

Evaluation of Formulae

Exercise 1

Find the value of the following expressions when $x = 4$, $y = 2$ and $z = 3$.

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|--------------------|--------------------|--------------------|
| 1) $2x + y$ | 2) $3y + 2z$ | 3) $5x + z$ |
| 4) $x + 3z$ | 5) $x + y + z$ | 6) $x + 3y + 2z$ |
| 7) $5x - 3y$ | 8) $6y - 2z$ | 9) $3x - 6y$ |
| 10) $6x - 8z$ | 11) $x + y - z$ | 12) $x + 3y - 2z$ |
| 13) $2x + 5y - 4z$ | 14) $3x - y - z$ | 15) $4y + z - 2x$ |
| 16) $y + z - x$ | 17) $4x + y - 6z$ | 18) $5z - 5y - x$ |
| 19) $z - y + x$ | 20) $8z - 4y - 2x$ | 21) $2x + 3y - 4z$ |

Exercise 2

Find the value when $a = 3$, $b = 2$ and $c = 5$.

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| 1) $2ac$ | 2) $3bc$ | 3) $4ab$ |
| 4) abc | 5) $3abc$ | 6) $3ab + 2bc$ |
| 7) $4bc + 2ab$ | 8) $2ab - bc$ | 9) $4ac - 2bc$ |
| 10) $3ab + ac$ | 11) $4a + bc$ | 12) $5b - 3a$ |
| 13) $5a - 3c$ | 14) $3ab + 4bc$ | 15) $6bc - 3ab$ |
| 16) $3ac + b$ | 17) $a + 5ac$ | 18) $abc - 6b$ |

Find the value when $x = 1$, $y = 3$ and $z = 4$.

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|-----------------|-----------------------|--------------------|
| 19) $4xy$ | 20) $2yz$ | 21) $5xz$ |
| 22) xyz | 23) $2xy + 3yz$ | 24) $5xz + 4xy$ |
| 25) $4yz - 8xy$ | 26) $5xz - 2xy$ | 27) $6x + 5y - 2z$ |
| 28) $yz - 6x$ | 29) $3xy + 2yz - 5xz$ | 30) $6y + xyz$ |

Find the value when $p = 2$, $q = 1$ and $r = 3$.

31) $3p(2q + r)$

32) $5q(3p - r)$

33) $2r(p + 4q)$

34) $r(2p + 3q)$

35) $4q(4r - 3p)$

36) $3r(4p - 8q)$

37) $2pr + 3q(p + r)$

38) $3qr + p(2q + r)$

39) $2r(p - q) + pq$

40) $4q(3r - p) - 2qr$

Exercise 3

1) The cost (C pence) of framing a picture depends on its length (L cm) and its height (H cm). If $C = 3L + 2H$, find C when:

a) $L = 50$, $H = 20$

b) $L = 30$, $H = 25$

c) $L = 80$, $H = 50$

2) The time, T minutes for a man to cycle U km uphill and D km downhill is given by $T = 12U + 2D$. Find T when:

a) $U = 2$, $D = 5$

b) $U = 6$, $D = 8$

c) $U = 3$, $D = 12$

3) The number of potatoes (n) which I plant in spring depends on the area of my vegetable plot ($A \text{ m}^2$) and the size of my lawn ($L \text{ m}^2$).

If $n = 5A - 3L$ find n when:

a) $A = 20$, $L = 15$

b) $A = 100$, $L = 50$

c) $A = 200$, $L = 50$

- 4) The time (T minutes) for a teacher to mark a pile of books depends on the number of pages (p) and the number of homeworks (h).

If $T = 2p + 15h$ find T when:

- a) $p = 6$, $h = 2$
- b) $p = 8$, $h = 1$
- c) $p = 10\frac{1}{2}$, $h = 3$

- 5) The cost (C pence) of hiring a taxi depends on the number n of kilometres you travel in it, where $C = 70 + 5n$. Find C when:

- a) $n = 2$
- b) $n = 6$
- c) $n = 20$

- 6) The time taken (T minutes) to get to school depends on how far I walk (W km) and how far I go by bus (B km).

If $T = 12W + 5B$ find T when:

- a) $W = 4$, $B = 8$
- b) $W = 3$, $B = 13$
- c) $W = 2\frac{1}{2}$, $B = 9$

- 7) The number of cakes (n) which Mrs Hirst has to buy for her daughter's birthday party depends on the number of boys (B) and the number of girls (G), who are invited, where $n = 4B + 3G$. Find n if:

- a) $B = 12$, $G = 5$
- b) $B = 7$, $G = 13$
- c) $B = 11$, $G = 14$

8) The cost (C pence) of using my radio depends on how long I play it on batteries (b hours) and how long I use mains electricity (e hours).

If $C = 2(3e + 2b)$ find C when:

- a) $e = 30$, $b = 6$
- b) $e = 12$, $b = 15$
- c) $e = 15$, $b = 12$

9) My uncle earns £ E when he puts new soles on S shoes and new heels on H shoes where $E = 2(4S + 2H)$. Find E when:

- a) $S = 5$, $H = 2$
- b) $S = 10$, $H = 5$
- c) $S = 8$, $H = 7$

10) A bus driver will collect P pence if the bus has A adults and C children travelling on it between two stops on both the outward and return journey.

If $P = 2(25A + 15C)$ find P when:

- a) $A = 4$, $C = 6$
- b) $A = 10$, $C = 3$
- c) $A = 12$, $C = 8$

11) I put T tulip bulbs and D daffodil bulbs into B bags and sell them on the market. My income £ I is given by the formula $I = B(12T + 7D)$.

Find I when:

- a) $B = 2$, $T = 3$, $D = 4$
- b) $B = 5$, $T = 5$, $D = 3$
- c) $B = 10$, $T = 6$, $D = 5$

- 12)** On my holiday of D days, I cycle for C hours and walk for W hours. The distance in miles (M) which I travel is given by the formula

$$I = D(12C + 2W).$$
 Find M when:

- a) $D = 4, C = 5, W = 2$
b) $D = 8, C = 4, W = 3$
c) $D = 12, C = 3, W = 4$
- 13)** When two resistors of strengths P and Q are connected in parallel in an electrical circuit, their total effect R is given by the formula

$$R = \frac{PQ}{P+Q}.$$
 Find R when:

- a) $P = 5, Q = 5$
b) $P = 7, Q = 3$
c) $P = 9, Q = 3$
- 14)** The height H of water in a tank depends on the rate R at which it is flowing in, the area of the cross-section A of the tank and time T after the water starts to flow.

$$\text{If } H = \frac{RT}{2A} \text{ find } H \text{ when:}$$

- a) $R = 3, T = 20, A = 5$
b) $R = 9, T = 8, A = 3$
c) $R = 12, T = 7, A = 4$

Exercise 4

Find the value of x if $a = 4$, $b = 3$ and $c = 2$

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|---------------------|----------------------|---------------------|
| 1) $x = a + b + c$ | 2) $x = 2a + c$ | 3) $x = a + 3b$ |
| 4) $x = 5a - b$ | 5) $x = 3a + b - 4c$ | 6) $x = 3(a - c)$ |
| 7) $x = 4(a - b)$ | 8) $x = 5(6a - 3b)$ | 9) $x = ab + c$ |
| 10) $x = ab - c$ | 11) $x = ab + ac$ | 12) $x = 5(bc + a)$ |
| 13) $x = 2(ab - c)$ | 14) $x = a(b + c)$ | 15) $x = b(2a - c)$ |

Exercise 5

If $p = 6$, $q = 4$ and $r = 1$ find the value of y .

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|---------------------|---------------------|-------------------|
| 1) $y = 2p - q$ | 2) $y = q - 4r$ | 3) $y = p - 2q$ |
| 4) $y = r - p$ | 5) $y = q + 2r - p$ | 6) $y = 2(q + r)$ |
| 7) $y = 3(r - q)$ | 8) $y = q(p + 2r)$ | 9) $y = p^2 + q$ |
| 10) $y = p^2 + q^2$ | 11) $y = (p + q)^2$ | 12) $y = 2q^2$ |
| 13) $y = (2q)^2$ | 14) $y = 3r^2$ | 15) $y = (3r)^2$ |

Exercise 6

If $x = 8$, $y = 2$ and $z = 3$ find the value of m in each of these.

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|--------------------|----------------------|--------------------------|
| 1) $m = x - y - z$ | 2) $m = xy - z$ | 3) $m = xyz$ |
| 4) $m = z - x$ | 5) $m = y - x$ | 6) $m = y^2 + z^2$ |
| 7) $m = y^2 - z^2$ | 8) $m = 3y^2 + 2z^2$ | 9) $m = (3y)^2 + (2z)^2$ |
| 10) $m = 5(x + z)$ | 11) $m = y(x - z)$ | 12) $x(y^2 - z)$ |