

2. In this question you should show all stages of your working.
Solutions relying on calculator technology are not acceptable.

Given

$$\frac{9^{x-1}}{3^{y+2}} = 81$$

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

(3)

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2. Find, using algebra, all real solutions to the equation

(i) $16a^2 = 2\sqrt{a}$ (4)

(ii) $b^4 + 7b^2 - 18 = 0$ (4)

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3. In this question you must show all stages of your working.

Solutions relying on calculator technology are not acceptable.

(i) Solve the equation

$$x\sqrt{2} - \sqrt{18} = x$$

writing the answer as a surd in simplest form.

(3)

(ii) Solve the equation

$$4^{3x-2} = \frac{1}{2\sqrt{2}}$$

(3)

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12. A student was asked to give the exact solution to the equation

$$2^{2x+4} - 9(2^x) = 0$$

The student's attempt is shown below:

$$2^{2x+4} - 9(2^x) = 0$$

$$2^{2x} + 2^4 - 9(2^x) = 0$$

Let $2^x = y$

$$y^2 - 9y + 8 = 0$$

$$(y - 8)(y - 1) = 0$$

$$y = 8 \text{ or } y = 1$$

$$\text{So } x = 3 \text{ or } x = 0$$

(a) Identify the two errors made by the student.

(2)

(b) Find the exact solution to the equation.

(2)

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2. Simplify the following expressions fully.

(a) $\left(\frac{1}{9}x^4\right)^{0.5}$ (1)

(b) $\left(\frac{x}{\sqrt{2}}\right)^{-2}$ (1)

(c) $x\sqrt{3} \div \sqrt{\frac{48}{x^4}}$ (2)

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3. Answer this question without a calculator, showing all your working and giving your answers in their simplest form.

(i) Solve the equation

$$4^{2x+1} = 8^{4x} \qquad (3)$$

(ii) (a) Express

$$3\sqrt{18} - \sqrt{32}$$

in the form $k\sqrt{2}$, where k is an integer. (2)

(b) Hence, or otherwise, solve

$$3\sqrt{18} - \sqrt{32} = \sqrt{n} \qquad (2)$$

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2. (i) Given that $\frac{49}{\sqrt{7}} = 7^a$, find the value of a . (2)

(ii) Show that $\frac{10}{\sqrt{18} - 4} = 15\sqrt{2} + 20$

You must show all stages of your working. (3)

Handwriting lines for working out the solutions to the problems above.

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3. Given that

$$y = \frac{1}{27}x^3$$

express each of the following in the form kx^n where k and n are constants.

(a) $y^{\frac{1}{3}}$ (1)

(b) $3y^{-1}$ (1)

(c) $\sqrt{(27y)}$ (1)



4. Answer this question without the use of a calculator and show all your working.

(i) Show that

$$\frac{4}{2\sqrt{2} - \sqrt{6}} = 2\sqrt{2}(2 + \sqrt{3})$$

(4)

(ii) Show that

$$\sqrt{27} + \sqrt{21} \times \sqrt{7} - \frac{6}{\sqrt{3}} = 8\sqrt{3}$$

(3)



3. (a) Simplify

$$\sqrt{50} - \sqrt{18}$$

giving your answer in the form $a\sqrt{2}$, where a is an integer.

(2)

(b) Hence, or otherwise, simplify

$$\frac{12\sqrt{3}}{\sqrt{50} - \sqrt{18}}$$

giving your answer in the form $b\sqrt{c}$, where b and c are integers and $b \neq 1$

(3)

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