

### Routine Writing Equations Practice #3

The purpose of this exercise is to **write equations**, which you can then solve.

There is **no** point using "guess and check" or working backwards using only numerical techniques, even if they are easy to do that way. That builds no skills for solving harder ones.

Write equations for each situation, and then solve the equation to find the answer.

(Note: because the process is what is important, the answer is already given for the first three questions, to help focus on the process.)

1. Harriet is making a mosaic. Five-sevenths of the tiles are red. If that means that there are 120 more red tiles than not red, how many tiles are there? (Answer = 280)
2. A dress is discounted by 20% (i.e. has 20% off the price). It doesn't sell, so is discounted again by 20%. If it cost \$120 as a result, what was full price? (Answer = \$187.50)
3. A triangle has a perimeter of 255 cm. If the long side is three times the short side, and the middle side is twice the short side, how long is the middle side? (Answer = 85 cm)
4. A rectangle has a base three times as wide as its width. If its area is  $507 \text{ cm}^2$ , how wide and long is it?
5. An isosceles triangle has a small angle that is  $48^\circ$  less than the two (equal) large angles. How big are the large angles?
6. A boy has 40 coins in his pocket, being a mix of 10 cent and 20 cent coins. If he has \$5, how many of them are 10 cent coins? (*Remember, you must write an equation, even though such problems are easy enough with guess and check.*)

### Answers: Routine Writing Equations Practice #3

The equations we are looking for are shown in bold. Other forms of the equation are acceptable, provided they give the right values, and obviously the letters chosen for the unknown(s) do not matter.

1. Let the number of tiles =  $x$ . We know:  $\frac{5}{7}x - \frac{2}{7}x = 120$   
 $\frac{3}{7}x = 120$   $x = 120 \div \frac{3}{7}$  **There are 280 tiles**

Note: working the answer out via calculating what a seventh is without an equation is **not** acceptable. There needs to be an equation with unknowns written and solved.

2. If  $x$  is the original price, then a discounted price is 80% of  $x = 0.8x$   
So a doubly discounted price is  **$0.8 \times 0.8x = 120$**   
 $0.64x = 120$   $x = 120 \div 0.64$  **The price was \$187.50**

3. Short side,  $x$ , is doubled to give long side =  $2x$ , and tripled to give long side =  $3x$   
 $x + 2x + 3x = 255$   $6x = 255$   $x = 255 \div 6$   
The middle side is twice  $x$  **The middle side is 85 cm**  
(If you make the middle side =  $x$ , then you get  $\frac{1}{2}x + x + 1\frac{1}{2}x = 255$ , so  $3x = 855$ )

4. Let the width =  $x$ . The base is therefore =  $3x$ . Area is  $b \times w$   
 **$507 = x \times 3x$**   $507 = 3x^2$   $x^2 = 507 \div 3$   
 $x = \sqrt{169} = 13$  **The width is 13 and the base is 39.**

5. Call the large angles  $x$ . The small angle is therefore =  $x - 48^\circ$   
 $180^\circ$  in a triangle So we know that  $x + x + (x - 48) = 180^\circ$   
 $3x - 48 = 180$   $x = 228 \div 3$  **The large angle is  $76^\circ$**

6. Let  $x$  be the number of 10c coins. So  $40 - x$  is the number of 20c coins.  
 **$10x + 20(40 - x) = 500$**  ( $500 = \$5$  in cents)  $10x + 800 - 20x = 500$   
 $-10x = 500 - 800$   $x = -300 \div -10$  **He has 30 10c coins.**