

## Changing the subject – lesson 4

We will start with a bit of revision:-

$$1) \quad g + 6 = h \quad (g) \quad 2) \quad g - h = m \quad (g) \quad 3) \quad m + h = -g \quad (g)$$

$$4) \quad a = b - c \quad (c) \quad 5) \quad a = -b - c \quad (b) \quad 6) \quad t - s = r \quad (s)$$

Learning Intention for today -

Learn how to change the subject of the formula when the 'subject' has been multiplied by something.

Before we begin today's lesson it is a good idea to remind ourselves of the following:-

*4t is a shorthand way of writing  $4 \times t$*

*2q is a shorthand way of writing  $2 \times q$*

*6s is a shorthand way of writing  $6 \times s$*

The following question is of the type we will be looking at today.

$$3q = p \quad (q)$$

We need to 'get rid of' the 3 from the left hand side of the equation. The 3 is not added to the  $q$ , so we cannot subtract 3 from each side of the equation nor is the 3 subtracted from the  $q$  so we cannot add 3 to each side of the equation. In fact, the  $q$  is **multiplied** by 3. Remember when we are changing the subject of a formula, we always need to do the **INVERSE** of what has been done.

The inverse of addition is subtraction.

The inverse of subtraction is addition.

The inverse of multiplication is division.

Let us go back to our example and see how we change the subject:-

$$\begin{array}{c} 3q = p \\ \div 3 \quad \div 3 \end{array} \quad (q)$$

We  $\div 3$  to 'undo' the multiplication of 3.

$$\underline{\underline{q = \frac{p}{3}}}$$

### Worked example 1

$$5t = k \quad \text{to } t$$

To make the subject of the formula  $t$  we need to 'get rid of' the  $\times 5$ . Remember we do this by doing the **INVERSE** of multiplying.

$$\underbrace{5t}_{\div 5} = \underbrace{k}_{\div 5} \quad (t)$$

$$t = \frac{k}{5}$$

---

### Worked example 2

$$r = 12s \quad (s)$$

$$\underbrace{12s}_{\div 12} = \underbrace{r}_{\div 12}$$

$$s = \frac{r}{12}$$

---

### Worked example 3

$$\underbrace{15p}_{\div 15} = \underbrace{30q}_{\div 15} \quad (p)$$

$$p = 2q$$

---

### Worked example 4

$$\underbrace{-2c}_{\div -2} = \underbrace{a}_{\div -2} - \underbrace{b}_{\div -2} \quad (c)$$

$$c = \frac{a}{-2} - \frac{b}{-2}$$

Now divide **each term** by -2

this can be tidied up a little and written as:-

$$c = -\frac{a}{2} - \left(-\frac{b}{2}\right)$$

$$c = -\frac{a}{2} + \frac{b}{2}$$

---



Change the subject of the following:-

- |                          |                            |                          |
|--------------------------|----------------------------|--------------------------|
| 7) $12b = c$ ( $b$ )     | 8) $5y = z$ ( $y$ )        | 9) $m = 3n$ ( $n$ )      |
| 10) $-6t = v$ ( $t$ )    | 11) $0.5d = f$ ( $d$ )     | 12) $n = -0.75m$ ( $m$ ) |
| 13) $5c = a - b$ ( $c$ ) | 14) $-13m = p - r$ ( $m$ ) | 15) $24x = 12y$ ( $x$ )  |