

1 Simplify $\left(\frac{125x^6}{64}\right)^{\frac{1}{3}}$

(Total for question 1 is 2 marks)

2 Simplify $\frac{(2x^{\frac{1}{2}})^3}{4x^2}$

(Total for question 2 is 2 marks)

3 Simplify $\left(\frac{216x^6}{27y^3}\right)^{-\frac{2}{3}}$

(Total for question 3 is 2 marks)

- 4** Express 9^{3x+2} in the form 3^y , giving y in the form $ax + b$, where a and b are constants.

(Total for question 4 is 2 marks)

- 5** Express 8^{2x-5} in the form 2^y , giving y in the form $ax + b$, where a and b are constants.

(Total for question 5 is 2 marks)

6 Given $y = 2^x$

(a) Express 4^x in terms of y .

(2)

(b) Hence, or otherwise, solve $4^x - 6(2^x) - 16 = 0$

(3)

(Total for question 6 is 5 marks)

7 Solve: $2^{2x+1} - 5(2^x) - 12 = 0$

(Total for question 7 is 5 marks)

8 Solve the equation $8^{2x-5} = 2^{x+1}$

(Total for question 8 is 3 marks)

9

(a) Solve the equation: $x^2 - 9x + 8 = 0$

(2)

(b) Hence solve the equation: $y^3 - 9y^{\frac{3}{2}} + 8 = 0$

(2)

(Total for question 9 is 4 marks)

10 Find the value of x such that

$$8^{x+1} = 4^{3x-1}$$

(Total for question 10 is 3 marks)

11 Factorise completely: $x - 16x^3$

(Total for question 11 is 2 marks)

12 Factorise completely: $75x - 12x^3$

(Total for question 12 is 2 marks)

13 Expand and Simplify: $(2x - 1)(x + 2)(x - 3)$

(Total for question 13 is 2 marks)

14 Expand and Simplify: $(3x - 2)(x - 5)^2$

(Total for question 14 is 2 marks)

15 Find the value of x such that

$$\frac{1+x}{x} = \sqrt{5}$$

Giving your answer in the form $a + b\sqrt{5}$ where a and b are rational numbers.

(Total for question 15 is 4 marks)

16 Show that $\frac{5+\sqrt{3}}{2-\sqrt{3}}$ can be written as $13 + 7\sqrt{3}$

(Total for question 16 is 3 marks)

17 Show that $\frac{5+2\sqrt{3}}{2+\sqrt{3}}$ can be written as $4 - \sqrt{3}$

(Total for question 17 is 3 marks)

18 Show that $\frac{1-\sqrt{2}}{3+2\sqrt{2}}$ can be written as $7 - 5\sqrt{2}$

(Total for question 18 is 3 marks)

19 Express as a single power of a $\frac{a^3}{\sqrt{a}}$ Circle your answer.

(Total for question 19 is 1 mark)

20 Identify the expression that is equivalent to $a^{-\frac{3}{2}}$ Circle your answer.

(Total for question 20 is 1 mark)

- 21** Solve the equation $x^{\frac{-1}{2}} = \frac{3}{5}$, giving your answer as a fraction in its lowest terms.

(Total for question 21 is 3 marks)

- 22** **Without** using a calculator, prove that $2\sqrt{5} > 3\sqrt{2}$

(Total for question 22 is 3 marks)

23 Given

$$\frac{4^{3x-1}}{8^{y+2}} = 16$$

express y in terms of x , writing your answer in its simplest form.

(Total for question 23 is 3 marks)

24 Show that $\frac{\sqrt{5}}{\sqrt{3+\sqrt{2}}}$ can be written in the form $\sqrt{a} - \sqrt{b}$, where a and b are integers.

(Total for question 24 is 4 marks)

25 Write $\frac{14}{3-\sqrt{2}}$ in the form $a + b\sqrt{2}$, where a and b are integers to be found.

(Total for question 25 is 2 marks)

26 In this question you must show detailed reasoning.

(i) Express $2^{\frac{9}{2}}$ in the form $a\sqrt{b}$, where a is an integer and b is a prime number.

(2)

(ii) Express $\frac{\sqrt{3}}{2-2\sqrt{3}}$ in the form $c + d\sqrt{e}$, where c and d are rational numbers and e is a prime number.

(3)

(Total for question 26 is 5 marks)

27 In this question you must show detailed reasoning.

Solve the equation $x(3 - \sqrt{3}) = 18$, giving your answer in the form $a + b\sqrt{3}$ where a and b are positive integers.

(Total for question 27 is 3 marks)

28 Find, using algebra, all the real solutions to the equation

(i) $a^2 = 8\sqrt{a}$

(3)

(ii) $b^4 - 5b^2 - 14 = 0$

(4)

(Total for question 28 is 7 marks)

29 Solve the equation $x^3 + 3x^{\frac{3}{2}} - 10 = 0$

(Total for question 29 is 4 marks)

30

(i) Solve the equation

$$x + \sqrt{12} = x\sqrt{3}$$

writing the answer as a surd in its simplest form.

(3)

(ii) Solve the equation

$$9^{3x-1} = 3\sqrt{3}$$

(3)

(Total for question 30 is 6 marks)

- 31** Given that k is an integer, express $\frac{\sqrt{18-k}}{4-\sqrt{8}}$ in the form $a + b\sqrt{2}$ where a and b are rational expressions in terms of k .

(Total for question 31 is 4 marks)
