

Bidmas, Powers & Roots (H)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

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Total Marks:	

1. Evaluate $3^{-2} \times 9^{\frac{1}{2}}$ giving your answer as a recurring decimal.

$$3^{-2} = \frac{1}{3^2} = \frac{1}{9} \quad 9^{\frac{1}{2}} = \sqrt{9} = 3 \quad 3^{-2} \times 9^{\frac{1}{2}} = \frac{1}{9} \times 3 = \frac{3}{9} = \frac{1}{3} = 0.\dot{3} \quad [3]$$

2. Simplify $3^4 \times 3^4$

Circle the answer.

3^8

9^8

3^{16}

9^{16}

[1]

3. (a) Write down the value of $64^{\frac{1}{2}}$

$\sqrt{64} = 8$

[1]

- (b) Find the value of $\left(\frac{8}{125}\right)^{-\frac{2}{3}}$

$$= \left(\frac{125}{8}\right)^{\frac{2}{3}} = \frac{(3\sqrt{125})^2}{(\sqrt[3]{8})^2} = \frac{5^2}{2^2} = \frac{25}{4} = 6.25 \quad [2]$$

4. In the formula $T = (n - 6)^2 + 1$ n is a positive integer.

- (a) Kim says,

n	1	2	3	4	5	6	7	8	9
T	26	17	10	5	2	1	2	5	10

"The value of T is always greater than 1

because $(n - 6)^2$ is always greater than 0"

Comment on her statement.

T will always be greater than or equal to 1 i.e. when $n = 6$ $T = 1$ [1]

- (b) What is the only value of T that is a square number?

$T = 1$

[1]

5. Bethany says that $(2x)^2$ is always greater than or equal to $2x$.

$(2x)^2 = 4x^2$

Decide whether she is correct or not.

$$\begin{array}{r|rrrr} x & -2 & 0 & 2 & 3 \\ 2x & -4 & 0 & 4 & 6 \\ 4x & -8 & 0 & 8 & 12 \end{array}$$

Show your working to justify your decision.

She is not correct. When x is a negative number $(2x)^2$ i.e. $4x^2$ is not greater than $2x$ [3]

6. Without using a calculator, show clearly that $64^{\frac{2}{3}}$ is equal to 16.

$$64^{\frac{2}{3}} = (\sqrt[3]{64})^2 = 4^2 = 16 \quad [2]$$

7. Work out the square root of 100 million.

Circle your answer. $100,000,000$

1000

10 000

100 000

1 000 000

8. a) Write down the reciprocal of 8.

a) $\frac{1}{8}$ [1]

b) Work out the value of k .

$$4^5 \times 2^{-4} = 2^k$$

$$\cancel{2 \times 2 \times 2 \times 2 \times 2} \times \cancel{2 \times 2 \times 2 \times 2} \times \frac{1}{\cancel{2 \times 2 \times 2 \times 2}} = 2^6$$

b) $k = 6$ [3]

9. Evaluate.

$$16^{-\frac{3}{2}} = \frac{1}{16^{\frac{3}{2}}} = \frac{1}{(\sqrt{16})^3} = \frac{1}{4^3} = \frac{1}{64}$$

..... [3]

10. Write down the value of $125^{\frac{2}{3}}$ $(\sqrt[3]{125})^2 = 5^2 = 25$

[1]

11. a) Find the value of $\sqrt[3]{8 \times 10^6}$ $\sqrt[3]{2 \times 2 \times 2 \times 10^2 \times 10^2 \times 10^2}$

$$2 \times 10^2 = 200 \quad [2]$$

b) Find the value of $144^{\frac{1}{2}} \times 64^{\frac{1}{3}}$ $\sqrt{144} = 12$ $\sqrt[3]{64} = 4$ $4 \times 12 = 48$

[2]

c) Solve $3^{2x} = \frac{1}{81}$ $(3^2)^{-2} = 3^{-4}$ $x = -2$

$$3 \times 3 \times 3 \times 3$$

12. Find the reciprocal of 2.5

$$\frac{1}{2.5} = \frac{10}{25} = \frac{2}{5} = 0.4$$

[2]

13. Circle the value of $9^{-\frac{1}{2}}$

$$\frac{1}{\sqrt{9}} = \frac{1}{3}$$

$$\frac{1}{81}$$

$$\frac{1}{3}$$

$$-3$$

$$-4\frac{1}{2}$$

[1]

14. Work out $\sqrt[2]{8} \times 5^{-2}$

Give your answer as a decimal.

$$2 \times \frac{1}{5^2} = \frac{2}{25} \times 4 = \frac{8}{100}$$

$$0.08$$

15. The square of x is 7

Circle the value of x^3

$$x^2 = 7 \quad x = \sqrt{7} = 7^{1/2}$$

$$x^3 = \sqrt{7} \sqrt{7} \sqrt{7}$$

[3]

343

$\sqrt[3]{49}$

117 649

$7\sqrt{7}$

[1]

CREDITS AND NOTES

Q	Awarding Body	Q	Awarding Body	Q	Awarding Body
1	WJEC Eduqas	8	OCR	15	AQA
2	AQA	9	OCR		
3	Pearson Edexcel	10	Pearson Edexcel		
4	AQA	11	Pearson Edexcel		
5	OCR	12	Pearson Edexcel		
6	OCR	13	AQA		
7	AQA	14	AQA		

Notes:

These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board's (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics "could" be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won't appear in the "live" papers from a specific exam board or that examination of a topic will be as shown in these questions.



Links:

AQA <http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300>

OCR <http://ocr.org.uk/gcsemaths>

Pearson Edexcel <http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html>

WJEC Eduqas <http://www.eduqas.co.uk/qualifications/mathematics/gcse/>

Contents:

This version contains questions from:

AQA – Sample Assessment Material, Practice set 1 and Practice set 2

OCR – Sample Assessment Material and Practice set 1

Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2

WJEC Eduqas – Sample Assessment Material