

**Answer ALL TWENTY TWO questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

- 1** (a) Write down the value of  $m$ , given that  $3^4 \times 3^5 = 3^m$

$m = \dots\dots\dots$   
(1)

- (b) Write down the value of  $n$ , given that  $(5^3)^7 = 5^n$

$n = \dots\dots\dots$   
(1)

- (c) Find the value of  $p$ , given that  $\frac{7^8 \times 7^2}{7^p} = 7^6$

$p = \dots\dots\dots$   
(2)

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**(Total for Question 1 is 4 marks)**

**2**

(a) Expand and simplify  $(y + 4)(2 - y)$

.....  
(2)

(b) Factorise fully  $15b^5c - 35b^3c^9$

.....  
(2)

**(Total for Question 2 is 4 marks)**

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**3** (a) Expand and simplify  $3(c - 7) + 2(3c + 4)$

.....  
(2)

(b) Expand and simplify  $(x + 7)(x - 2)$

.....  
(2)

(c) Factorise fully  $28y^2 - 21y$

.....  
(2)

(d) Solve  $\frac{7x - 2}{4} = 3x + 1$

Show clear algebraic working.

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

**(Total for Question 3 is 9 marks)**

4 (a) Factorise fully  $15y^4 + 20uy^3$

.....  
(2)

(b) Solve  $4 - 3x = \frac{5 - 8x}{4}$

Show clear algebraic working.

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

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(Total for Question 4 is 5 marks)

**5** (a) Write down the value of  $x^0$

.....  
(1)

Given that  $2^{-3} \times 2^9 = 2^n$

(b) find the value of  $n$

$n =$  .....  
(1)

Given that  $\frac{7^{206} \times 7^m}{7^{214}} = 7^{-3}$

(c) find the value of  $m$

$m =$  .....  
(2)

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**(Total for Question 5 is 4 marks)**

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6 (a) Make  $c$  the subject of  $A = \frac{c}{y} - 5z$

.....  
(2)

(b) Write down the value of  $g^0$

.....  
(1)

(c) Factorise  $x^2 - 11x + 24$

.....  
(2)

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(Total for Question 6 is 5 marks)

- 7 (a) Solve  $5(4 - x) = 7 - 3x$   
Show clear algebraic working.

$$x = \dots\dots\dots$$

(3)

- (b) Factorise fully  $16m^3g^3 + 24m^2g^5$

$$\dots\dots\dots$$

(2)

- (c) (i) Factorise  $y^2 - 2y - 48$

$$\dots\dots\dots$$

(2)

- (ii) Hence, solve  $y^2 - 2y - 48 = 0$

$$\dots\dots\dots$$

(1)

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**(Total for Question 7 is 8 marks)**

**8**  $-4 \leq 2y < 6$

$y$  is an integer.

(a) Write down all the possible values of  $y$ .

.....  
(2)

(b) Solve the inequality  $7t - 3 \leq 2t + 31$

Show your working clearly.

.....  
(2)

**(Total for Question 8 is 4 marks)**

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9 (a) Simplify  $(3x^2y)^0$

.....  
(1)

(b) (i) Factorise  $x^2 - 5x - 36$

.....  
(2)

(ii) Hence solve  $x^2 - 5x - 36 = 0$

.....  
(1)

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**(Total for Question 9 is 4 marks)**

**10** (a) Simplify  $(2x^3y^5)^4$

.....  
(2)

(b) (i) Factorise  $x^2 + 5x - 36$

.....  
(2)

(ii) Hence, solve  $x^2 + 5x - 36 = 0$

.....  
(1)

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**(Total for Question 10 is 5 marks)**

**11** (a) Factorise fully  $25a^4c^7d + 45a^9c^3h$

.....  
(2)

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

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

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**(Total for Question 11 is 5 marks)**

**12**  $\sqrt{2} \times 16 = 2^x$

- (a) Find the value of  $x$ .  
Show your working clearly.

$$x = \dots\dots\dots$$

(2)

$$\frac{(11^{-6})^5}{11^4} = 11^n$$

- (b) Find the value of  $n$ .  
Show your working clearly.

$$n = \dots\dots\dots$$

(2)

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**(Total for Question 12 is 4 marks)**

**13** (a) Simplify  $(64p^9q^{12})^{\frac{2}{3}}$

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(2)

(b) Write as a single fraction  $\frac{2}{3x} + \frac{4}{5x} - \frac{9}{10x}$

Give your answer in its simplest form.

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(2)

- (c) Expand and simplify  $4x(x - 5)(2x + 3)$   
Show your working clearly.

.....  
(3)

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**(Total for Question 13 is 7 marks)**

- 14** Expand and simplify  $4x(3x + 1)(2x - 3)$   
Show your working clearly.

.....

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**(Total for Question 14 is 3 marks)**

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15 (a) Simplify fully  $(16x^8y^6)^{\frac{1}{2}}$

(2)

(b) Solve  $\frac{8-2x}{3} - \frac{2x-3}{2} = 4$

Show clear algebraic working.

$x =$

(3)

(c) Make  $f$  the subject of  $m = \sqrt{\frac{1}{3}ef}$

(2)

(Total for Question 15 is 7 marks)



**16** Given that  $n > 0$

make  $n$  the subject of the formula  $y = \frac{n^2 + d}{n^2}$

.....  
**(Total for Question 16 is 4 marks)**

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17 Make  $t$  the subject of  $n^2 = \frac{4d+t^3}{t^3}$

.....  
(Total for Question 17 is 4 marks)

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18  $\frac{8}{2^7} = 2^n$

(a) Find the value of  $n$ .

$n = \dots\dots\dots$   
(2)

$(13^{-6})^4 \times 13^5 = 13^k$

(b) Find the value of  $k$ .

$k = \dots\dots\dots$   
(2)

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(Total for Question 18 is 4 marks)

19 (a) Simplify  $n^0$

(1)

(b) Simplify  $(3x^2y^5)^3$

(2)

(c) Factorise fully  $2e^2 - 18$

(2)

(d) Make  $r$  the subject of  $m = \sqrt{\frac{6a + r}{5r}}$

(4)

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(Total for Question 19 is 9 marks)

**20** Simplify fully  $\left(\frac{9t^4w^9}{18t^6w^{10}}\right)^{-2}$

.....  
(Total for Question 20 is 3 marks)

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**21** Simplify fully  $\left(\frac{9x^4}{16y^{10}}\right)^{-\frac{1}{2}}$

.....

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**(Total for Question 21 is 3 marks)**

**22**

Express  $\frac{5}{3} - \frac{x+2}{2x}$  as a single fraction in its simplest terms.

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**(Total for Question 22 is 3 marks)**