N298 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 $\dfrac{21}{\sqrt{3}}$

....

(2)

(Total for Question is 4 marks)

Q2.

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

(Total for question = 2 marks)

Q3.

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

....

(Total for question = 3 marks)

Q4.

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

d = ...

(Total for question = 3 marks)

Q5.

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

(Total for question = 3 marks)

Q6.

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

(Total for question = 3 marks)

Q7.

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

Find the value of *a*.

....

(Total for question = 3 marks)

Q8.

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

(Total for question = 3 marks)

Q9.

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

(Total for question = 3 marks)

Q10.

ABD is a right angled triangle.
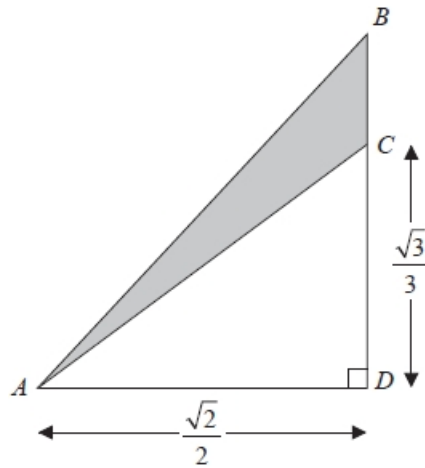
Diagram **NOT** accurately drawn

All measurements are given in centimetres.

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

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

Work out the exact area, in cm², of the shaded region.

.... cm²

(Total for question = 3 marks)

Q11.

Here is a trapezium.
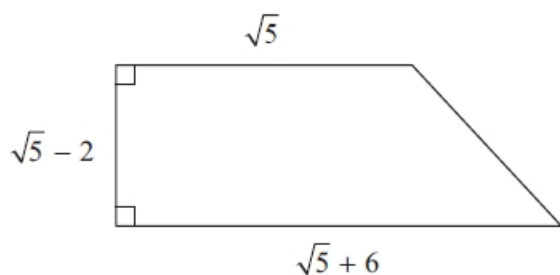
Diagram **NOT** accurately drawn

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)

Q12.

* The diagram shows the triangle *PQR*.
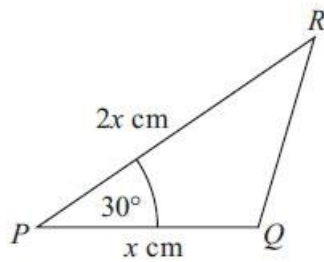
Diagram **NOT** accurately drawn

$PQ = x$ cm
$PR = 2x$ cm
 Angle $QPR = 30°$

The area of triangle $PQR = A$ cm^2

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

(Total for Question is 3 marks)

Q13.

$a = \sqrt{7} + \sqrt{c}$ 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)

Q14.

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)

Q15.

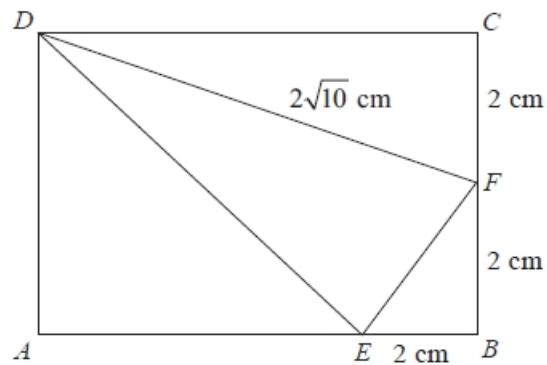* The diagram shows a triangle *DEF* inside a rectangle *ABCD*.

Diagram **NOT**
accurately drawn

Show that the area of triangle *DEF* is 8 cm².
You must show all your working.

(Total for question = 4 marks)