

GCSE QUESTIONS

Q1. NON-CALCULATOR

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

$a = \dots\dots\dots$

(Total for question = 3 marks)

Q2. NON-CALCULATOR

$$\frac{1}{1 + \frac{1}{\sqrt{2}}}$$

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

(Total for question = 3 marks)

Q3. NON-CALCULATOR

$$\frac{4}{\frac{1}{\sqrt{3}} + \sqrt{3}}$$

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

(Total for question = 3 marks)

Q4. NON-CALCULATOR

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

(Total for question = 2 marks)

Q5. NON-CALCULATOR

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

(Total for question = 3 marks)

Q6. NON-CALCULATOR

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)

Q7. NON-CALCULATOR

$$\frac{(6 - \sqrt{5})(6 + \sqrt{5})}{\sqrt{31}}$$

Simplify fully

You must show your working.

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

Q8. NON-CALCULATOR

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

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)

Q9. NON-CALCULATOR

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)

Q10. NON-CALCULATOR

(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)

Q11. NON-CALCULATOR

- (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)

Q12. CALCULATOR ALLOWED

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

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

Q13. CALCULATOR ALLOWED

Martin did this question.

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

Here is how he answered the question.

$$\begin{aligned} \frac{14}{2 + \sqrt{3}} &= \frac{14 \times (2 - \sqrt{3})}{(2 + \sqrt{3})(2 - \sqrt{3})} \\ &= \frac{28 - 14\sqrt{3}}{4 + 2\sqrt{3} - 2\sqrt{3} + 3} \\ &= \frac{28 - 14\sqrt{3}}{7} \\ &= 4 - 2\sqrt{3} \end{aligned}$$

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.

$$\begin{aligned} \frac{5}{\sqrt{12}} &= \frac{5\sqrt{12}}{\sqrt{12} \times \sqrt{12}} \\ &= \frac{5 \times 3\sqrt{2}}{12} \\ &= \frac{5\sqrt{2}}{4} \end{aligned}$$

Sian's answer is wrong.

(b) Find Sian's mistake.

.....

(1)
 (Total for question = 2 marks)

Q14. CALCULATOR ALLOWED

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

Q15. CALCULATOR ALLOWED

$(a + \sqrt{8})^2$ 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)

Q16. CALCULATOR ALLOWED

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.

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

.....
(3)

(2)
(Total for question = 5 marks)