Edexcel GCSE

Mathematics

Foundation Tier

Number: Index notation

Information for students

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 9 questions in this selection.

Advice for students

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

Information for teachers

The questions in this document are taken from the 2009 GCSE Exam Wizard and include questions from examinations set between January 2003 and June 2009 from specifications 1387, 1388, 2540, 2544, 1380 and 2381.

Questions are those tagged as assessing "Index notation" though they might assess other areas of the specification as well. Questions are those tagged as "Foundation" so could have (though not necessarily) appeared on either a Foundation or Intermediate tier paper.

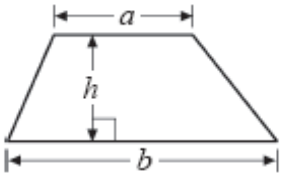
GCSE Mathematics

Formulae: Foundation Tier

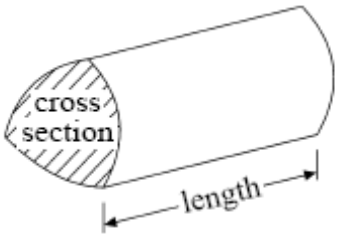
You must not write on this formulae page.

Anything you write on this formulae page will gain NO credit.

Area of trapezium = $(a + b)h$



Volume of prism = area of cross section × length



1. (a) Work out the square of 3

.....

(1)

(b) Work out the value of 2^6

.....

(1)

(c) Write 80% as a fraction.
Give your answer in its simplest form.

.....

(2)

(d) Work out 10% of £320

£ .....

(2)

(e) Write these numbers in order of size.
Start with the smallest number.

$\frac{2}{5}$ 45% 0.35 $\frac{3}{8}$

.....

(2)
(Total 8 marks)

2. Write down the value of

(i) 2^3

……

(ii) $\sqrt{81}$

……
(Total 2 marks)

3. (a) Find the value of

3.7^2

……

(1)

The table shows some numbers.

51	52	53	54	55	56	57	58	59

Two of the numbers are prime numbers.

(b) Put a tick (✓) underneath each of these **two** numbers.

(2)
(Total 3 marks)

4. Work out

$$\sqrt{46} - 2.5^2$$

Write down all the figures on your calculator display.

……
(Total 2 marks)

5. Work out the value of

(i) $\sqrt{46} - 2.5^2$

Write down all the figures on your calculator display.

……

(ii) Write your answer to (i) correct to 1 significant figure.

……

(Total 3 marks)

6. (a) Work out the value of

(i) 4^2

...……

(ii) 2^3

…...……

(2)

(b) Write as a power of 10

$10 \times 10 \times 10 \times 10 \times 10$

…...……

(1)

(Total 3 marks)

7. Find the value of 2.2^3

…….

(Total 1 mark)

8. Find the value of

(i) the square root of 36

.....

(ii) 5×10^2

.....

(iii) 2^3

.....

(Total 3 marks)

9. (a) Find the square of 6

.....

(1)

(b) Find the square root of 225

.....

(1)

(c) Find the value of 10^3

.....

(1)
(Total 3 marks)

01. (a) 9 1

B1 cao

(b) 64 1

B1 cao

(c) $\frac{4}{5}$ 2

B2 for 4/5
(B1 for 80/100 oe or 0.8)

(d) £32 2

M1 for 10/100 × 320, or 320 ÷ 10
A1 cao
NB: £320-£32=£288 or £320+£32=£352 can be awarded M1 A1, but £288 or £352 without working award B1

(e) 0.35, 3/8
2/5, 45% 2

B2 all correct, or for equivalents in order: 0.35,0.375,0.4,0.45, or for a mixture of equivalents as long as the order is correct. (B1 one error of misplacing numbers, or correct conversion to decimals or %, or correct order but reversed).
NB: accept 0.38 or 0.37 instead of 0.375 for B1, but not B2

[8]

02. (i) 8 2

B1 cao

(ii) 9

B1 cao

[2]

03. (a) 13.69 1

B1 cao

(b) 53 and 59 2

B2 cao (B1 for 53 or 59)
(–1 for each extra answer)

[3]

04. 0.5323… 2

6.782…–6.25

M1 for sight of 6.782… or 6.25 or 0.532
A1 cao

[2]

05. (i) 0.5323……. 3

6.782… –6.25

M1 for sight of 6.782… or 6.25
A1

(ii) 0.5

B1 ft [0.5000… gets B0]

[3]

06. (a) (i) 16 2

B1

(ii) 8

B1

(b) 10^5 1

B1

[3]

07. 10.648 1

B1

[1]

08. (i) 6 3

B1

(ii) 500

B1

(iii) 8

B1

[3]

09. (a) 36 1

B1 cao accept answer in words, ignore spelling

(b) 15 1

B1 cao accept answer in words, ignore spelling

(c) 1000 1

B1 cao accept answer in words, ignore spelling

[3]

01. The success rate in parts (a) & (b) in this question was related to that of question 2(ii), about half the candidates gaining the mark, with many lacking an understanding of square numbers or indices. In part (c) most were able to express the fraction as $\frac{80}{100}$, but of these half were then unable to cancel the fraction into its simplest form.

Candidates used a variety of methods in part (d), with many realising that a division by 10, or "10p in the £" would lead to the correct answer.

Candidates found part (e) far more challenging. The most successful method appeared to be conversion to decimals.

02. In part (i) there was much evidence to suggest that candidates appreciated that 2^3 represented $2 \times 2 \times 2$ but a significant number, after showing this working, then went on to give 6 as the answer. Only a few wrote $2 \times 3 = 6$.
Finding $\sqrt{81}$ gave rise to $9 \times 9 = 81$ but often candidates were unable to select 9 as being the required answer.

03. (a) This was generally well done with the predictable error of doubling 3.7 to give 7.4 rather than squaring.
(b) This was rather a disappointingly done question; many candidates did manage to identify at least one prime number, but an alarming number seemed to be choosing arbitrarily, with even numbers often being selected.

04. It was not always evident that the candidates understood what they were meant to do with the square root and the square. Success, however, did seem to come where the intermediate working was written down. 4.282329983 was a common incorrect answer. Candidates did not always write down all the digits on their calculator display.

05. This was very well answered although some candidates ignored the instruction to write down all the figures on their calculator display; a minimum of 4 significant figures was required.
2.5^2 was sometimes taken as 5 and if the square root of 46 had not been written down explicitly no marks were gained for an answer of 1.7823… only.
In part (ii) the most common errors were 1 and 0.50000

06. Handling powers met with moderate success as the writing of 4^2 and 2^3 were often indicated in the format 4×4 and $2 \times 2 \times 2$. The evaluation of these, however, was only partially completed correctly. Usually the 4^2 led to 16 although 8 was also seen; the result of $2 \times 2 \times 2$ did produce the occasional 8 but 6 was the most common response. In part (b) the evaluation of $10 \times 10 \times 10 \times 10 \times 10$ as 10^5 was well rewarded although some struggled to achieve an answer and 5^{10}, 5×10 and 50 were frequent incorrect responses.

07. Only 24% of candidates correctly reached the answer of 10.648. Some lost the mark by seeing 10.648 on their calculator but only writing 10.6, 10.64 or 10.65 on paper. Seeing $2.2 \times 2.2 \times 2.2$ in the working was reassuring that some had understood what to do.

08. Just over half the candidates were able to provide the answer of 6 when finding the square root of 36 with the most common incorrect response being 6×6. It was evident that many candidates understood that 10^2 meant 10×10 and 2^3 meant $2 \times 2 \times 2$ but unfortunately after writing this down, their arithmetic let them down. It was not uncommon to see $2 \times 2 \times 2 = 6$ written in full. Under 40% of the candidates scored the mark in parts (ii) or (iii).

09. This question tested whether candidates understood the concept of powers and roots. Whilst 67% could find the square of 6 only 43% could find the square root of 225 and even fewer (41%) could find the value of 10^3. This was an indication of the size of the lack of calculator problem.