

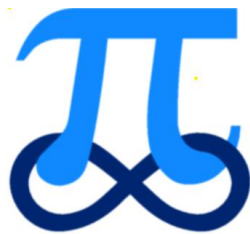
Kumarmaths

Pearson Edexcel

GCSE Maths 9 -1

Past Exam Questions
by Topics.

Algebra: Surds-Higher



1. (a) Write down the value of $49^{\frac{1}{2}}$

.....
(1)

(b) Write $\sqrt{45}$ in the form $k\sqrt{5}$, where k is an integer.

.....
(1)

(2 marks)

2. Express $\sqrt{48} + \sqrt{108}$ in the form $k\sqrt{6}$ where k is a surd.

.....
(3 marks)

3. (a) Rationalise the denominator of $\frac{6}{\sqrt{5}}$

.....
(2)

(b) Expand and simplify $(2 + \sqrt{10})(\sqrt{5} + \sqrt{20})$

.....
(4)

(6 marks)

4. Work out $(2 + \sqrt{3})(2 - \sqrt{3})$
Give your answer in its simplest form.

.....
(2 marks)

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

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

.....

(2 marks)

6. (a) Write the following five numbers in order of size.
Start with the smallest number.

$$2^0 \qquad \sqrt{2} \qquad \frac{1}{2} \qquad 2^{-2} \qquad \frac{1}{\sqrt{2}}$$

.....

(2)

(b) Simplify $\left(\frac{2}{\sqrt{2}}\right)^3$

Give your answer in the form $a\sqrt{2}$ where a is an integer.

.....

(3)

(5 marks)

7. Given that $\frac{8 - \sqrt{18}}{\sqrt{2}} = a + b\sqrt{2}$, where a and b are integers,

find the value of a and the value of b .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

(3 marks)

8. 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.

(3 marks)

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

Find the value of a .

$a = \dots\dots\dots$

(3 marks)

10. 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.

(3 marks)

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

(3 marks)

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

(3 marks)

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

$c = \dots\dots\dots$

$d = \dots\dots\dots$

(3 marks)

14. $a = \sqrt{7} + \sqrt{c}$ 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 $a : b$

$\dots\dots\dots$

(3 marks)

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

Find the value of a and the value of b .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

(5 marks)

16. (a) Simplify

$$\sqrt{32} + \sqrt{18},$$

giving your answer in the form $a\sqrt{2}$, where a is an integer.

(2)

(b) Simplify

$$\frac{\sqrt{32} + \sqrt{18}}{3 + \sqrt{2}},$$

giving your answer in the form $b\sqrt{2} + c$, where b and c are integers.

(4)

(6 marks)

17. Martin did this question.

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

Here is how he answered the question.

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

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.

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

Sian's answer is wrong.

(b) Find Sian's mistake.

.....
.....

(1)

(2 marks)

18. A trapezium $ABCD$ has an area of $5\sqrt{6} \text{ cm}^2$.

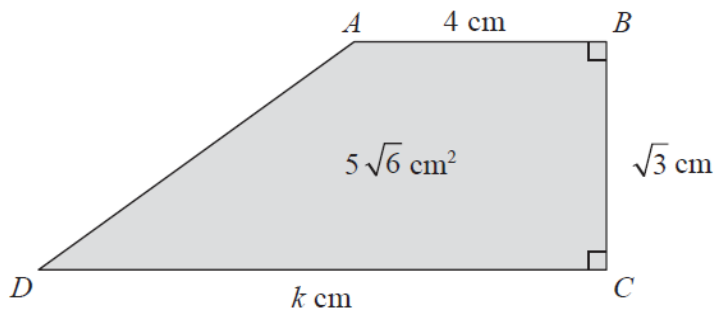


Diagram **NOT** accurately drawn

- $AB = 4 \text{ cm}$.
- $BC = \sqrt{3} \text{ cm}$.
- $DC = k \text{ cm}$.

Calculate the value of k , giving your answer in the form $a\sqrt{b} - c$, where a , b and c are positive integers. Show each step in your working.

$k = \dots\dots\dots$

(3 marks)