

Lesson 8

A-Level Pure Mathematics : Year 1
GCSE (Grades 8 and 9)
Algebra of Surds and Indices I

8.1 Revision

*Any solution based entirely on graphical
or numerical methods is not acceptable*

Marks Available : 56

Do NOT use a calculator

Question 1

GCSE Examination Question, June 2016, Paper 4H, Q5

(a) Simplify $m^5 \times m^2$ [1 mark]

(b) Simplify $\frac{c^{11}}{c^3}$ [1 mark]

(c) Simplify $(a^5)^3$ [1 mark]

(d) Expand and simplify $4(2x + 3) + 2(x + 5)$ [2 marks]

Question 2

A-Level Examination Question from June 2009, C1, Q1 (Edexcel)

(a) Simplify $(3\sqrt{7})^2$ [1 mark]

(b) Showing the non-calculator method used, simplify $(8 + \sqrt{5})(2 - \sqrt{5})$

[3 marks]

Question 3

A-Level Examination Question from January 2007, C1, Q2 (Edexcel)

- (a) Show how to express $\sqrt{108}$ in the form $a\sqrt{3}$, where a is an integer, without the use of a calculator.

[1 mark]

- (b) Show how to express $(2 - \sqrt{3})^2$ in the form $b + c\sqrt{3}$, where b and c are integers to be found, without the use of a calculator.

[3 marks]

Question 4

Evaluate each of the following without the use of a calculator.

Write your answers in the form $a\sqrt{b}$ where a and b are integers and b is \square free.

(i) $5\sqrt{21} \times \sqrt{45}$

(ii) $2\sqrt{70} \times \sqrt{90}$

[4 marks]

Question 5

A-Level Examination Question from May 2014, C1, Q2 (Edexcel)

- (a) Write down the value of $32^{\frac{1}{5}}$

[1 mark]

- (b) Simplify fully, $(32x^5)^{-\frac{2}{5}}$

[3 marks]

Question 6

- (i) Write 726 as a product of primes.
You may use the factorise button on your calculator.

[1 mark]

- (ii) If $\sqrt{726} = v\sqrt{6}$ find v

[1 mark]

Question 7

- (i) Write 1350 as a product of primes
You may use the factorise button on your calculator

[1 mark]

- (ii) If $\sqrt{1350} = w\sqrt{6}$ find w

[1 mark]

Question 8

Using your answers from questions 6 and 7, or otherwise, find $\sqrt{726} + \sqrt{1350}$

[1 mark]

Question 9

A-Level Examination Question from May 2006, C1, Q6 (Edexcel)

- (a) Demonstrate how to expand and simplify without the use of a calculator

$$(4 + \sqrt{3})(4 - \sqrt{3})$$

[2 marks]

- (b) Making a non-calculator method clear, express

$$\frac{26}{4 + \sqrt{3}}$$

in the form $a + b\sqrt{3}$, where a and b are integers.

[2 marks]

Question 10

GCSE Examination Question, June 2016, Q19 edited

Simplify,

$$(7 + 2\sqrt{50})(5 - 2\sqrt{2})$$

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

Show your working clearly.

[3 marks]

Question 11

Rationalise the denominator, $\frac{1 + \sqrt{3}}{2 - \sqrt{3}}$

[4 marks]

Question 12

A-Level Examination Question from June 2009, C1, Q2 (Edexcel)

Given that

$$32\sqrt{2} = 2^a$$

find the value of a .

[3 marks]

Question 13

Without using a calculator, and making your method clear, find the square root of

$$2^7 \times 3^2 \times 5^3$$

Writing your answer in the form $a\sqrt{b}$ where a and b are integers and b is \square free.

[3 marks]

Question 14

A-Level Examination Question from January 2012, C1, Q2 (Edexcel)

(a) Without using a calculator, show how to simplify

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

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

[2 marks]

(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.

Show full working.

[4 marks]

Question 15

GCSE Examination Question, January 2016, Paper 3H, Q4 (d)

Simplify fully

$$\frac{36k^3m^4}{30k^5m}$$

[2 marks]

Question 16

GCSE Examination Question, January 2016, Paper 4H, Q17 (a)

Simplify

$$\left(\frac{8e^6}{f^{12}} \right)^{\frac{1}{3}}$$

[2 marks]

Question 17

GCSE Examination Question from January 2016, Paper 4H, Q25

$y = 16 \times 10^{8k}$ where k is an integer.

Find an expression, in terms of k for $y^{\frac{5}{4}}$

Give your answer in standard form.

[3 marks]

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