

Surds – Advanced

Please write clearly in block capitals

Forename:

Surname:

Materials

For this paper you must have:

- mathematical instruments



You must **not** use a calculator.

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- You may ask for graph paper, tracing paper and more answer paper. These must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.

1 Rationalise the denominator of the following expressions (Level 6)

Give all answers in their simplest form.

1(a) $\frac{1}{\sqrt{5}}$

[1 mark]

Answer _____

1(b) $\frac{\sqrt{7}}{\sqrt{3}}$

[1 mark]

Answer _____

1(c) $\frac{\sqrt{3} + 1}{\sqrt{6}}$

[1 mark]

Answer _____

1(d) $\frac{\sqrt{18} + 8}{\sqrt{3}}$

[2 marks]

Answer _____

Turn over for next question

2 Rationalise the denominator of the following expressions

(Level 6)

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

[2 marks]

Answer _____

2(b) $\frac{3}{\sqrt{6} + 3}$

[2 marks]

Answer _____

2(c) $\frac{10}{\sqrt{7} - 6}$

[2 marks]

Answer _____

Turn over for next question

3 Rationalise the denominator of the following expressions

(Level 6)

3(a) $\frac{\sqrt{3} + 1}{\sqrt{5} + 2}$

[2 marks]

Answer _____

3(b) $\frac{3 + \sqrt{2}}{\sqrt{6} + 3}$

[2 marks]

Answer _____

3(c) $\frac{\sqrt{21} + 7}{\sqrt{21} - 7}$

[3 marks]

Answer _____

Turn over for next question

Turn over ►

4 Rationalise the denominators of the following expressions and simplify where possible. (Level 6)

4(a) $\frac{8 + \sqrt{5}}{4 - \sqrt{5}}$

[2 marks]

Answer _____

4(b) $\frac{1}{(5 - \sqrt{2})^2}$

[3 marks]

Answer _____

Turn over for next question

5

Simplify,

(Level 6)

$$\frac{6 - 5\sqrt{5}}{3\sqrt{5} - 2}$$

Give your answer in the form $a + b\sqrt{5}$, where a and b are rational numbers.

[4 marks]

Answer _____



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- 6 Show that the following expression can be written in the form $k\sqrt{a}$, where k and a are integers (Level 6)

$$\frac{4}{3}\sqrt{\frac{300}{4}} + \frac{10}{\sqrt{3}}$$

[4 marks]

Answer _____

- 7 Show that the following expression can be written as $\frac{a}{b}\sqrt{c}$, where a , b and c are all integers: (Level 6)

$$\left(\frac{4}{3}\right)^{\frac{1}{2}} + \left(\frac{1}{3}\right)^{-\frac{1}{2}}$$

[3 marks]

Answer _____

Turn over for next question

Turn over ►

8 Simplify the following expression:

(Level 6)

$$\sqrt{4\frac{12}{9} + \left(\frac{1}{3}\right)^{\frac{1}{2}}}$$

Give your answer in the form $\frac{a\sqrt{3}}{b}$, where a and b are integers

[4 marks]

Answer _____



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