

GNOMON and SIMILARITY WORKSHEET

Read all questions carefully and completely answer each question.

1) C is a circle with circumference 14π and area 49π . If C' is 4 times larger than circle C, then what is the circumference and area of C'?

$$C = 14\pi \quad A = 49\pi$$

$$14\pi \cdot 4 = 56\pi$$

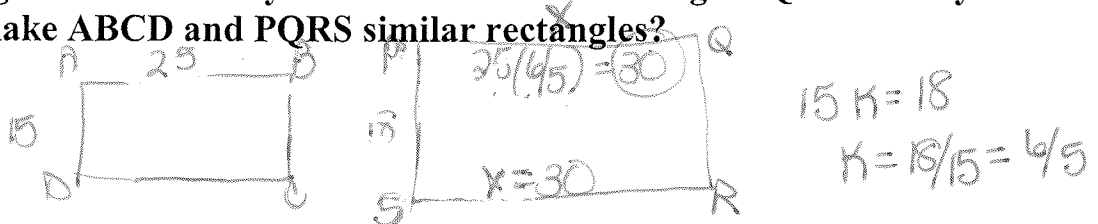
$$784\pi$$

2) R is a 3 by 7 rectangle. Suppose R' is known to be a similar rectangle to R. If R' is 2.5 times larger than R, then what is the length and width of R'?

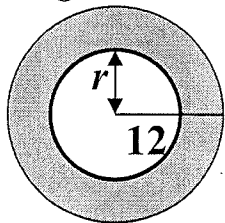
$$7.5 \quad 17.5$$

$$7.5 \text{ by } 17.5$$

3) The first rectangle ABCD is 15 by 25 and the second rectangle PQRS is 18 by x. What value of x would make ABCD and PQRS similar rectangles?



4) The following gnomon ring is added to a circle of radius r (below). The area of the ring (shaded region) is known to be $23\pi \text{ in}^2$ and its outer radius is 12 inches. What is the length of the inner radius, r, and the area of the original circle?



$$12^2\pi - r^2\pi = 23\pi$$

$$144\pi - r^2\pi = 23\pi$$

$$144 - r^2 = 23$$

$$121 = r^2 \quad r = 11$$

ring $23\pi \text{ m}^2$

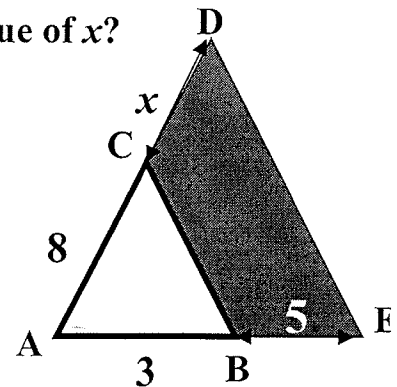
5) Triangle ABC is similar to Triangle ADE (right). What is the value of x?

$$\frac{3}{8} = \frac{8}{8+x}$$

$$64 = 24 + 3x$$

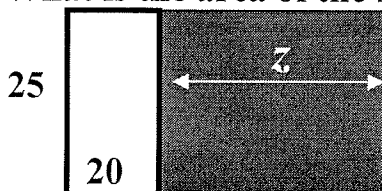
$$40 = 3x$$

$$x = 40/3 = 13\frac{1}{3}$$



6) Consider the original 20 by 25 rectangle.

- Find the value of z so that the shaded rectangle is a gnomon to the white rectangle.
- What is the area of the shaded region?



$$\frac{25}{20} = \frac{20+z}{25}$$

$$625 = 400 + 20z$$

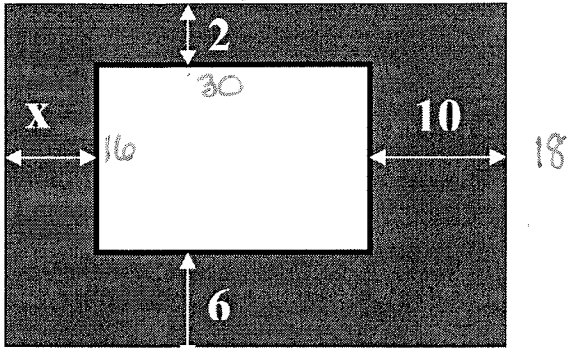
$$225 = 20z$$

$$z = 11.25$$

$$A = (25)(11.25) = 281.25$$

7) Consider the original 16 by 30 rectangle.

- a) Find the value of x so that the shaded region is a gnomon to the white rectangle.
 b) What is the area of the shaded region?



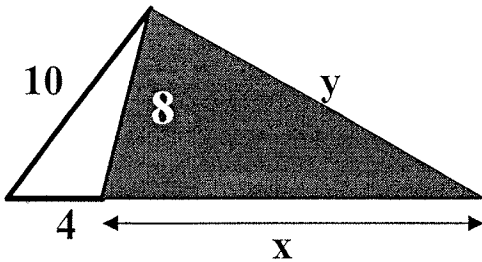
$$\frac{16}{30} = \frac{2+16+6}{x+30+10}$$

$$\frac{16}{30} = \frac{24}{x+40} \quad a) \quad x=5$$

$$16x + 640 = 720 \quad b) (24)(45) = 600$$

$$16x = 80$$

8) Find the value of x and y so that the shaded triangle is a gnomon to the white triangle.



$$\frac{4}{10} = \frac{10}{4+x}$$

$$\frac{4}{10} = \frac{8}{y}$$

$$16 + 4x = 100$$

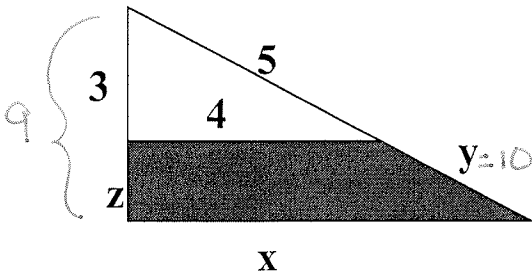
$$4x = 84$$

$$x = 21$$

$$4y = 80$$

$$y = 20$$

9) Given the white right triangle T and shaded gnomon G, find the value of x , y , and z such that the new triangle G&T is 3 times larger than triangle T.



$$(3+z) = 3(3)$$

$$z = 9 - 3$$

$$z = 6$$

$$\frac{3}{9} = \frac{5}{5+y}$$

$$45 = 15 + 3y$$

$$30 = 3y$$

$$y = 10$$

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

$$x = 12$$

10) What are the values of x and y that make the shaded region a gnomon to the original trapezoid?

$$\frac{28}{20} = \frac{16}{y}$$

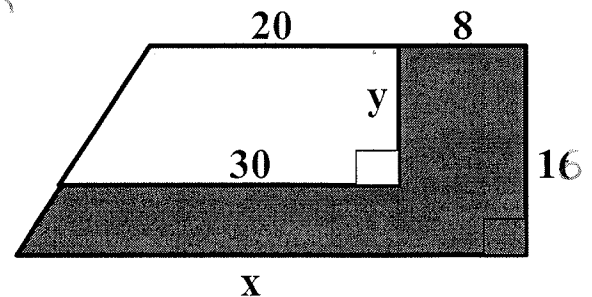
$$\frac{28}{20} = \frac{x}{30}$$

$$28y = 20 \cdot 16$$

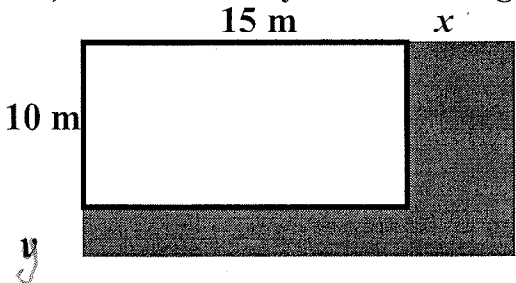
$$28y = 320 \quad y = 11\frac{3}{4}$$

$$30 \cdot 28 = 20x$$

$$42 = x$$



11) The a 10 m by 15 m rectangle had an L-shaped gnomon of widths x and y attached.



11a. Find y if $x = 3$.

$$\frac{10}{15} = \frac{10+y}{18}$$

$$180 = 150 + 15y$$

$$30 = 15y \quad y = 2$$

11b. Find x if $y = 3$

$$\frac{10}{15} = \frac{13}{15+x}$$

$$150 + 10x = 195$$

$$10x = 45$$

$$x = 4.5$$