1. **[2 marks]**

Express $\sqrt{98}$ in the form $a\sqrt{b}$ where a and b are integers and $a > 1$.

....

2. **[3 marks]**

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

....

3. **[2 marks]**

Show that $\sqrt{27} + \sqrt{147}$ can be expressed in the form $a\sqrt{b}$, where a and b are integers.

....

(2)

4. **[3 marks]**

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.

....

5. **[3 marks]**

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

Show each stage of your working clearly.

6. **[4 marks]**

(a) Show that $\sqrt{48} + \sqrt{108}$ can be expressed in the form $a\sqrt{b}$, where a and b are integers.

....

(2)

(b) Show that $(5 - \sqrt{12})(6 - \sqrt{3}) = 36 - 17\sqrt{3}$
Show each stage of your working.

....

(2)

7. **[3 marks]**

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.

$k =$ ....

8. **[4 marks]**

(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)

9. **[2 marks]**

Show that $\dfrac{12}{\sqrt{8}} = 3\sqrt{2}$

10. **[5 marks]**

(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.

....
(2)

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

Find the value of q.

$q =$ ....
(3)

11. **[3 marks]**

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.

$x =$ ....

$y =$ ....

12. **[3 marks]**

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

Find the value of a and the value of k.

$a =$ ....

$k =$ ....

13. **[3 marks]**

A trapezium $ABCD$ has an area of $5\sqrt{6}$ cm^2.

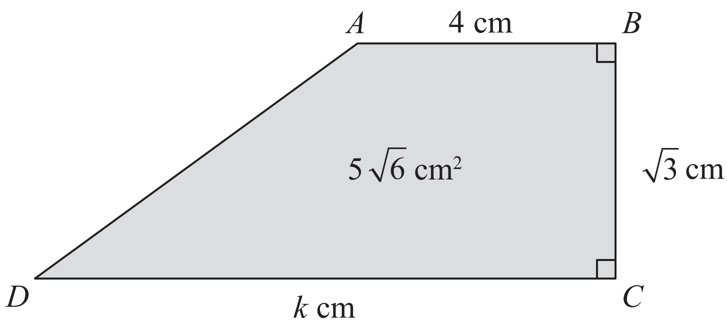

Diagram **NOT** accurately drawn

$AB = 4$ cm.
$BC = \sqrt{3}$ cm.
$DC = k$ cm.

Calculate the value of k, giving your answer in the form $a\sqrt{b} - c$ where a, b and c are positive integers.
Show each step in your working.

$k =$ ....

14. **[5 marks]**

(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)

15. **[3 marks]**

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

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

$a =$ ....

$b =$ ....

16. **[3 marks]**

$(a + \sqrt{b})^2 = 49 + 12\sqrt{b}$ where a and b are integers, and b is prime.

Find the value of a and the value of b

$a =$ ....

$b =$ ....

17. **[3 marks]**

Simplify fully $\dfrac{(6 - \sqrt{5})(6 + \sqrt{5})}{\sqrt{31}}$

You must show your working.

....

18. **[3 marks]**

Express $\dfrac{\sqrt{18}+10}{\sqrt{2}}$ in the form $p+q\sqrt{2}$, where p and q are integers.

Show clear working out.

....

(3)

19. **[4 marks]**

Rationalise the denominator and simplify fully $\dfrac{33}{4+\sqrt{5}}$

Show clear working out.

....

(4)

20. **[4 marks]**

Express $\dfrac{39}{4-\sqrt{3}}$ in the form $a+b\sqrt{3}$, where a and b are integers

Show clear working out.

....

(4)

21. **[4 marks]**

Simplify $\dfrac{7-\sqrt{5}}{2+\sqrt{5}}$, giving your answer in the form $a+b\sqrt{5}$, where a and b are integers.

Show clear working out.

....

(4)

22. **[4 marks]**

Show that $\dfrac{3}{\sqrt{27}-\sqrt{18}}$ can be written in the form $\sqrt{m}+\sqrt{n}$, where m and n are integers.

....

(4)

23. **[4 marks]**

Show that $\dfrac{16}{\sqrt{2}}-\sqrt{8}=6\sqrt{2}$

(4)