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

Show your working clearly.

(3)

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

Show your working clearly.

(3)

(Total for Question 1 is 6 marks)

2 Show that $\dfrac{2}{6-3\sqrt{2}}$ can be written in the form $\dfrac{a+\sqrt{a}}{b}$

where a and b are integers.
Show your working clearly.

(3)

Given that y is a prime number,

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

....

(2)

(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.

$y =$ ....

(Total for Question 13 is 3 marks)

4 Given that $\left(8-\sqrt{x}\right)\left(5+\sqrt{x}\right)=y\sqrt{x}+21$ 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.

$x =$ ....

$y =$ ....

(Total for Question 4 is 3 marks)

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

Simplify your answer.

(Total for Question 5 is 3 marks)

6

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

Show each stage of your working.

(3)

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

Simplify your answer.
You must show each stage of your working.

....

(Total for Question 6 is 6 marks)

7

Show that $\dfrac{4 + \sqrt{8}}{\sqrt{2} - 1}$ 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.

(Total for Question 7 is 3 marks)

8 Express $\dfrac{8}{\sqrt{5}-1}$ in the form $\sqrt{a}+b$ where a and b are integers.

Show each stage of your working clearly.

....

(Total for Question 8 is 3 marks)

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

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

(Total for Question 9 is 3 marks)

10 Without using a calculator, show that $\frac{12}{\sqrt{2}-1} - \left(\sqrt{2}\right)^5 = 2\sqrt{32} + 12$

Show your working clearly.

(Total for Question 10 is 3 marks)

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

Show each stage of your working clearly.

....

(Total for Question 11 is 4 marks)

12 (a) Show that $\sqrt{45} + \sqrt{20} = 5\sqrt{5}$

Show your working clearly.

(2)

(b) Express $\dfrac{2}{\sqrt{3} - 1}$ 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 $\left(\sqrt{7}+1\right)$ 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

(Total for Question 13 is 3 marks)