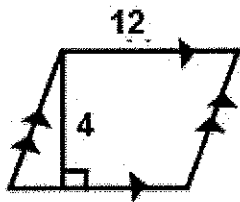
$$C = 13.5$$

$$14 \text{ meters}$$

28. Compute the area of the polygon below.

$$A = b \cdot h$$

$$4 \cdot 12 = 48 \text{ units}^2$$



29. The width of a rectangle is 6 times bigger than its length. If the area of the rectangle is 54 in^2 , determine the measure of the **longest** side.

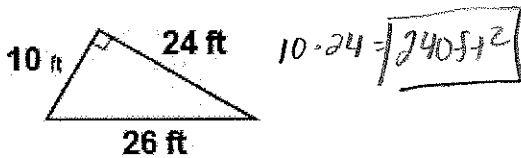


$$x \cdot 6x = 54 \rightarrow 6x^2 = 54$$

$$x^2 = 9$$

$$x = 3 \quad 6 \cdot 3 = 18 \text{ in}$$

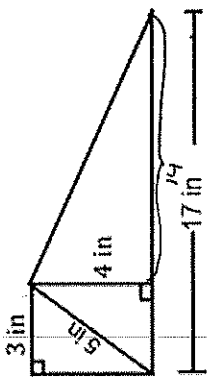
30. What is the area of the triangle?



$$10 \cdot 24 = 240$$

$$240 \div 2 = 120$$

31. Calculate the area of the polygon below.

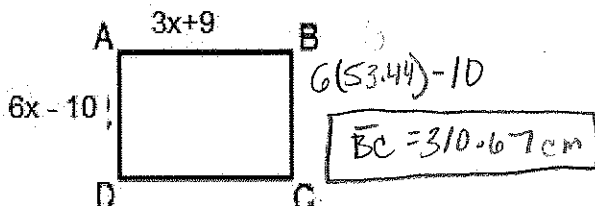


$$3 \cdot 4 = 12 \quad \text{OR} \quad \frac{3+17}{2} (4) = 40$$

$$\frac{4 \cdot 14}{2} = 28$$

$$12 + 28 = 40 \text{ in}^2$$

32. The perimeter of the rectangle shown below is 960 cm. Calculate side length \overline{BC} .



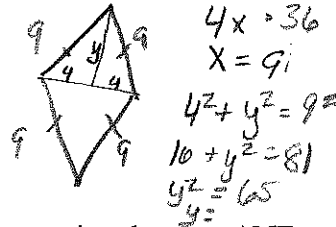
$$6(53.44) - 10 = \overline{BC} = 310.67 \text{ cm}$$

$$(6x-10) + (6x-10) + (3x+9) + (3x+9) = 960$$

$$12x - 20 + 6x + 18 = 960$$

$$18x - 2 = 960 \quad 18x = 962 \quad x = 53.44$$

33. The perimeter of a rhombus is 36 feet long. One diagonal length is 8 feet long. What is the **area** of the rhombus?



$$4x = 36$$

$$x = 9$$

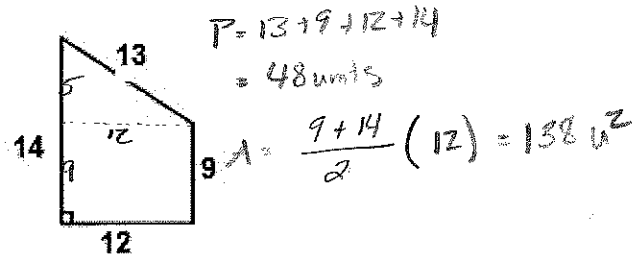
$$4^2 + y^2 = 9^2$$

$$16 + y^2 = 81$$

$$y^2 = 65$$

$$y = \sqrt{65}$$

34. Determine the area AND perimeter of the shape below.



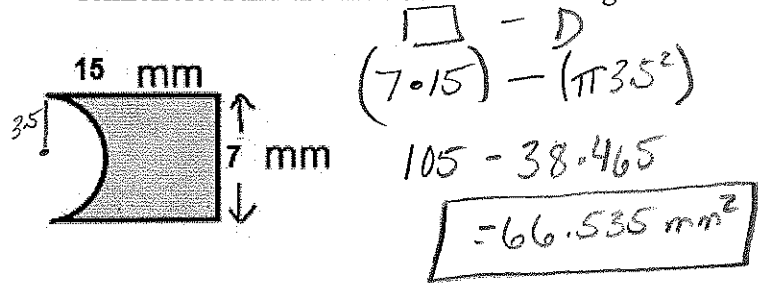
$$P = 13 + 9 + 12 + 14 = 48 \text{ units}$$

$$A = \frac{9+14}{2} (12) = 138 \text{ in}^2$$

$$\text{OR} \quad \frac{1}{2} (5)(12) = 30$$

$$9 \cdot 12 = 108 \quad 30 + 108 = 138 \text{ in}^2$$

35. Assume the cut out section of the figure is a semicircle. Find the area of the shaded region.

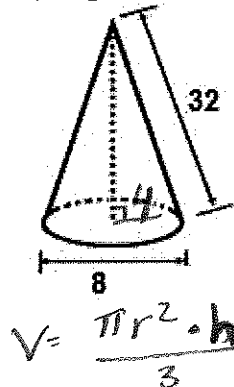


$$(7 \cdot 15) - (\pi 3.5^2)$$

$$105 - 38.465$$

$$= 66.535 \text{ mm}^2$$

36. What is the **EXACT** volume of the shape? (Keep in terms of π)



$$V = \frac{\pi 4^2 (31.75)}{3}$$

$$\sqrt{V} = 169.3 \pi$$

$$V = \frac{\pi r^2 \cdot h}{3}$$

$$4^2 + b^2 = 32^2$$

$$16 + b^2 = 1024$$

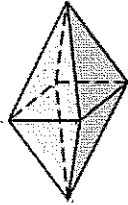
$$b^2 = 1008$$

$$b = 31.75$$

37. How many **vertices** and **faces** does the figure have?

Vertices: 6

Faces: 8



38. Calculate the **surface area** AND **volume** of the square pyramid below.

$SA = \square + 4\Delta$
 $= 6 \cdot 6 + 4\left(\frac{1}{2} \cdot 6 \cdot 10\right)$
 $= 36 + 120$
 $SA = \boxed{156 m^2}$
 $V = l \cdot w \cdot h$
 $V = \frac{6 \cdot 6 \cdot 8}{3} = \boxed{96 m^3}$

39. Calculate the **exact volume** AND **surface area** of the shape below. The diameter of the solid is 12 m. (Keep in terms of π)

$SA = 2\textcircled{\pi} + \square$
 $= 2 \cdot (\pi \cdot 6^2) + 20 \cdot (12\pi)$
 $= 72\pi + 240\pi$
 $= \boxed{312\pi m^2}$
 $V = \pi r^2 \cdot h$
 $= \pi \cdot 6^2 \cdot 20 = \boxed{720\pi m^3}$

40. Calculate the **volume** and **surface area** of the prism below.

$V = A \cdot h$
 $= \frac{1}{2}(6)(11.62)(10)$
 $= \boxed{348.57 u^3}$
 $SA = 2\Delta + 3\square$
 $\downarrow \quad \downarrow$
 $\frac{1}{2}b \cdot h \quad 10 \cdot 12$
 $\frac{1}{2}(6)(11.62) \quad 120$
 34.86
 $SA = 2(34.86) + 3(120)$
 $= \boxed{429.72 u^2}$

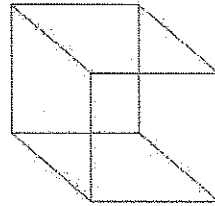
$3^2 + x^2 = 12^2$
 $9 + x^2 = 144$
 $x = 11.62$

41. Calculate the **exact surface area** and **volume** of the sphere. (Keep in terms of π)

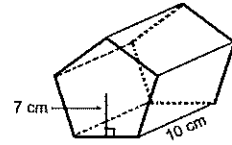
$V = \frac{4\pi r^3}{3}$
 $= \frac{4\pi \cdot 7^3}{3} = 457.\bar{3}\pi cm^3$
 $SA = 4\pi r^2$
 $= 196\pi cm^2$

42. What is the name of each of the following shapes? How many sides does the **BASE** of each shape have?

- A. rectangular prism sides of base: 4
- B. pentagonal pyramid sides of base: 5
- C. hexagonal prism sides of base: 6
- D. pentagonal prism sides of base: 5
- E. octagonal pyramid sides of base: 8



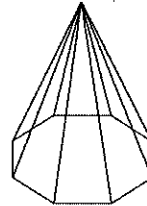
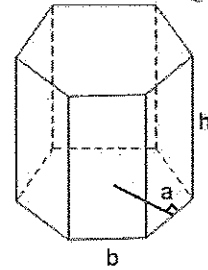
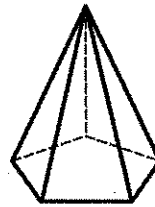
Shape rectangular prism



Shape pentagonal prism

Shape pentagonal pyramid

Shape hexagonal prism



Shape octagonal pyramid

43. A paint roller uses a cylindrical sponge. The roller has a diameter of 3 inches and a width of 9 inches. How much surface area can the paint roller cover in one full rotation?

$9 \cdot 3\pi = 27\pi$
 $= 84.78 m^2$

44. The average 400 page book has 32 chapters. If you have read 175 pages, approximately how many chapters have you read?

$$\frac{400 \text{ pages}}{32 \text{ chap}} = \frac{175 \text{ p}}{x \text{ chap}}$$

$$\frac{5(400) = 400x}{400}$$

$$x = 14 \text{ chapters}$$

45. A basketball player can make 24 baskets in 3.5 minutes. How many baskets can he make in 2 hours?

$$\frac{24 \text{ baskets}}{3.5 \text{ min}} \cdot \frac{120 \text{ min}}{2 \text{ hr}} = \frac{411.4 \text{ baskets}}{2 \text{ hours}}$$

46. The ratio of females to males in a classroom is 4:5. If there are 2 more males than females, how many males are there?

$$\frac{4F}{5m} = \frac{x}{x+2}$$

8 females
10 males

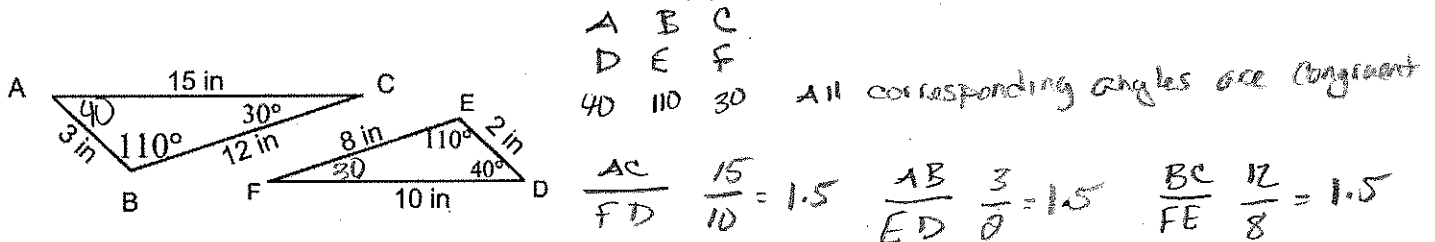
$$5x = 4(x+2)$$

$$5x = 4x + 8$$

$$-4x \quad -4x$$

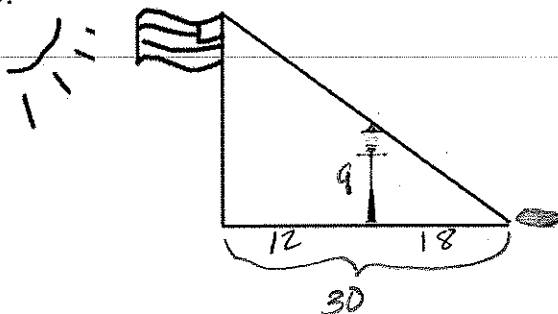
$$x = 8$$

47. Determine whether or not $\triangle ABC \sim \triangle DEF$. Justify your answer mathematically and in words.



All corresponding sides are proportional.

48. At 6:45 pm, the shadow of a lamppost lines up with the shadow of a flagpole. The lamppost is 18 feet from a rock. The lamppost is also 12 feet from the flagpole. If we know that the lamppost is 9 feet tall, how tall is the flagpole?



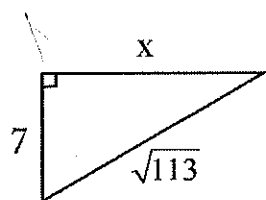
$$\frac{9}{18} = \frac{x}{30}$$

$$270 = 18x$$

$$15 = x$$

$$x = 15 \text{ ft}$$

49. Calculate the area of the triangle.



$$7^2 + x^2 = (\sqrt{113})^2$$

$$49 + x^2 = 113$$

$$x^2 = 64$$

$$x = 8$$

$$A = \frac{b \cdot h}{2}$$

$$A = \frac{7 \cdot 8}{2}$$

$$A = 28 \text{ u}^2$$

50. Use your knowledge of right triangles to calculate the values. You must show work and/or use the pattern in order to receive credit. *Hint: You can use rules of special right triangles, trigonometry, and Pythagorean Theorem.*

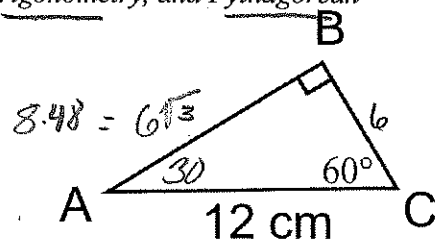
Length of $\overline{AB} = 8.48$ or $6\sqrt{3}$

Length of $\overline{BC} = 6$

Angle A = 30

Area: 31.18

Perimeter: 28.39

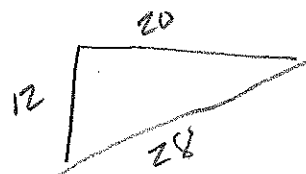


51. $\triangle BAT$ has the side lengths of 12 inches, 20 inches, and 28 inches. Determine whether or not $\triangle BAT$ is a **right triangle**. Justify mathematically and in words.

Is $\triangle BAT$ a right triangle? YES or NO (circle)

Justify your answer with math and words:

Converse of Pythagorean Theorem is not true.



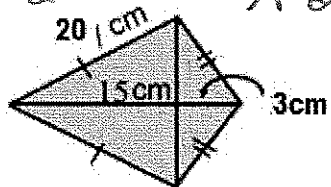
$12^2 + 20^2 = 544$

$28^2 = 784$

52. Determine the area AND perimeter of the entire polygon below.

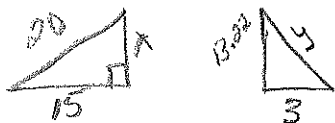
$A = \frac{P \cdot b}{2}$
 $A = \frac{18 \cdot 26 \cdot 44}{2}$

$A = 237.96 \text{ cm}^2$



$P = 20 + 20 + 13.56 + 13.56$

$P = 67.12 \text{ cm}$



$15^2 + x^2 = 20^2$

$x^2 = 175$

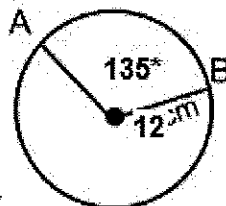
$x = 13.22$

$3^2 + 13.22^2 = y^2$

$184 = y^2$

$y = 13.56$

53. Determine the length of \overline{AB} .



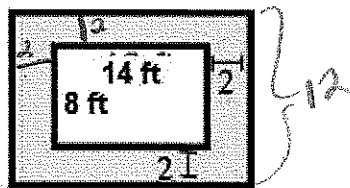
$\frac{135}{360} = \frac{x}{2\pi(12)}$

$\frac{3240\pi}{360} = \frac{360x}{360}$

$9\pi = x$
cm

or $x = 28.26 \text{ cm}$

54. A garden has the dimensions 8 feet by 14 feet. There will be a stone path that is 2 feet wide surrounding the garden. We need to estimate how many bags of cement to buy; hence, calculate the area of the shaded cement walkway.



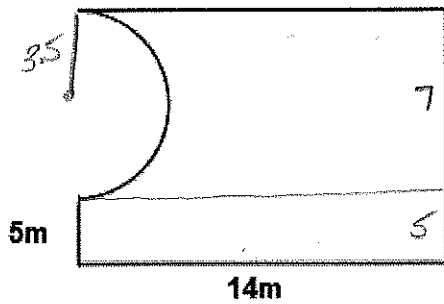
$18 \cdot 12 = 216$

$216 - 112 = 104 \text{ ft}^2$

55. Find the area of the shaded part of the rectangle below.

21 m
 8
 $r = 3.5$
 $21 \cdot 8 - 3(\pi 3.5^2)$
 $168 - 115.395$
 $= 52.605 \text{ m}^2$

56. Calculate the PERIMETER and AREA of the composite shape below. (2 pts)



$A = \text{rectangle} - \text{D}$
 $A = 14 \cdot 12 - \frac{\pi(3.5)^2}{2}$
 $168 - 19.2325$
 $= 148.7675 \text{ m}^2$

$2\pi r = 21.98$
 $21.98 + 14 + 12 + 14 + 5$
 $= 66.98 \text{ m}$