

N297 Surds

Q1.

(a) Express $5\sqrt{27}$ in the form $n\sqrt{3}$, where n is a positive integer.

..... (2)

(b) Rationalise the denominator of $\frac{21}{\sqrt{3}}$

..... (2)

(Total for Question is 4 marks)

Q2.

Expand $(1 + \sqrt{2})(3 - \sqrt{2})$

Give your answer in the form $a + b\sqrt{2}$ where a and b are integers.

.....
(Total for Question is 2 marks)

Q3.

Show that $\frac{(4 - \sqrt{3})(4 + \sqrt{3})}{\sqrt{13}}$ simplifies to $\sqrt{13}$

(Total for question = 2 marks)

Q4.

Simplify fully $(\sqrt{a} + \sqrt{4b})(\sqrt{a} - 2\sqrt{b})$

.....
(Total for question = 3 marks)

Q5.

$(a + \sqrt{8})^2$ can be written in the form $c + d\sqrt{2}$, where a , c and d are integers.

Find, in terms of a , an expression for **c** and an expression for **d** .

$c = \dots\dots\dots$

$d = \dots\dots\dots$

(Total for question = 3 marks)

Q6.

Show that $\frac{3 + \sqrt{2}}{5 + \sqrt{8}}$ can be written as $\frac{11 - \sqrt{2}}{17}$

(Total for question = 3 marks)

Q7.

Show that $\frac{6 - \sqrt{8}}{\sqrt{2} - 1}$ can be written in the form $a + b\sqrt{2}$ where a and b are integers.

(Total for question = 3 marks)

Q8.

$\frac{\sqrt{3}}{5} + \frac{2}{\sqrt{3}} = a\sqrt{3}$, where a is a fraction

Find the value of a .

.....
(Total for question = 3 marks)

Q9.

Show that $\frac{4}{\frac{1}{\sqrt{3}} + \sqrt{3}}$ can be written as $\sqrt{3}$

(Total for question = 3 marks)

Q10.

Show that $\frac{1}{1 + \frac{1}{\sqrt{2}}}$ can be written as $2 - \sqrt{2}$

(Total for question = 3 marks)

Q11.

$\frac{1 + \sqrt{2}}{(3 - \sqrt{2})^2}$ can be written in the form $a + b\sqrt{2}$

Find the value of a and the value of b .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

(Total for question = 5 marks)

Q12.

(a) Express $\sqrt{3} + \sqrt{12}$ in the form $a\sqrt{3}$ where a is an integer.

.....
(2)

(b) Express $\left(\frac{1}{\sqrt{3}}\right)^7$ in the form $\frac{\sqrt{b}}{c}$ where b and c are integers.

.....
(3)

(Total for question = 5 marks)

Q13.

The perimeter of a square is $\sqrt{120}$ cm.

Work out the area of the square.

Give your answer in its simplest form.

.....cm²

(Total for Question is 3 marks)

Q14.

ABD is a right angled triangle.

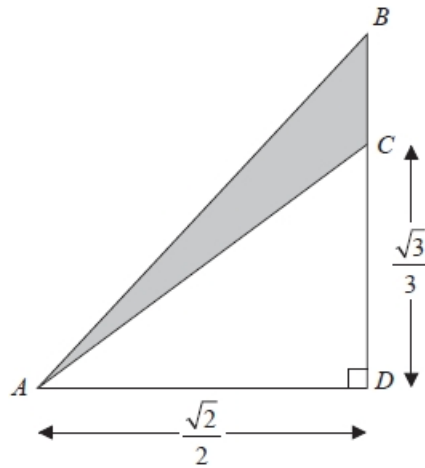


Diagram NOT accurately drawn

All measurements are given in centimetres.

C is the point on BD such that $CD = \frac{\sqrt{3}}{3}$

$$AD = BD = \frac{\sqrt{2}}{2}$$

Work out the exact area, in cm^2 , of the shaded region.

..... cm^2

(Total for question = 3 marks)

Q15.

Here is a trapezium.

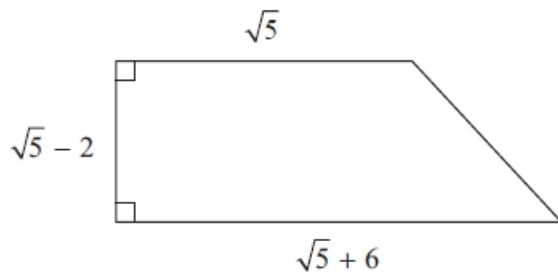


Diagram **NOT**
accurately drawn

All measurements shown are in centimetres.

Work out the area of the trapezium.

Give your answer in cm^2 in the form $a\sqrt{5} + b$ where a and b are integers.

..... cm^2

(Total for question = 3 marks)

Q16.

* The diagram shows a triangle DEF inside a rectangle $ABCD$.

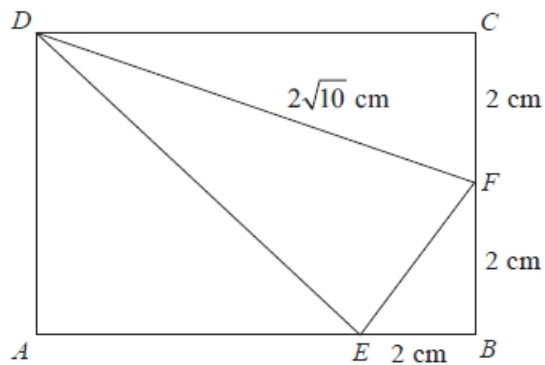


Diagram **NOT** accurately drawn

Show that the area of triangle DEF is 8 cm^2 .
You must show all your working.

(Total for question = 4 marks)

Q17.

* The diagram shows the triangle PQR .

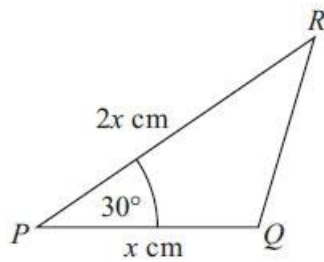


Diagram **NOT**
accurately drawn

$$PQ = x \text{ cm}$$

$$PR = 2x \text{ cm}$$

$$\text{Angle } QPR = 30^\circ$$

The area of triangle $PQR = A \text{ cm}^2$

Show that $x = \sqrt{2A}$

(Total for Question is 3 marks)

Q18.

$a = \sqrt{7} + \sqrt{c}$ and $b = \sqrt{63} + \sqrt{d}$ where c and d are positive integers.

Given that $c : d = 1 : 9$

find, in its simplest form, the ratio $a : b$

.....
(Total for question = 3 marks)

Q19.

S is a geometric sequence.

(a) Given that $(\sqrt{x} - 1)$, 1 and $(\sqrt{x} + 1)$ are the first three terms of S, find the value of x.

You must show all your working.

.....
(3)

(b) Show that the 5th term of S is $7 + 5\sqrt{2}$

(2)

(Total for question = 5 marks)