eClassroom

Algebraic Expressions

Questions

Suitable for:

Pearson Edexcel International A-Level (iAL) — Pure Mathematics 1

Question 1

(i) Given that

$$27^{\frac{1}{3}} \times 3^{a} = 81$$

find the value of *a*.

(2 marks)

(ii) Show that

$$\frac{8}{\sqrt{8}-2} = 4\sqrt{2} + 4$$

You must show all stages of your working.

(3 marks)

Total for question = 5 marks

Question 2

Given that

$$y = \frac{1}{64}x^6$$

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

(a) $y^{1/3}$

(1 marks)

(b) $4y^{-1}$

(1 marks)

(c) $\sqrt{(64y)}$

(1 marks)

Total for question = 3 marks

Question 3

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

(i) Show that

$$\frac{12}{3\sqrt{2}-\sqrt{6}} = \sqrt{2}\,(3+\sqrt{3})$$

(4 marks)

(ii) Show that

$$\sqrt{108}+\sqrt{84}\times\sqrt{7}-\frac{12}{\sqrt{3}} = 16\sqrt{3}$$

(3 marks)

Total for question = 7 marks

Question 4

Without using your calculator, solve

$$x\sqrt{48} + 20 = \frac{10x}{\sqrt{3}}$$

Write your answer in the form $a\sqrt{b}$ where a and b are integers.

You must show all stages of your working.

(4 marks)

Total for question = 4 marks

Question 5

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

(i) Solve the equation

$$4^{x+2} = 8^{2x}$$

(3 marks)

(ii) (a) Express

$$5\sqrt{18} - \sqrt{50}$$

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

(2 marks)

(b) Hence, or otherwise, solve

$$5\sqrt{18} - \sqrt{50} = \sqrt{n}$$

(2 marks)

Total for question = 7 marks

Question 6

(a) Find the value of a and the value of b for which

$$\frac{16^x}{4^{x-1}} \equiv 2^{ax+b}$$

(3 marks)

(b) Hence solve the equation

$$\frac{16^x}{4^{x-1}} = 64$$

(3 marks)

Total for question = 6 marks

Question 7

In this question you must show detailed reasoning.

Solutions relying on calculator technology are not acceptable.

(a) Write

$$\frac{8}{\sqrt{6}-\sqrt{2}}$$

in the form $a\sqrt{6} + b\sqrt{2}$, where a and b are integers to be found.

(2 marks)

(b) Hence, or otherwise, solve the equation

$$\sqrt{6}\,x = \sqrt{2}\,x + 8$$

giving your answer in its simplest form.

(3 marks)

Total for question = 5 marks

Question 8

Given that

$$y = \frac{9x^4}{16}, \quad x > 0$$

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

(a) $y^{-1/2}$

(3 marks)

(b) $(16y)^{3/2}$

(2 marks)

Total for question = 5 marks

Question 9

Simplify the following expressions fully.

(a) $(x^8)^{1/4}$

(1 marks)

(b)

$$\sqrt{3}\,(x^4) \div \sqrt{\frac{27}{x^2}}$$

(2 marks)

Total for question = 3 marks

Question 10

(a) Write 4^{2x+3} in the form 2^{a}, where a is an expression in x.

(1 marks)

(b) Hence solve, without using a calculator, the equation

$$2^{x} \times 4^{2x+3} = 8^{2x}$$

(4 marks)

Total for question = 5 marks