

- 1 Show that  $\frac{\sqrt{8}}{\sqrt{8}-2}$  can be written in the form  $n + \sqrt{n}$ , where  $n$  is an integer.  
Show your working clearly.

(3)

- (b) Show that  $\frac{\sqrt{20} + \sqrt{80}}{\sqrt{3}}$  can be expressed in the form  $\sqrt{a}$  where  $a$  is an integer.

Show your working clearly.

(3)

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(Total for Question 1 is 6 marks)

- 2 Show that  $\frac{2}{6 - 3\sqrt{2}}$  can be written in the form  $\frac{a + \sqrt{a}}{b}$   
where  $a$  and  $b$  are integers.  
Show your working clearly.

(3)

Given that  $y$  is a prime number,

- (b) express  $\frac{3}{2 - \sqrt{y}}$  in the form  $\frac{a + b\sqrt{y}}{c - y}$  where  $a$ ,  $b$  and  $c$  are integers.

(2)

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(Total for Question 2 is 5 marks)

3  $a = \sqrt{8} + 4$

$$b = \sqrt{8} - 4$$

$(a - b)(a + b)$  can be written in the form  $y\sqrt{4y}$

Find the value of  $y$

Show your working clearly.

$$y = \dots\dots\dots$$

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**(Total for Question 3 is 3 marks)**

- 4 Given that  $(8 - \sqrt{x})(5 + \sqrt{x}) = y\sqrt{x} + 21$  where  $x$  is a prime number and  $y$  is an integer, find the value of  $x$  and the value of  $y$ . Show each stage of your working clearly.

$x =$  .....

$y =$  .....

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(Total for Question 4 is 3 marks)

- 5** (a) Rationalise the denominator of  $\frac{a + \sqrt{4b}}{a - \sqrt{4b}}$  where  $a$  is an integer and  $b$  is a prime number.

Simplify your answer.

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**(Total for Question 5 is 3 marks)**

**6**

(a) Show that  $(6 + 2\sqrt{12})^2 = 12(7 + 4\sqrt{3})$

Show each stage of your working.

(3)

(b) Without using a calculator, rationalise the denominator of  $\frac{6}{3 - \sqrt{7}}$

Simplify your answer.

You must show each stage of your working.

.....  
(Total for Question 6 is 6 marks)

7

Show that  $\frac{4 + \sqrt{8}}{\sqrt{2} - 1}$  can be written in the form  $a + b\sqrt{2}$ , where  $a$  and  $b$  are integers.

Show each stage of your working clearly and give the value of  $a$  and the value of  $b$ .

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**(Total for Question 7 is 3 marks)**

- 8 Express  $\frac{8}{\sqrt{5}-1}$  in the form  $\sqrt{a} + b$  where  $a$  and  $b$  are integers.  
Show each stage of your working clearly.

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(Total for Question 8 is 3 marks)

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9 Show that  $\frac{\sqrt{12}}{\sqrt{3} + 2}$

can be written in the form  $a + \sqrt{b}$  where  $a$  and  $b$  are integers.

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(Total for Question 9 is 3 marks)

- 10** Without using a calculator, show that  $\frac{12}{\sqrt{2}-1} - (\sqrt{2})^5 = 2\sqrt{32} + 12$   
Show your working clearly.

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**(Total for Question 10 is 3 marks)**

**11** Express  $\frac{3 + \sqrt{8}}{(\sqrt{2} - 1)^2}$  in the form  $p + \sqrt{q}$  where  $p$  and  $q$  are integers.

Show each stage of your working clearly.

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**(Total for Question 11 is 4 marks)**

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- 12 (a) Show that  $\sqrt{45} + \sqrt{20} = 5\sqrt{5}$   
Show your working clearly.

(2)

- (b) Express  $\frac{2}{\sqrt{3}-1}$  in the form  $p + \sqrt{q}$   
where  $p$  and  $q$  are integers.  
Show your working clearly.

.....  
(2)

- (c) Express  $x^2 + 6\sqrt{2}x - 1$  in the form  $(x + a)^2 + b$   
Show your working clearly.

.....  
(2)

(Total for Question 12 is 6 marks)

**13** The area of a rectangle is  $18 \text{ cm}^2$

The length of the rectangle is  $(\sqrt{7} + 1) \text{ cm}$ .

Without using a calculator and showing each stage of your working,

find the width of the rectangle.

Give your answer in the form  $a\sqrt{b} + c$  where  $a$ ,  $b$  and  $c$  are integers.

..... cm

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**(Total for Question 13 is 3 marks)**