

Homework #19

Solve: (note: you **must** use equations)

1. One side of a rectangle is 4 cm longer than the other and the area is 45 cm^2 . What size is the rectangle?
2. Which numbers add to 12 and have the sum of their squares = 90?
3. What are the edge lengths of a square if the number of metres in the perimeter of a square is 12 less than the area of the square?
4. Which numbers that differ by five, when multiplied together give 84?
5. Which two numbers when multiplied together give 125 but when one is divided by the other give 5?
6. What four consecutive even numbers add to 852?
7. Find a number that when squared is 72 more than the starting number.
8. Bill is a third of Tim's age. In eight years' time he will be half his age. How old is Tim?
9. A woman had a pair of twins and then three years later a set of triplets. How old are the children if their combined ages is 31?
10. What two numbers add to give 3 but subtract to give 13?
11. A square's sides are increased by 2 m on each side. If the area increases by 40 m^2 , what was the original square's side length?
12. Adult tickets cost \$30 and children's tickets cost \$20. If 400 tickets are sold, and the total money taken is \$9400. How many tickets were adult tickets?

Answers Homework #19

Note that all solutions **must** start from an **algebraic equation**. Merely showing that a solution works is not sufficient. If there are two solutions, **both** must be given.

1. One side of a rectangle is 4 cm longer than the other and the area is 12 cm². What size is the rectangle?

$$x \times (x + 4) = 45 \quad x^2 + 4x - 45 = 0 \quad (x + 9)(x - 5) = 0 \quad x = -9 \text{ or } 5$$

rectangle is 5 by 9

2. Which numbers add to 12 and have the sum of their squares = 90?

$$a + b = 12 \text{ and } a^2 + b^2 = 90 \quad a^2 + (12 - a)^2 = 90 \quad a^2 + 144 - 24a + a^2 = 90$$

$$2x^2 - 24a + 54 = 0 \quad x^2 - 12a + 27 = 0 \quad (a - 3)(a - 9) = 0$$

$$a = 3 \text{ or } 9 \quad \text{numbers are 3 and 9}$$

3. What are the edge lengths of a square if the number of metres in the perimeter of a square is 12 less than the area of the square?

$$x^2 = 4x + 12 \quad x^2 - 4x - 12 = 0 \quad (x + 2)(x - 6) = 0 \quad x = -2 \text{ or } 6$$

square is 6 by 6

4. Which numbers that differ by five, when multiplied together give 84?

$$x(x + 5) = 84 \quad x^2 + 5x = 84 \quad x^2 + 5x - 84 = 0 \quad (x - 7)(x + 12) = 0$$

$$x = 7 \text{ or } -12 \quad \text{numbers are 7 and 12 or } -7 \text{ and } -12$$

5. Which numbers multiplied together give 125 but when one is divided by the other give 5?

$$xy = 125 \text{ and } y/x = 5 \text{ putting } y = 5x \text{ into } xy = 125 \text{ gives } x(5x) = 125$$

$$5x^2 = 125 \quad x^2 = 25 \quad x = \pm\sqrt{25} \quad x = \pm 5$$

numbers are 5 and 25 or they are -5 and -25

6. What four consecutive even numbers add to 852?

$$x + (x + 2) + (x + 4) + (x + 6) = 852 \quad 4x + 12 = 852 \quad 4x = 840$$

$$x = 210 \quad \text{the numbers are 210, 212, 214 and 216}$$

7. Find a number that when squared is 72 more than the starting number.

$$x^2 = x + 72 \quad x^2 - x - 72 = 0 \quad (x - 9)(x + 8) = 0$$

$$x = 9 \text{ or } -8 \quad \text{the numbers are 9 or } -8$$

8. Bill is a third of Tim's age. In eight years' time he will be half his age. How old is Tim?

$$3b = t \quad 2(b + 8) = t + 8 \quad \text{thus } 2(b + 8) = 3b + 8$$

$$2b + 16 = 3b + 8 \quad \text{Bill is 8 (Tim is 24)}$$

9. A woman had a pair of twins and then three years later a set of triplets. How old are the children if their combined ages is 31?

$$2x + 3(x - 3) = 31 \quad 5x - 9 = 31 \quad x = 8 \quad \text{the twins are 8 the triplets are 5}$$

10. What two numbers add to give 3 but subtract to give 13?

$$x + y = 3 \text{ and } x - y = 13 \quad \text{so } x + y + x - y = 3 + 13 \quad 2x = 16$$

$$x = 8 \quad \text{the numbers are 8 and } -5$$

11. A square's sides are increased by 2 m on each side. If the area increases by 40 m², what was the original square's side length?

$$(x + 2)^2 - x^2 = 40 \quad x^2 + 4x + 4 - x^2 = 40 \quad 4x + 4 = 40$$

$$x = 9 \quad \text{The square's sides were 9 m long}$$

12. Adult tickets cost \$30 and children's tickets cost \$20. If 400 tickets are sold, and the total money taken is \$9400. How many tickets were adult tickets?

$$a + c = 400 \text{ and } 30a + 20c = 9400 \quad 30a + 20(400 - a) = 9400$$

$$8000 + 10a = 9400 \quad a = 140 \quad \text{There were 140 adult tickets sold}$$