

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

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