CLASSIFIED

International Examinations Papers

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MATHEMATICS A

TOPIC- Surds

1 Express $\sqrt{48} + \sqrt{108}$ in the form $k\sqrt{6}$ where k is a surd.

2 Show that $\dfrac{\sqrt{3} + \sqrt{27}}{\sqrt{2}}$ can be expressed in the form $\sqrt{k}$ where k is an integer.

State the value of k.

$k =$ ....

(Total for Question 2 is 3 marks)

3 Show that $(6 - \sqrt{8})^2 = 44 - 24\sqrt{2}$

Show each stage of your working clearly.

4 $(3 + \sqrt{a})(4 + \sqrt{a}) = 17 + k\sqrt{a}$ where a and k are positive integers.

Find the value of a and the value of k.

$a =$ ....

$k =$ ....

5 $\left(\sqrt{a} + \sqrt{8a}\right)^2 = 54 + b\sqrt{2}$

a and *b* are positive integers.
Find the value of *a* and the value of *b*.
Show your working clearly.

$a =$ ....

$b =$ ....

(Total for Question 5 is 3 marks)

6 Given that $(5 - \sqrt{x})^2 = y - 20\sqrt{2}$ where *x* and *y* are positive integers, find the value of *x* and the value of *y*.

x

y

(Total for Question 6 is 3 marks)

7 Given that x and y are positive integers such that $(1 + \sqrt{x})(3 + \sqrt{x}) = y + 4\sqrt{5}$ find the value of x and the value of y.

$x = \text{.........................}$

$y = \text{.........................}$

(Total for Question 7 is 3 marks)

8 (a) Expand $(5 + 3\sqrt{2})^2$

Give your answer in the form $(a + b\sqrt{2})$, where a and b are integers.
Show your working clearly.

(b) $(5 + 3\sqrt{2})^2 = p + \dfrac{q}{\sqrt{8}}$, where p and q are integers.

Find the value of q.

(Total for Question 8 is 5 marks)

9 (a) Write $\dfrac{1}{32}$ as a power of 2

(2)

(b) Show that $(4 + \sqrt{12})(5 - \sqrt{3}) = 14 + 6\sqrt{3}$

Show each stage of your working clearly.

(3)

(Total for Question 9 is 5 marks)

10 (a) Show that $(3 + 2\sqrt{2})(4 - \sqrt{2}) = 8 + 5\sqrt{2}$

Show your working clearly.

(2)

(b) Rationalise the denominator and simplify fully $\dfrac{10 + 3\sqrt{2}}{\sqrt{2}}$

Show your working clearly.

(2)

(Total for Question 10 is 4 marks)

11 (a) Show that $\left(5 - \sqrt{8}\right)\left(7 + \sqrt{2}\right) = 31 - 9\sqrt{2}$

Show each stage of your working.

(3)

Given that c is a prime number,

(b) rationalise the denominator of $\dfrac{3c - \sqrt{c}}{\sqrt{c}}$

Simplify your answer.

(2)

(Total for Question 11 is 5 marks)

12

$$\frac{1}{5^3} = 5^p \qquad 1 = 5^q \qquad \sqrt{5^3} = 5^r$$

(a) Write down the value of

    (i) p

$p =$ ....

(3)

$$\frac{14}{\sqrt{245}} \qquad \frac{2\sqrt{5}}{5}$$

(2)

$$\left(-2\sqrt{3}\right)^2 \qquad 20\sqrt{3}$$

(3)

(Total for Question 12 is 8 marks)

1 (a) Work out the value of $\dfrac{\sqrt{4.6}}{8.1 - 3.7}$

Give your answer as a decimal.
Write down all the figures on your calculator display.

....

(2)

(b) Write your answer to part (a) correct to 3 significant figures.

....

(1)

(Total for Question 1 is 3 marks)

2 (a) Simplify fully $\dfrac{50x^2 - 8}{10x - 4}$

Show clear algebraic working.

....

(3)

(b) Given that a is a positive integer, show that

$$\sqrt{3a}\left(\sqrt{12a} + a\sqrt{3a}\right)$$

is always a multiple of 3

(3)

(Total for Question 2 is 6 marks)

3 Simplify $(7 + 2\sqrt{50})(5 - 2\sqrt{2})$

Give your answer in the form $a + b\sqrt{18}$ where a and b are integers.
Show your working clearly.