Integers – Lesson 10

Today we will continue our work with equations. We will also do some more work on substitution. Finally, we will have a quick reminder about using negative numbers in co-ordinates.

First try these examples: -

1) $2x - 2 = -20$ **2)** $3x + 12 = 0$ **3)** $4x - 8 = -40$ **4)** $9x + 28 = 10$

5) $5x - 10 = -20$ **6)** $3x + 10 = -17$ **7)** $7x - 8 = -50$ **8)** $4x + 30 = 10$

Now look at these examples: -

$-2x + 3 = -17$ *Three is added……*	$-3x - 16 = -31$ *Sixteen is subtracted…..*	$-4x + 20 = 40$ *Twenty is added……*
$-2x = -20$ *….so subtract three*	$-3x = -15$ *…..so add sixteen*	$-4x = 20$ *…so subtract twenty*
$x = 10$ *- 20 divide by - 2*	$x = 5$ *- 15 divide by - 3*	$x = -5$ *20 divide by - 4*

Now try these examples: -

9) $-3x + 15 = 0$ **10)** $-4x + 30 = 10$ **11)** $-5x - 10 = -50$ **12)** $-6x + 60 = 0$

13) $-2x + 20 = 0$ **14)** $-3x + 10 = -5$ **15)** $-4x - 4 = -40$ **16)** $-5x + 40 = 10$

17) $-4x + 44 = 0$ **18)** $-5x + 20 = -10$ **19)** $-6x - 6 = -30$ **20)** $-7x - 8 = -50$

Previously we have looked at substituting into an expression which contain terms like x^2, y^3 or ab. What about $3x^2$, $5y^3$ or 7ab?

Have a look at these examples: -

a = - 3 and b = - 4

$5a^2$ $= 5 \times (-3)^2$ $= 5 \times 9$ $= 45$	$2b^3$ $= 2 \times (-4)^3$ $= 2 \times -64$ $= -128$	$6ab$ $= 6 \times -3 \times -4$ $= 6 \times 12$ $= 72$

Notice that when we are doing this work we follow the normal order of operations i.e. deal with squared or cubed before multiplying, even although the multiplication is written first.

Now try these examples: -

p= - 2 and q = - 5

21) $3p^2$ **22)** $4q^2$ **23)** $5p^2$ **24)** $4p^3$

25) $7p^2$ **26)** $3pq$ **27)** $9q^2$ **28)** $10pq$

More examples

e = - 2 and f = -4

a) $4e^3 + 2f^2$ $= 4 \times (-2)^3 + 2 \times (-4)^2$ $= 4 \times -8 + 2 \times 16$ $= -32 + 32$ $= 0$	**b)** $\frac{4ef + 8}{f^2 + 4e} = \frac{4 \times -2 \times -4 + 8}{(-4)^2 + 4 \times -2} = \frac{4 \times 8 + 8}{16 + -8} = \frac{40}{16 - 8}\ \frac{40}{8} = 5$

Some colours might make this easier to understand.

a) $4e^3 + 2f^2$ $= 4 \times (-2)^3 + 2 \times (-4)^2$ $= 4 \times -8 + 2 \times 16$ $= -32 + 32$ $= 0$	**b)** $\frac{4ef + 8}{f^2 + 4e} = \frac{4 \times -2 \times -4 + 8}{(-4)^2 + 4 \times -2} = \frac{4 \times 8 + 8}{16 + -8} = \frac{40}{16 - 8}\ \frac{40}{8} = 5$

Now try these examples: -

u = - 3 and v = - 4

29) $3u^2 + 2v^3$ **30)** $2u^3 - 3uv$ **31)** $2v^3 + 5uv$ **32)** $2u^2 + 3uv + 4v^2$

33) $\frac{4u^2 + 4}{2v + 10}$ **34)** $\frac{100}{2u^2 + 2}$ **35)** $\frac{3uv + 4}{3v + 2}$ **36)** $\frac{2u^3 - 6}{2uv - 12}$

Finally, we will spend a few minutes revising negative co-ordinates.

Draw four sets of co-ordinate axes from -5 to 5. On each set of axes, you should end up with a square but one of the points is missing.

Using a different axis for each question, plot the three points that have been given, join them up and work out what the fourth coordinate should have to be to make a square.

37) (-2, -1) (1, 2) (4, - 1)

38) (2, -4) (-2, -3) (-1, 1)

39) (1, 3) (5, -1) (1, -5)

40) (2, 3) (0, -1) (-4, 1)