

Name: \_\_\_\_\_

## GCSE (1 – 9)

### Surds

#### Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

#### Information

- The marks for each question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

#### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end

1 Write  $\sqrt{48}$  in the form  $k\sqrt{3}$ , where  $k$  is an integer.

.....  
**(Total for question 1 is 2 marks)**

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2 Write  $\sqrt{50}$  in the form  $k\sqrt{2}$ , where  $k$  is an integer.

.....  
**(Total for question 2 is 2 marks)**

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3 Write  $5\sqrt{27}$  in the form  $k\sqrt{3}$ , where  $k$  is an integer.

.....  
**(Total for question 3 is 2 marks)**

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4 Write  $7\sqrt{20}$  in the form  $k\sqrt{5}$ , where  $k$  is an integer.

.....  
**(Total for question 4 is 2 marks)**

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5 Expand and Simplify  $(2 + \sqrt{3})(2 - \sqrt{3})$

.....  
**(Total for question 5 is 2 marks)**

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6 Write  $(3 + \sqrt{5})^2$  in the form  $a + b\sqrt{5}$ , where  $a$  and  $b$  are integers.

.....  
**(Total for question 6 is 2 marks)**

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7 Expand and Simplify  $(2 + \sqrt{5})(1 - \sqrt{5})$

.....  
**(Total for question 7 is 2 marks)**

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8 Write  $(3 - \sqrt{2})^2$  in the form  $a + b\sqrt{2}$ , where  $a$  and  $b$  are integers.

.....  
**(Total for question 8 is 2 marks)**

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9 Expand and Simplify  $(2 + \sqrt{3})^2 - (2 - \sqrt{3})^2$

.....  
(Total for question 9 is 2 marks)

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10 Rationalise the denominator  $\frac{6}{\sqrt{3}}$

.....  
(Total for question 10 is 2 marks)

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11 Rationalise the denominator  $\frac{x}{\sqrt{x}}$

.....  
(Total for question 11 is 2 marks)

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12 Rationalise the denominator  $\frac{1 + \sqrt{5}}{\sqrt{2}}$

.....  
(Total for question 12 is 2 marks)

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13 Simplify  $\frac{(3+\sqrt{6})}{\sqrt{3}}$

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**(Total for question 13 is 3 marks)**

14 Simplify fully  $\frac{(4+2\sqrt{3})(4-2\sqrt{3})}{\sqrt{11}}$

You must show all your working.

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**(Total for question 14 is 3 marks)**

15 Show that  $\frac{5 + 2\sqrt{3}}{2 + \sqrt{3}}$  can be written as  $4 - \sqrt{3}$

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**(Total for question 15 is 3 marks)**

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

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**(Total for question 16 is 3 marks)**

17 Show that  $\frac{1}{\frac{1}{\sqrt{2}} + \sqrt{2}}$  can be written as  $\frac{\sqrt{2}}{3}$

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**(Total for question 17 is 3 marks)**

18 Show that  $\frac{2}{\frac{1}{\sqrt{3}} + 1}$  can be written as  $3 - \sqrt{3}$

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**(Total for question 18 is 3 marks)**

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

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**(Total for question 19 is 2 marks)**

20 Simplify fully  $(2a + \sqrt{b})^2$

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**(Total for question 20 is 2 marks)**