

Math Analysis
P.8 Modeling

The median starting salary of a computer science major exceeds that of an education major by \$21 thousand. The median starting salary of an economics major exceeds that of an education major by \$14 thousand. Combined, their median starting salaries are \$140 thousand. Determine the median starting salaries of education majors, computer science majors, and economics majors with bachelor's degrees.

$$Cs = Ed + 21$$

$$Ec = Ed + 14$$

$$Ed = \$35 \text{ thousand}$$

$$Cs = \$56 \text{ thousand}$$

$$Ec = \$49 \text{ thousand}$$

$$Ed + Cs + Ec = 140$$

$$x + x + 21 + x + 14 = 140$$

$$3x + 35 = 140$$

$$3x = 105$$

$$x = 35$$

After a 30% price reduction, you purchase a new computer for \$840. What was the computer's price before the reduction? = Orig

$$\text{Orig} - \text{Orig} (\% \text{ as a dec}) = \text{Sale Price}$$

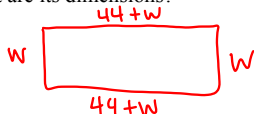
$$x - x(.3) = 840$$

$$1x - .3x = 840$$

$$\frac{.7x}{.7} = \frac{840}{.7}$$

$$x = \$1092.00$$

The length of a rectangular basketball court is 44 feet more than the width. If the perimeter of the basketball court is 288 feet, what are its dimensions?



or $w + w + 44 + w + 44 + w = 288$

$$2w + 2(44 + w) = 288$$

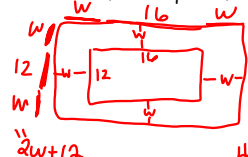
$$2w + 88 + 2w = 288$$

$$4w + 88 = 288$$

$$\frac{4w = 200}{4} \quad w = 50$$

50 ft by 94 ft

A rectangular garden measures 16 feet by 12 feet. A path of uniform width is to be added so as to surround the entire garden. The landscape artist doing the work wants the garden and path to cover an area of 320 square feet. How wide should the path be?



$$2w + 16 = 2w + 16$$

2 ft

$$(w + 16)(2w + 12) = 320$$

$$4w^2 + 32w + 24w + 192 = 320$$

$$4w^2 + 56w - 128 = 0$$

$$4(w^2 + 14w - 32) = 0$$

$$4(w + 16)(w - 2) = 0$$

$$w + 16 = 0 \quad w - 2 = 0$$

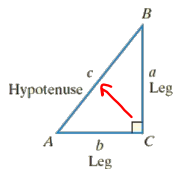
$$w = -16 \quad w = 2$$

The Pythagorean Theorem

The sum of the squares of the lengths of the legs of a right triangle equals the square of the length of the hypotenuse.

If the legs have lengths a and b , and the hypotenuse has length c , then

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



A radio tower is supported by two wires that are each 130 yards long and attached to the ground 50 yards from the base of the tower. How tall is the tower?

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

$$x^2 + 50^2 = 130^2$$

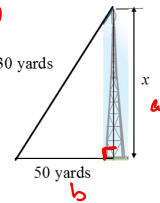
$$x^2 + 2500 = 16900$$

$$\quad -2500 \quad -2500$$

$$\sqrt{x^2} = \sqrt{14400}$$

$$x = \pm 120$$

120 yds



A group of people share equally in a \$5,000,000 lottery. Before the money is divided, three more winning ticket holders are declared. As a result, each person's share is reduced by \$375,000. How many people were in the original group of winners? = x

$$x \cdot \left(\frac{5,000,000}{x} - 375,000 \right) = \frac{5,000,000}{x+3}$$

each person's share

$$5,000,000(x+3) - 375,000x(x+3) = 5,000,000x$$

$$\frac{5,000,000}{5,000,000}x + 15,000,000 - 375,000x^2 - 1,125,000x = \frac{5,000,000}{5,000,000}x$$

$$-375,000x^2 - 1,125,000x + 15,000,000 = 0$$

$$15,000(-25x^2 - 75x + 1,000) = 0$$

$$-25 \cdot 15,000(x^2 + 3x - 40) = 0$$

$$(x+8)(x-5)$$

5 ppl in original group

Homework

pg. 116; 2-22e, 28-38e, 44-48e

ec: 40, 50, 60