

**You have 1 hour to complete all questions and show your working where applicable.  
There are 60 marks available. You may use a calculator.**

1. Simplify the following expressions.

(a)  $\frac{a^2 \times a^5}{a^3}$

(b)  $\frac{(3x^2)^3}{x^{-4}}$

(c)  $\frac{2y^{1/2}}{(8y^{-3})^{2/3}}$

..... (1) ..... (1) ..... (1)

2. Solve the following equations.

(a)  $3n^2 \times 4n^3 = 384$

(b)  $3 \times \sqrt{27} = 3^x$

(c)  $a^{-3/4} = \frac{1}{27}$

$n =$ ..... (1)  $x =$ ..... (2)  $a =$ ..... (2)

3. Simplify the following surds. You must show your working.

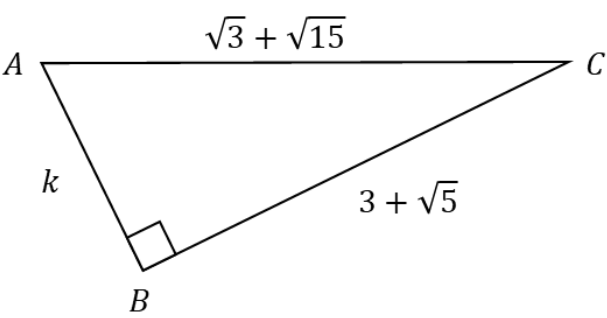
(a)  $\sqrt{72}$

(b)  $\sqrt{32} \times \sqrt{45}$

(c)  $(2 + \sqrt{5})(1 - \sqrt{5})$

..... (1) ..... (1) ..... (2)

4. All measurements on the triangle are in centimetres.  
 $ABC$  is a right-angled triangle.  $k$  is a positive integer.  
 Find the value of  $k$ .  
 You must show your working.



$k = \dots\dots\dots (3)$

5. Rationalise the denominator of these surds. You must show your working.

(a)  $\frac{1}{\sqrt{5}}$                       (b)  $\frac{6}{2\sqrt{3}}$                       (c)  $\frac{5+2\sqrt{3}}{2+\sqrt{3}}$

$\dots\dots\dots (1)$                        $\dots\dots\dots (2)$                        $\dots\dots\dots (3)$

6. Expand and simplify these expressions.

(a)  $4x(xy + 3)$                       (b)  $(x + 3)(2x - 4)$                       (c)  $(x - 3)^2(x + 2)$

$\dots\dots\dots (1)$                        $\dots\dots\dots (2)$                        $\dots\dots\dots (3)$

7. Fully factorise these expressions.

(a)  $6a^2b - 9ab^3$

(b)  $x^2 - x - 42$

(c)  $6x^2 + 7x - 3$

..... (2)

..... (2)

..... (2)

8. Solve the following equations.

(a)  $4a + 6 = 8$

(b)  $x^2 - 7x + 12 = 0$

(c)  $2n^2 + 3n = 11 - n$

$a =$ ..... (1)

$x =$ ..... (2)

$n =$ ..... (3)

9. (a) Write  $x^2 + 10x + 2$  in the form  $(x + a)^2 + b$  where  $a$  and  $b$  are integers.

..... (2)

(b) Hence, or otherwise, write down the coordinates of the turning point of the graph of  $y = x^2 + 10x + 2$

..... (1)

10. Given that  $f(x) = 2x^2 - 10$ ,

(a) find  $f(-2)$

(b) Solve  $f(x) = 8$

..... (1)

$x =$ ..... (3)

11. Solve these pairs of simultaneous equations. You must show your working.

(a)  $3x - y = -4$   
 $2x - 3y = 9$

(b)  $x^2 + y^2 = 17$   
 $y = x - 3$

$x = \dots\dots\dots$

$x = \dots\dots\dots$

$y = \dots\dots\dots$  (3)

$y = \dots\dots\dots$  (5)

12. Solve these inequalities. You must show all your working.

(a)  $3x - 7 \geq 2$

(b)  $-7 < 2x + 3 < 1$

(c)  $x^2 - 7x + 6 < 0$

$\dots\dots\dots$  (2)

$\dots\dots\dots$  (2)

$\dots\dots\dots$  (2)