Order of operations

- Working out more complex calculations involving brackets and powers
- Understanding that multiplying by a number does not always produce a bigger answer
- Understanding that dividing by a number does not always produce a smaller answer

Keywords

You should know

explanation 1 online

1 Calculate these without using a calculator.

a $4 + 5^2$ **b** $(4 + 5)^2$ **c** $4^2 + 5^2$

d $\dfrac{13 - 3^2}{5}$ **e** $\dfrac{(13 - 3)^2}{5}$ **f** $\left(\dfrac{13 - 3}{5}\right)^2$

g $16 - 2 \times 4$ **h** $(16 - 2) \times 4$ **i** $24 \div 3 + 5$

j $24 \div (3 + 5)$ **k** $(36 \div 6 + 12) \div 4$ **l** $36 \div (6 + 12 \div 4)$

m $36 \div 6 + 12 \div 4$ **n** $36 \div (6 + 12) \div 4$ **o** $(36 \div 6) + (12 \div 4)$

2 Calculate these without using a calculator.

a $12 - 3 \times 2$ **b** $(12 - 3) \times 2$ **c** $8^2 - 14 \div 2$

d $(8^2 - 14) \div 2$ **e** $(15 - 5)^2 \times 2 + 8$ **f** $15 - 5^2 \times (2 + 8)$

g $15 - 5^2 \times 2 + 8$ **h** $15 - (5^2 \times 2 + 8)$ **i** $(15 - 5^2) \times 2 + 8$

3 Insert brackets in these calculations, if necessary, to make them correct.

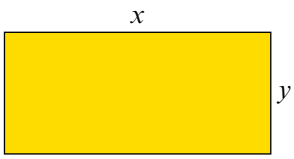
a $6 + 24 \div 6 + 4 = 14$ **b** $6 + 24 \div 6 + 4 = 9$

c $6 + 24 \div 6 + 4 = 3$ **d** $6 + 24 \div 6 + 4 = 8.4$

e $16 + 4^2 \times 8 - 3 = 3197$ **f** $16 + 4^2 \times 8 - 3 = 141$

g $16 + 4^2 \times 8 - 3 = 96$ **h** $16 + 4^2 \times 8 - 3 = 160$

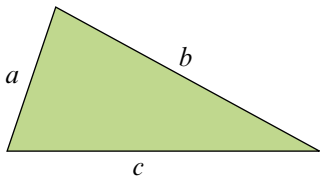
4 The perimeter, P, of the rectangle below is given by this formula.
$P = 2x + 2y$.



a Write the formula for the perimeter of the rectangle using brackets.

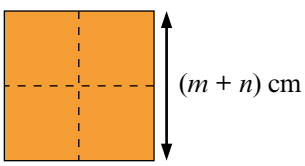
b Calculate the perimeter when $x = 6$ cm and $y = 3.5$ cm.

5 The perimeter, P, of this triangle is given by the formula $P = a + b + c$.



Write, using brackets, the formula for the perimeter of a triangle whose edges are double the length of these.

6 This square has sides of length $(m + n)$ cm.



a Using brackets, write a formula for the perimeter, P, of the square.

b Using brackets, write a formula for the area, A, of the square.

c The square is divided into four equal parts as shown. Write an expression, using brackets, for the perimeter of each of the smaller squares.

d Write an expression for the area of each of the smaller squares.

explanation 2a | explanation 2b | online

7 Copy and complete these statements by inserting >, < or = in the spaces.

a $7 \times 0.1 \square 7$ **b** $6 \times 0.4 \square 6$ **c** $8 \times 0.2 \square 0.2$

d $15 \times 0.3 \square 15$ **e** $12 \times 0.1 \square 1.2$ **f** $0.3 \times 0.5 \square 0.3$

g $25 \times 0.2 \square 5$ **h** $0.2 \times 30 \square 30$ **i** $0.4 \times 0.6 \square 0.6$

8 Work these out without using a calculator.

a 5×0.1 **b** 5×0.3 **c** 5×0.8

d 8×0.1 **e** 8×0.3 **f** 8×0.9

g 20×0.01 **h** 20×0.02 **i** 20×0.05

j 55×0.01 **k** 55×0.02 **l** 55×0.06

9 Copy and complete these statements by inserting >, < or = in the spaces.

a $8 \div 0.2 \square 8$ **b** $12 \div 0.5 \square 12$ **c** $20 \div 0.8 \square 20$

d $0.5 \div 0.1 \square 0.5$ **e** $5 \div 0.2 \square 25$ **f** $0.5 \div 5 \square 0.5$

10 Work these out without using a calculator.

a $5 \div 0.1$ **b** $5 \div 0.2$ **c** $5 \div 0.5$

d $2 \div 0.1$ **e** $20 \div 0.1$ **f** $200 \div 0.1$

g $100 \div 0.1$ **h** $10 \div 0.01$ **i** $1 \div 0.001$

11 **a** In your own words describe the effect of multiplying a positive number by a number that is between 0 and 1.

b What happens if you multiply a negative number by a number that is between 0 and 1?

12 **a** In your own words describe the effect of dividing a positive number by a number that is between 0 and 1.

b What happens if you divide a negative number by a number that is between 0 and 1?

13 For each statement below

i decide whether it is true or false

ii give an example to demonstrate your answer to part **i**

a Multiplying any number by a number greater than 1 gives a bigger answer.

b Multiplying a negative number by a number between 0 and 1 gives a bigger answer.

c Dividing a negative number by a number greater than 1 gives a smaller answer.