Changing the subject – lesson 6

Revision to start us off:-

1) $a - 12 = b \quad (a)$ 2) $-g + h = j \quad (h)$ 3) $t - s = 3r \quad (s)$

4) $12p = 24q \quad (p)$ 5) $\frac{p}{3} = -q \quad (p)$ 6) $12t = \frac{s}{r} \quad (s)$

Learning Intention for today -

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

One of the great things about Maths is that we are always building on things we have done before.

So far you have learned how to change the subject of formulae that look like this:-

$$t + 5 = v$$

AND

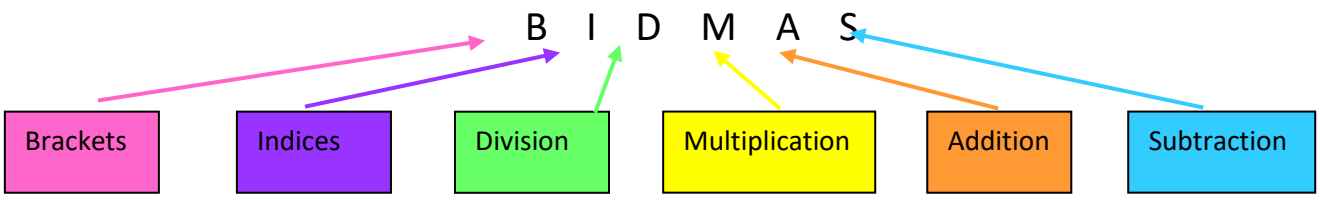
formulae that look like this:-

$$3m = n$$

In this lesson we are going to be looking at formulae that combine both things **and** use a topic we have looked at before called *the order of operations* (sometimes taught as BIDMAS).

Before we begin the lesson for today, let us do a little reminder of BIDMAS. BIDMAS tells us the order that we need to use when carrying out calculations.

(A bit like having to put your socks on before you put your shoes on!).



Example 1		Example 2
$10 - (4 - 2)$ Do the bit in the brackets first $= 10 - 2$ $= 8$		$3 + 4 \times 5$ Do the multiplication first $= 3 + 20$ $= 23$

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 me show you……..

$$3t + 5 = v \qquad (t)$$

It is a good idea to highlight the reasons why t is not on its own already.

$$3t + 5 = v$$

So, the t has been multiplied by three and, five has been added to it.

✓ ✓

BIDMAS

When doing a calculation, we would do the multiplication before the addition however, because we are changing the subject, we do the operations in reverse. We deal with the addition *and then* the multiplication.

Step 1

$$3t + 5 = v$$
$$-5 \quad -5$$

Step 2

$$3t = v - 5$$
$$\div 3 \quad \div 3$$

$$t = \frac{v - 5}{3}$$

Worked example 1

$$4n - m = 10 \qquad (n)$$

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

$$4n = 10 + m$$

$\div 4$ $\quad$ $\div 4$

$$n = \frac{10 + m}{4}$$

✓ ✓ BIDMAS ←

Worked example 2

$$b = 3a + c \qquad (a)$$

$$3a + c = b$$

$-c$ $\quad$ $-c$

$$3a = b - c$$

$\div 3$ $\quad$ $\div 3$

$$a = \frac{b - c}{3}$$

✓ ✓ BIDMAS ←

Worked example 3

$$s = -5t + 6 \quad (t)$$

$$-5t + 6 = s$$

-6 $\quad$ -6

$$-5t = s - 6$$

$\div -5$ $\quad$ $\div -5$

$$t = -\frac{(s - 6)}{5}$$

✓ ✓ BIDMAS ←

Worked example 4

$$p = 3q - 9 \qquad (q)$$

$$3q - 9 = p$$

$+9$ $+9$

✓ ✓ BIDMAS

$$3q = p + 9$$

$\div 3$ $\div 3$

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

Change the subject of the following:-

7)	$5a + b = c \quad (a)$	8)	$-5a + b = c \quad (a)$	9)	$q = 3r - p \quad (r)$
10)	$t + 4s = 16 \quad (s)$	11)	$l = 20m - 20 \quad (m)$	12)	$m = -3n + p \quad (n)$
13)	$3c + d = 4e \quad (c)$	14)	$q + 12 = 4p \quad (p)$	15)	$3x + 15 = 6y \quad (x)$