Worksheet 1.1 Order of Operations

Section 1 BIDMAS

When performing arithmetic operations there is a particular order in which the operations must be done. If we fail to do things in the correct order, we may end up with the wrong answer. The order of operations is:-

1. Brackets
2. Indices
3. Division and multiplication
4. Addition and subtraction

Some people remember this as BIDMAS (an acronym for the above list). This means that when looking at a calculation you should first do the operations inside brackets, then do any division or multiplication, working from left to right in the expression. Finally do addition and subtraction, again working from left to right in the expression. Powers should be treated as a high-priority multiplication.

Example 1 :

What is $3 + 3 \times 10$?

By BIDMAS we do the multiplication first, hence

$$\begin{aligned} 3 + 3 \times 10 &= 3 + 30 \\ &= 33 \end{aligned}$$

Note: If we did not follow the correct order of operations we may have got 60 as our answer.

Example 2 : What is $3 \times (7 + 2) + 6$?

$$\begin{aligned} 3 \times (7 + 2) + 6 &= 3 \times 9 + 6 \quad \text{(do the bracket first)} \\ &= 27 + 6 \quad \text{(then do the multiplication)} \\ &= 33 \end{aligned}$$

Example 3 : What is $3 + 15 \div (\frac{1}{2} \times 6) - 9 \div 3^2$?

$$\begin{aligned} 3 + 15 \div (\frac{1}{2} \times 6) - 9 \div 3^2 &= 3 + 15 \div 3 - 9 \div 9 \quad \text{(do brackets and indices first)} \\ &= 3 + 5 - 1 \quad \text{(then do division)} \\ &= 7 \quad \text{(then work from left to right)} \end{aligned}$$

Example 4 : Work out $\frac{27}{3+6}$.
Note that 27 must be divided by (3+6), so we introduce brackets in the expression.

$$\begin{aligned} \frac{27}{3+6} &= 27 \div (3+6) \\ &= 27 \div 9 \\ &= 3 \end{aligned}$$

If you try to do the calculation without the brackets on your calculator, you will get an answer of 15. Why?

Exercises:

1. Calculate the following, without the use of a calculator:
   (a) $3 + 4 \times 7$
   (b) $6 + (7 \times 3) - (6 + 4)$
   (c) $18 \div (4 + 2)$
   (d) $6 + 3^2 - 4 \times 2$
   (e) $\frac{48}{6+2}$
   (f) $12 - \frac{1}{2} \times 10 + 4^2 \div 2$

Answers 1.1

Section 1

1. (a) 31 (b) 17 (c) 3 (d) 7 (e) 6 (f) 15