Questions

Q1.

Show that $\frac{8+\sqrt{12}}{5+\sqrt{3}}$ can be written in the form $\frac{a+\sqrt{3}}{b}$, where *a* and *b* are integers.

(Total for question = 4 marks)

(**Q19 1MA1/1H, Nov 2021**)

Q2.

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

.....

(Total for question = 3 marks)

(**Q18 1MA1/2H/S2, Specimen papers**)

Q3.

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)

(**Q23 1MA1/2H, Nov 2017**)

Q4.

$\sqrt{5}(\sqrt{8} + \sqrt{18})$ can be written in the form $a\sqrt{10}$ where a is an integer.

Find the value of a.

a = ...

(Total for question = 3 marks)

(**Q13 1MA1/1H, June 2018**)

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 = ...

d = ...

(Total for question = 3 marks)

(**Q22 1MA1/2H/M2, Specimen papers**)

Q6.

The 2nd term of a geometric sequence is $3 + 2\sqrt{2}$

The 3rd term of the sequence is $13 + 9\sqrt{2}$

Find the value of the common ratio of the sequence.

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

You must show all your working.

.....

(Total for question = 4 marks)

(**Q22 1MA1/1H, Nov 2023**)

Q7.

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

(Total for question = 3 marks)

(**Q23 1MA1/1H/N, Specimen papers**)

Q8.

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

(Total for question = 3 marks)

(**Q18 1MA1/1H/M2, Specimen papers**)

Q9.

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

(Total for question = 2 marks)

(**Q14 1MA1/1H/S2, Specimen papers**)

Q10.

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

(Total for question = 3 marks)

(**Q21 1MA1/1H/M1, Specimen papers**)

Q11.

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)

(**Q21 1MA1/1H, Nov 2017**)

Q12.

Martin did this question.

Rationalise the denominator of $\frac{14}{2+\sqrt{3}}$

Here is how he answered the question.

$$\frac{14}{2+\sqrt{3}} = \frac{14 \times (2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})}$$

$$= \frac{28-14\sqrt{3}}{4+2\sqrt{3}-2\sqrt{3}+3}$$

$$= \frac{28-14\sqrt{3}}{7}$$

$$= 4-2\sqrt{3}$$

Martin's answer is wrong.

(a) Find Martin's mistake.

.....

.....

(1)

Sian did this question.

Rationalise the denominator of $\frac{5}{\sqrt{12}}$

Here is how she answered the question.

$$\frac{5}{\sqrt{12}} = \frac{5\sqrt{12}}{\sqrt{12} \times \sqrt{12}}$$

$$= \frac{5 \times 3\sqrt{2}}{12}$$

$$= \frac{5\sqrt{2}}{4}$$

Sian's answer is wrong.

(b) Find Sian's mistake.

.....

.....

(1)

(Total for question = 2 marks)

(Q20 1MA1/2H, June 2018)

Q13.

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

You must show your working.

.....

(Total for question is 3 marks)

(**Q19 1MA1/1H/S1, Specimen papers**)

Q14.

$a = \sqrt{7} + \sqrt{c}$ 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 1MA1/3H/M2, Specimen papers**)

Q15.

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

Find the value of *a* and the value of *b*.

a = ...

b = ...

(Total for question = 5 marks)

(**Q19 1MA1/1H/M3, Specimen papers**)

Q16.

Show that $\frac{(\sqrt{18}+\sqrt{2})^2}{\sqrt{8}-2}$ can be written in the form $a(b+\sqrt{2})$ where *a* and *b* are integers.

(Total for question = 3 marks)

(**Q20 1MA1/1H, Nov 2018**)

Q17.

(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)

(Q18 1MA1/1H, June 2019)

Q18.

(a) Rationalise the denominator of $\frac{22}{\sqrt{11}}$

Give your answer in its simplest form.

.....

(2)

(b) Show that $\frac{\sqrt{3}}{2\sqrt{3}-1}$ can be written in the form $\frac{a+\sqrt{3}}{b}$ where a and b are integers.

(3)

(Total for question = 5 marks)

(**Q16 1MA1/1H, Nov 2019**)

Q19.

Show that $\frac{\sqrt{180}-2\sqrt{5}}{5\sqrt{5}-5}$ can be written in the form $a+\frac{\sqrt{5}}{b}$ where *a* and *b* are integers.

(Total for question = 4 marks)

(**Q20 1MA1/1H, Nov 2020**)

Q20.

Write $\frac{3\sqrt{3}}{4-\sqrt{3}} - \frac{2}{\sqrt{3}}$ in the form $\frac{a\sqrt{3}+b}{c}$ where a, b and c are integers.

.....

(Total for question = 4 marks)

(**Q23 1MA1/1H, June 2023**)

Q21.

(a) Rationalise the denominator of $\frac{1}{\sqrt{7}}$

.....

(1)

(b) Simplify fully $\sqrt{80} - \sqrt{5}$

.....

(2)

(Total for question = 3 marks)

(**Q17 1MA1/1H, June 2024**)

Q22.

Given that *a* is a prime number, rationalise the denominator of $\frac{1}{\sqrt{a}+1}$

Give your answer in its simplest form.

.....

(Total for question = 2 marks)

(**Q15 1MA1/2H, June 2024**)

Q23.

(a) Rationalise the denominator of $\frac{15}{\sqrt{5}}$

Give your answer in its simplest form.

.....

(2)

(b) Write $\frac{\sqrt{75}-2}{1+2\sqrt{3}}$ in the form $\frac{a-b\sqrt{3}}{c}$ where a, b and c are integers.

.....

(4)

(Total for question = 6 marks)

(**Q16 1MA1/1H, Nov 2024**)

Q24.

Here are the first five terms of a geometric sequence.

$$\sqrt{5} \qquad 10 \qquad 20\sqrt{5} \qquad 200 \qquad 400\sqrt{5}$$

(a) Work out the next term of the sequence.

.....

(2)

The 4th term of a different geometric sequence is $\frac{5\sqrt{2}}{4}$

The 6th term of this sequence is $\frac{5\sqrt{2}}{8}$

Given that the terms of this sequence are all positive,

(b) work out the first term of this sequence.
You must show all your working.

.....

(3)

(Total for question = 5 marks)

(**Q23 1MA1/1H, Nov 2022**)