



**What you will learn**

- Addition and subtraction have 'equal priority' when evaluating a numerical expression.
- Multiplication and division have 'equal priority' when evaluating a numerical expression.
- Indices and roots also have 'equal priority'.
- The correct order of operations in which to evaluate expressions.
- Any expression in brackets is to be evaluated first.

**Task One (work left to right)**

a)  $14 + 6 - 8 - 5 =$

b)  $32 - 7 - 5 - 11 =$

c)  $17 + 5 - 4 + 8 =$

d)  $28 - 16 + 31 + 9 =$

e)  $102 + 17 + 11 - 21 =$

f)  $99 + 16 - 25 + 11 =$

**Task Two (work left to right)**

a)  $3 \times 4 \div 6 =$

b)  $8 \times 5 \times 2 \div 4 =$

c)  $12 \div 4 \times 9 =$

d)  $6 \times 7 \div 2 =$

e)  $24 \div 8 \times 7 =$

f)  $18 \times 5 \div 3 =$

**Concept corner**

Addition and subtraction are of equal priority. This means that we can evaluate addition and subtraction calculations from left to right.

$$\begin{aligned} 184 + 36 - 11 - 41 \\ 220 - 11 - 41 \\ 209 - 41 \\ \text{Answer: } 178 \end{aligned}$$

Where appropriate we can use commutativity of addition to make calculations more straightforward.

$$\begin{aligned} 218 - 24 - 53 + 6 \\ 218 + 6 - 24 - 53 \\ 224 - 24 - 53 \\ \text{Answer: } 147 \end{aligned}$$

For addition and subtraction, when in doubt, work left to right!

**Concept corner**

Multiplication and division are also of equal priority. This means that we can evaluate multiplication and division calculations from left to right.

$$\begin{aligned} 24 \times 3 \div 6 \div 2 \\ 72 \div 6 \div 2 \\ 12 \div 2 \\ \text{Answer: } 6 \end{aligned}$$

Where appropriate we can use commutativity of multiplication to make calculations more straightforward.

$$\begin{aligned} 24 \times 3 \div 6 \div 2 \\ 3 \times 24 \div 6 \div 2 \\ 3 \times 4 \div 2 \\ \text{Answer: } 6 \end{aligned}$$

For multiplication and division, when in doubt, work left to right!



## Year 7 Summer 1 Unit 1 Order of Operations



### Concept corner

The order in which we evaluate calculations matters. As mathematicians we need to agree how we should do this so that everyone gets the same answers.

- We evaluate any calculations in brackets first:
  - $3 \times (4 + 5) = 3 \times \underline{\quad} = 27$
  - $2 \times (8 + 4) \div (2 \times 3) = \underline{\quad} \times 12 \div 6 = \underline{\quad} \div 6 = 4$
- We evaluate multiplication and division before we do addition and subtraction.
  - $3 + 8 \times 5 \div 2 = 3 + \underline{\quad} \div 2 = \underline{\quad} + 20 = 23$
  - $42 - \underline{\quad} \div 2 \times 4 + 5 \div 4 = 42 - 3.5 \times 4 + 5 \div 4 = 42 - \underline{\quad} + 1.25 = 29.25$
  - $6 \div 5 + (3 + 4 \times \underline{\quad}) = 6 \div 5 + (3 + 16) = 6 \div 5 + 19 = 1.2 + 19 = \underline{\quad}$

When working with operations of equal priority we can still work from left to right. We can still use commutativity to help us too!

a)  $4(5 + 2) =$

b)  $11(19 - 12) =$

c)  $5(4 + 8) - 3 \times 5 =$

d)  $3 + 6(2 + 9) \div 3 =$

e)  $7 \times 18 + 18 \times 3 =$

f)  $\frac{3+7-4}{2 \times 2} =$

### Concept corner

To complete our order of operations we need to include indices such as  $4^2$  and  $\sqrt{25}$ .

$4^2 = 4 \times 4 = 16$  We say this as “four squared” or “four to the power of two”.

$2^3 = \underline{\quad} \times \underline{\quad} \times \underline{\quad} = 8$  “Two cubed” or “two to the power of \_\_\_\_\_”.

Square and cube roots show the inverse of squaring and cubing:

$\sqrt{25} = 5$  “The square root of twenty-five is equal to five”.

This is because  $\underline{\quad} \times \underline{\quad} = 25$ .

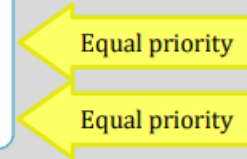
Roots and indices (powers) have equal priority, so they can be calculated from left to right.

First do the calculations in **brackets**

Then do **indices**

Then do **multiplication and division**

Then do **addition and subtraction**



### Remember!

If the operations have equal priority we can do the calculation from **left to right**

a)  $5^2 \times 2 \div (5 \times 2) =$

b)  $(2 + 2)^2 - 3 \times 3 =$

c)  $(8 \times 2) \div 2^2 =$

a)  $4 + \sqrt{36} \div 3 =$

b)  $5(\sqrt{49} - 3) =$

c)  $5(\sqrt{49} - 3)^2 =$

Answers to questions—see Mr CJ or your teacher for solutions