

## Lesson 2 – Decomposing

### Starter

Simplify each expression

1)  $t + t + t + t$

2)  $y \times y \times y \times y$

3) Simplify  $3x + 4y - 2x - 8y$

4) Simplify  $3ab + 5ba$

### Starter Answers

1)  $4t$

2)  $y^4$

3)  $x - 4y$

4)  $8ab$  (or  $8ba$ )

When we divide, we have a **dividend** and a **divisor**.

$$\begin{array}{ccc} & 28 \div 4 & \\ \swarrow & & \searrow \\ \text{Dividend} & & \text{Divisor} \end{array}$$

We can make calculations easier by splitting up the divisor or the dividend. This is called **decomposing**.

### Decomposing the Dividend

When we know our times tables, some calculations are simple, like  $108 \div 12 = 9$ . It becomes more difficult when we have something that goes beyond the times tables we know, like  $216 \div 12$ .

First, notice that  $216 = 108 \times 2$

So we can change the calculation to:

$$108 \times 2 \div 12$$

We can do the  $\times 2$  or the  $\div 12$  in either order. Since we know what  $108 \div 12$  is, we can change the calculation to:

$$108 \div 12 \times 2$$

Now, since  $108 \div 12 = 9$ , we have:

$$9 \times 2$$

$$= 18$$

So, the answer to  $216 \div 12 = 18$

### **Example 1**

Work out  $324 \div 9$

We know that  $162 \times 2 = 324$ , so change the calculation to:

$$162 \times 2 \div 9$$

We also know that  $81 \times 2 = 162$ , so change the calculation to:

$$81 \times 2 \times 2 \div 9$$

We can do  $\times 2$  and  $\div 9$  in any order, so:

$$81 \div 9 \times 2 \times 2$$

$$= 9 \times 2 \times 2$$

$$= 18 \times 2$$

$$= 36$$

### **Decomposing the Divisor**

We can also split up the divisor to make calculations easier.

### **Example 2**

Work out  $128 \div 8$

Since  $8 = 2 \times 4$  we can change the calculation to  $128 \div 2 \div 4$

We can divide by 2 and 4 in either order but dividing by 2 first is easier in this case.

$$128 \div 2 = 64$$

$$64 \div 4 = 16$$

The answer is 16.

We could also have split this up further, since  $8 = 2 \times 2 \times 2$

$$128 \div 2 = 64$$

$$64 \div 2 = 32$$

$$32 \div 2 = 16$$

### **Example 3**

Work out  $315 \div 15$

$$15 = 3 \times 5$$

So we can change the calculation to  $315 \div 3 \div 5$  or  $315 \div 5 \div 3$

$$315 \div 5 = 63$$

$$63 \div 3 = 21$$

So the answer is 21.

### **Example 4**

$560 \div 16$

We know that  $16 = 2 \times 2 \times 2 \times 2$

So, change the calculation to:

$$560 \div 2 \div 2 \div 2 \div 2$$

$$= 280 \div 2 \div 2 \div 2$$

$$= 140 \div 2 \div 2$$

$$= 70 \div 2$$

$$= 35$$

The answer is 35.