

1 Given that y is a prime number,

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

.....
(2)

(Total for Question 1 is 2 marks)

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

Show each stage of your working.

(3)

(Total for Question 2 is 3 marks)

3 The area of a rectangle is 18 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

(Total for Question 3 is 3 marks)

4 (b) Show that $\frac{2}{6 - 3\sqrt{2}}$ can be written in the form $\frac{a + \sqrt{b}}{c}$

where a and b are integers.

Show your working clearly.

(3)

(Total for Question 4 is 3 marks)

- 5** 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.

$x =$

$y =$

(Total for Question 5 is 3 marks)

6 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.

(Total for Question 6 is 4 marks)

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

(Total for Question 7 is 3 marks)

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

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

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

Find the value of y

Show your working clearly.

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

(Total for Question 8 is 3 marks)

9 The diagram shows the prism $ABCDEFGHJK$ with horizontal base $AEFG$

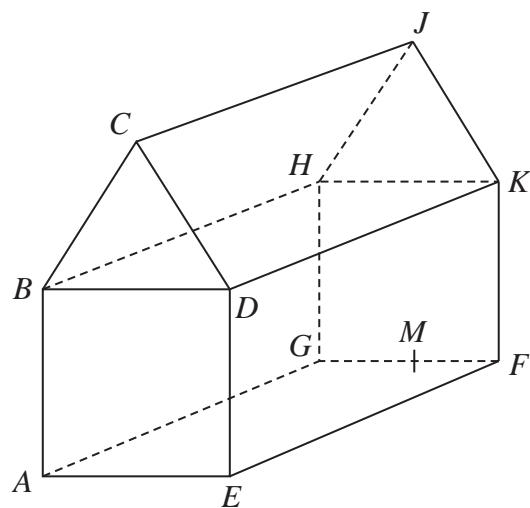


Diagram **NOT** accurately drawn

$ABCDE$ is a cross section of the prism where
 $ABDE$ is a square
 BCD is an equilateral triangle

$EF = 2 \times AE$
 M is the midpoint of GF so that JM is vertical.

Angle $MAJ = y^\circ$

Given that $\tan y^\circ = T$

find the value of T , giving your answer in the form $\frac{\sqrt{p} + \sqrt{q}}{17}$ where p and q are integers.

$T = \dots\dots\dots$

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

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

(Total for Question 10 is 3 marks)

11 Solve $\sqrt{3}(x - 2\sqrt{3}) = x + 2\sqrt{3}$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.
Show your working clearly.

$x = \dots\dots\dots$

(Total for Question 11 is 4 marks)

- 12** Given that $8\sqrt{m} + \sqrt{49m} - \sqrt{9m} = k\sqrt{m}$
where k is an integer and m is a prime number,
(a) work out the value of k

$$k = \dots\dots\dots$$

(1)

- (b) Show that $\frac{5 - \sqrt{18}}{1 - \sqrt{2}}$ can be written in the form $a + b\sqrt{2}$
where a and b are integers.
Show each stage of your working clearly.

(3)

(Total for Question 12 is 4 marks)

- 13** Show that $\frac{2\sqrt{3}}{\sqrt{3}-1}$ can be written in the form $a + \sqrt{a}$ where a is an integer.

Show your working clearly.

(Total for Question 13 is 3 marks)

14 The diagram shows a cuboid with a square cross section.

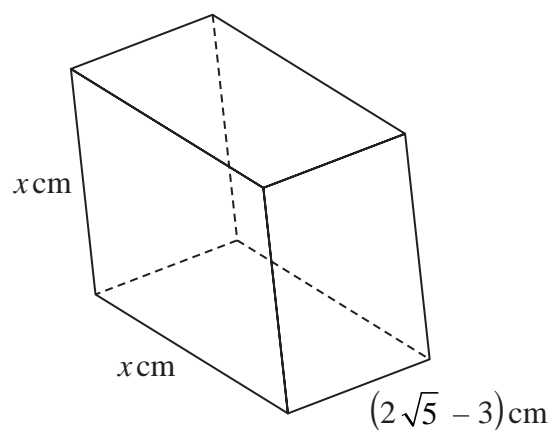


Diagram **NOT**
accurately drawn

The volume of the cuboid is $(13 + 6\sqrt{5})\text{cm}^3$

Without using a calculator, find the value of x

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

Show your working clearly.

$x = \dots\dots\dots$

(Total for Question 14 is 4 marks)