

Index Laws and Equations with Indices

For AQA Level 2 Certificate in Further Mathematics (8365)

Name _____

Total marks: **38**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method. You may use a calculator.

1 Circle the value of $\left(\frac{8}{125}\right)^{-\frac{2}{3}}$

[1 mark]

$-\frac{4}{25}$

$\frac{4}{25}$

$\frac{5}{2}$

$\frac{25}{4}$

2 Simplify fully $(49a^{-6}b^8)^{\frac{3}{2}}$

[2 marks]

Answer _____

3 Write each expression as a single power of x .

(a) $\frac{x^2 \times \sqrt{x}}{\sqrt[3]{x}}$

[2 marks]

Answer _____

(b) $\left(\frac{\sqrt{x}}{x^3}\right)^{-2}$

[2 marks]

Answer _____

4 $(t^3)^k = t^8 \div t^{2k}$

Work out the value of k .

[2 marks]

Answer $k =$ _____

5 Simplify fully $\frac{15m^{\frac{3}{2}}n^{-1} - 10m^{-\frac{1}{2}}n^2}{5m^{\frac{1}{2}}n^{-3}}$

[3 marks]

Answer _____

6 Solve

(a) $\sqrt[3]{2x^2 - 3} = 5$

[2 marks]

Answer $x =$ _____

(b) $x^{-\frac{3}{4}} = \frac{125}{64}$

[3 marks]

Answer $x =$ _____

7 Solve $\frac{3^{x+5}}{9^x} = 27^{2x}$

[3 marks]

Answer $x =$ _____

8 The curves $y = \left(\frac{1}{2}\right)^x$ and $y = 4^{x+3}$ intersect at the point P .
Work out the coordinates of P .

[3 marks]

Answer (_____ , _____)

- 9 Solve $2^{x^2} \times 4^x = 8^{x+4}$
You must show your working.

[4 marks]

Answer $x =$ _____

- 10 Solve $3^{x+2} + 3^x = 30\sqrt{3}$
Do not use trial and improvement.
You must show your working.

[3 marks]

Answer $x =$ _____

- 11 Solve $\left(x^{\frac{3}{2}} + 4x^{\frac{1}{2}}\right)\left(x^{\frac{3}{2}} - x^{\frac{1}{2}}\right) = 6x(x+1)$ for $x \geq 0$
You must show your working.

[4 marks]

Answer $x =$ _____

12 Here is an equation, where $x > 0$

$$10x^{\frac{1}{2}} - 3x^{\frac{3}{2}} = 5x^{-\frac{1}{2}}$$

(a) Show that the equation can be written as $3x^2 - 10x + 5 = 0$

[2 marks]

(b) Hence solve the equation.
Give your answers to 3 significant figures.

[2 marks]

Answer $x =$ _____