

1 Simplify the following:

a) $p^3 \times p^5$

b) $(5m^2)^3$

c) $\sqrt{192}$ (leave in surd form)

d) $\frac{7}{\sqrt{7}}$ (rationalise the denominator)

2 Write as 2^n (eg $8 = 2^3$):

a) $128 =$

b) $1 =$

c) $8^4 =$

d) $\frac{1}{4} =$

3 Evaluate $\frac{1}{2} + \frac{x}{3} + \frac{x^2}{4}$ when

a) $x = 3$

b) $x = \frac{1}{2}$

c) $x = -2$

4 If $p = -1$, $q = 2$, and $r = -3$ evaluate:

a) $2p - 2(q^2 + r^2)$

b) $\frac{(r-q)}{p} + \frac{(3q-r)}{2p}$

5 Expand:

a) $5(3c - 11)$

b) $(3m - 4)(5m - 9)$

c) $(q - 2)^2 + (q + 3)^2$

6 Solve:

a) $5x + 1 = 2x + 7$

b) $4x - 2(x + 1) = 5(x + 3) + 5$

c) $\frac{x+1}{2} + \frac{x-1}{3} = \frac{1}{6}$

d) $\frac{3x}{4} - 5 = 1$

7 Factorise fully:

a) $x^2 - 13x$

b) $x^2 - 3x - 10$

d) $x^2 - 1$

c) $4x^2 + 4x + 1$

e) $20x^2 - 7x - 3$

8 Solve giving your answer to 2 decimal places:

a) $x^2 + 6x = 0$

b) $x^2 = 9x$

c) $5x^2 - 7x - 20 = 0$

d) $4x^2 = 9x - 3$

9 Solve the equation $x^2 - 6x + 2 = 0$ by completing the square

10 Make the variable in the square bracket the subject in each of the following:

a) $x^2 + y^2 = r^2$ [y]

b) $v = u + at$ [t]

c) $a(x - 2) = b(x + 1)$ [x]

d) $T = 2\pi \left(\sqrt{\frac{l}{g}} \right)$ [l]

e) $y = \frac{2x-4}{x+3}$ [x]

f) $r = x - \sin\left(\frac{6}{y}\right)$ [y]

11 The sum of three consecutive numbers is 45.

Find the three numbers, showing your working.

12 Solve the simultaneous equations:

$$2x + 5y = 24$$

$$4x + 3y = 20$$

Challenge question:

13 Find the sum of

$$\frac{1}{\sqrt{1} + \sqrt{2}} + \frac{1}{\sqrt{2} + \sqrt{3}} + \text{and so on up to } + \frac{1}{\sqrt{99} + \sqrt{100}}$$