Changing the subject – lesson 7

Revision to start us off:-

1) $\frac{a}{3} = 12 \quad (a)$ 2) $q = \frac{2}{p} \quad (p)$ 3) $p = \frac{m}{5} \quad (m)$

4) $3n + 5 = m \quad (n)$ 5) $r = 3s - t \quad (t)$ 6) $r = 3s - t \quad (s)$

Learning Intention for today -

> Learn how to change the subject of the formula when the 'subject' has been **divided** by something **and** something has been **added to it** or **subtracted from it**.

Remember, when we are changing the subject of an equation, we still use BIDMAS but, because we need to do the INVERSE of things, we use BIDMAS backwards.

Let us look at an example:-

$$\frac{m}{12} + 4 = p \quad (m)$$

So, we want m to be by itself on the left hand side of the equation but it has been *divided* by 12 **and** 4 has been added to it.

I am going to write out BIDMAS to help me.

✓ ✓
BIDMAS
←

Notice that I have put a tick above the D for division and the A for addition. As we are changing the subject, I need to use BIDMAS **backwards,** so I deal with the addition first and then the division.

Step 1

$$\frac{m}{12} + 4 = p$$

-4 $\quad$ -4

'Get rid of' the addition of 4 by subtracting 4 from both sides of the equation.

Step 2

$$\frac{m}{12} = p - 4$$

$\times 12$ $\quad$ $\times 12$ $\quad$ $\times 12$

'Get rid of' the divide by 12 by multiplying ***every*** term by 12.

$$m = 12p - 48$$

Worked example 1

$$\frac{n}{3} - m = 10 \qquad (n)$$

$+m$ $\quad$ $+m$

BIDMAS

$$\frac{n}{3} = 10 + m$$

$\times 3$ $\quad$ $\times 3$ $\quad$ $\times 3$

$$n = 30 + 3m$$

Worked example 2

$$b = \frac{a}{5} - c \qquad (a)$$

BIDMAS

$$b = \frac{a}{5} - c$$

$+c$ $\quad$ $+c$

$$b + c = \frac{a}{5}$$

$\times 5$ $\quad$ $\times 5$ $\quad$ $\times 5$

$$5b + 5c = a$$

$$a = 5b + 5c$$

Worked example 3

$$\underbrace{a}_{+6} = \frac{d}{e} \underbrace{- 6}_{+6} \qquad (d)$$

BIDMAS

$$\underbrace{a}_{\times e} + \underbrace{6}_{\times e} = \underbrace{\frac{d}{e}}_{\times e}$$

$$ae + 6e = d$$

$$\underline{d = ae + 6e}$$

Change the subject of the following:-

7) $\frac{q}{5} + p = 50 \qquad (q)$

8) $a + \frac{b}{3} = c \qquad (b)$

9) $q = -\frac{r}{7} - p \qquad (r)$

10) $\frac{p}{15} + 5 = q \qquad (p)$

11) $-\frac{l}{2} + m = 2 \qquad (l)$

12) $\frac{4}{m} + n = 12 \qquad (n)$