Edexcel GCSE

Mathematics

Foundation Tier

Number: Primes, factors, multiples

Information for students

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 108 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 "Primes, factors, multiples" 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 = $(a + b)h$
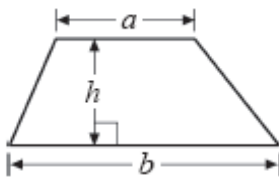
Volume of prism = area of cross section × length
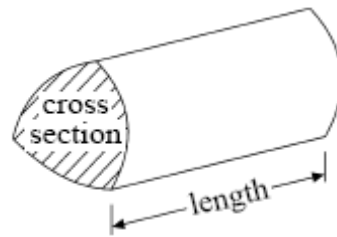
1.
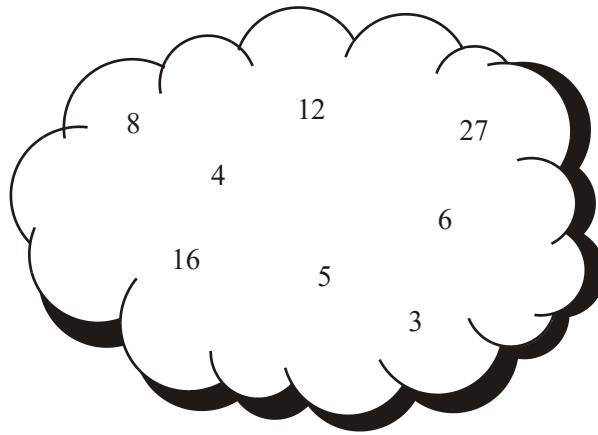
Using only the numbers in the cloud, write down

(i)   all the multiples of 6,   ……………………………..

(ii)   all the square numbers,   ……………………………..

(iii)   all the factors of 12,   ……………………………..

(iv)   all the cube numbers.   ……………………………..

(Total 4 marks)

2.   (a)   Write down all the prime numbers between 40 and 50.

………………………….

(2)

(b)   Write down the cube of 10.

………………………….

(1)
(Total 3 marks)

3.   Here is a list of eight numbers.

                5   6   12   20   25   26   28   33

(a)   From the list, write down

        (i)   a square number,

                                                                ....

        (ii)   a number that is a multiple of 7,

                                                                ....

        (iii)   **two** numbers that are factors of 40,

                                                        .... and ....

        (iv)   **two** numbers with a sum of 59.

                                                        .... and ....
                                                                                        (4)

(b)   Tony says that "6 is a cube number because $2^3 = 6$".
        Tony is wrong. Explain why.

        ....
                                                                                        (1)
                                                                                        (Total 5 marks)

4.   Here is a list of 8 numbers.

        II   I6   I8   36   68   69   82   88

(a)   Write down **two** numbers from the list with a sum of 87

                                                        …………… , ……………
                                                                                        (1)

(b)   Write down a number from the list which is

(i)   a multiple of 9,

……………………..

(ii)   a square number.

……………………..

(2)

cube	multiple	factor	product

(c)   Use a word from the box to complete this sentence correctly.

11 is a …………..…………… of 88

(1)

Here are the same 8 numbers drawn larger.

11	**16**	**18**	**36**
68	**69**	**82**	**88**

(d)   From these numbers, write down a number which has

(i)   exactly **one** line of symmetry,

……………………..

(ii)   2 lines of symmetry **and** rotational symmetry of order 2,

……………………..

(iii)   rotational symmetry of order 2 but **no** lines of symmetry.

……………………..

(3)
(Total 7 marks)

5.

8
9   10
12
30   3
5   20

Using only the numbers in the rectangle, write down

(i)   an even number

....

(ii)   a multiple of 4

....

(iii)   a factor of 15

....

(Total 3 marks)

6.

factor   multiple   square   square root   half
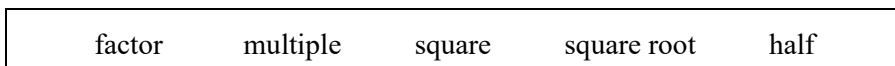
(a)   Use a word from the list above to complete the following sentence.

        10 is a .... of 5

(1)

(b)   From the list below, write down the odd number.

        10   15   18   20   24

………………...

(1)

(c)   From the list below, write down the square number.

           10   12   14   16   18   20

                                                                    …………………...
                                                                                            (1)
                                                                                 (Total 3 marks)

7.   Here is a list of numbers.

                          2   4   5   6   7

From the list of numbers write down

(i)   an odd number

                                                                    ....

(ii)   a square number

                                                                    ....

(iii)   a multiple of 3

                                                                    ....

(iv)   a factor of 10

                                                                    ....
                                                                         (Total 4 marks)

8.   Here is a list of 8 numbers.

        3   5   6   8   9   10   11   16

From the list, write down

(a)   **two** odd numbers,

                                                          .... and ....
                                                                                    (1)

(b)   **two** numbers with a sum of 15

                                                          .... and ....
                                                                                    (1)

(c)   a factor of 12

                                                          ....
                                                                                    (1)

(d)   a multiple of 4

                                                          ....
                                                                                    (1)

James says that 10 is a square number because $5^2 = 10$

(e)   James is wrong.
      Explain why.

      ....

      ....
                                                                                    (1)
                                                                        (Total 5 marks)

9.

```
┌─────────────────────────────────────────────┐
│      18                       42              │
│                    9                          │
│                                               │
│                                          3    │
│               12                              │
│    6                              81          │
│                                               │
│                  11                   30      │
└─────────────────────────────────────────────┘
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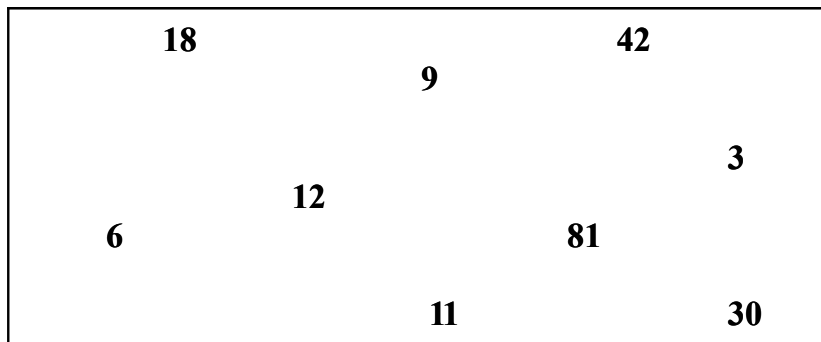
From the numbers in the rectangle,

(i)   write down a multiple of 4,

....

(ii)   write down a factor of 21,

....

(iii)   write down a prime number.

....
(Total 3 marks)

10.   (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)

11.   Here is a list of numbers.

        8   15   23   27   32   33

From the numbers in the list, write down a number that is prime.

…………………………….
(Total 1 mark)

12.   Here is a list of numbers.

        17   24   25   26   35   43   44

From the numbers in the list, write down

(i)   the odd number that is larger than 40,

....

(ii)   the number that is a multiple of 7,

....

(iii)   two numbers that have a difference of 20,

............., ...

(iv)   the number that has the same value as $2 + 3 \times 5$

....
(Total 4 marks)

13.   (a)   Write 0.37 as a fraction.

....
(1)

(b)   Write down **all** the factors of 21

....
(2)
(Total 3 marks)

14.

2   3   4   5   6   7   8

From the list of numbers, write down

(i)   the square number,

....

(ii)   the cube number,

....

(iii)   the square root of 9.

....
(Total 3 marks)

15.   Here is a list of numbers.

2   5   7   8   9   12

Write down a number from the list which is

(i)   a multiple of 6,

....

(ii)   a factor of 15,

....

(iii)   a square number.

....
(Total 3 marks)

16.
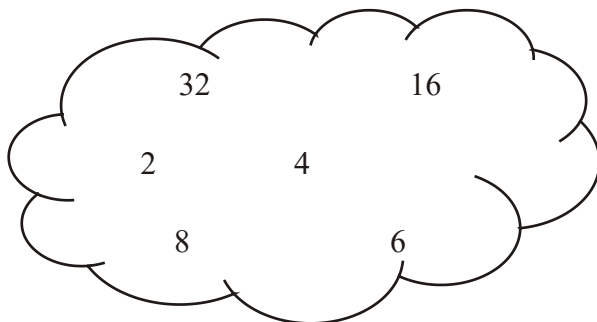
From the numbers in the cloud, write down

(a)   a square number,

....
(1)

(b)   the square root of 16,

....
                                                                                (1)

(c)   the cube of 2,

....
                                                                                (1)

(d)   the prime number.

....
                                                                                (1)
                                                                (Total 4 marks)

17.   Find the highest common factor (HCF) of 30 and 45

....
                                                                (Total 2 marks)

18.   Which of these numbers is a prime number?

2	6	9	21	15
A	**B**	**C**	**D**	**E**

                                                                (Total 1 mark)

19. Which number is a multiple of 6?

	8	22	16	10	18
	A	**B**	**C**	**D**	**E**

(Total 1 mark)

20. Which number is a prime number?

	4	9	15	12	7
	A	**B**	**C**	**D**	**E**

(Total 1 mark)

21. Here is a list of numbers.

          3   8   11   25   33   41

Write down a number from the list which is

(a) an even number,

....
(1)

(b) a square number,

....
(1)

(c) a multiple of 11

....
(1)
(Total 3 marks)

22.   2   4   5   6   9   15

Which two numbers in the list are prime numbers?

4 and 9	5 and 6	9 and 15	5 and 9	2 and 5
A	**B**	**C**	**D**	**E**

(Total 1 mark)

23.   Which number is a factor of 15?

30	5	10	2	20
A	**B**	**C**	**D**	**E**

(Total 1 mark)

24.   Which number is a factor of 28?

9	7	27	56	280
A	**B**	**C**	**D**	**E**

(Total 1 mark)

01.   (i)   6, 12   4
                 B1 cao

      (ii)   4, 16
                 B1 cao

      (iii) 3, 4, 6 or 3, 4, 6, 12
                 B1 Condone omission of 12

      (iv)   8, 27
                 B1 cao

                                                                                        [4]

02.   (a)   41, 43, 47   2
                 B2 3✔ & 0×
                 (B1 for 2✔ & ≤ 1×)

    (b)   1000   1

                  B1 cao

                                                                     [3]

03.   (a)   (i)   25   4

                      B1 for 25

           (ii)   28

                      B1 for 28

           (iii) 5 and 20

                      B1 for 5 and 20

           (iv) 26 and 33

                      B1 for 26 and 33

    (b) $2^3 = 8$

          or $2^3 = 2 \times 2 \times 2$ (which is not 6)   1

              B1 for valid 'explanation'

                                                                     [5]

04.   (a)   18, 69   1

                  B1

    (b)   (i)   18 or 36   1

                      B1

           (ii)   16 or 36   1

                      B1

    (c)   factor   1

                  B1

    (d)   (i)   18   3

                      B1 cao

           (ii)   11 or 88

                      B1

           (iii) 69

                      B1 cao

                                                                      [7]

05. (i) 8, 10, 12, 20 or 30

(ii) 8, 12 or 20

(iii) 3 or 5   3

B1 at least one of 8, 10, 12, 20, 30 (no extras)
B1 at least one of 8,12, 20 (no extras)
B1 3 or 5 or both (no extras)

[3]

06. (a) Multiple   1
B1 cao

(b) 15   1
B1 cao

(c) 16   1
B1 cao

[3]

07. (i) 5 or 7   1
B1 5 or 7

(ii) 4   1
B1 cao

(iii) 6   1
B1 cao

(iv) 2 or 5   1
B1 2 or 5

[4]

08. (a) Two of 3, 5, 9, 11   1
B1 cao

(b) 5, 10 or 6,9   1
B1 cao

(c) 3 or 6   1
B1 for 3 or 6

(d) 8 or 16   1
B1 for 8 or 16

(e)   e.g. "$5^2 = 25$"   1

B1 for correct explanation, e.g. $5^2 = 25$ or $3^2 = 9$ and $4^2 = 16$
so 10 cannot be a square number or showing diagramatically
that 10 is not a square number

[5]

09.   (i)   12   1

B1 for 12 cao

(ii)   3   1

B1 for 3 cao

(iii)   3 or 11   1

B1 for 3 and/or 11 cao

[3]

10.   (a)   13.69   1

B1 cao

(b)   53 and 59   2

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

[3]

11.   23   1

B1 cao

[1]

12.   (i)   43   4

B1

(ii)   35

B1

(iii)   24, 44

B1

(iv)   17

B1

[4]

13. (a) $\dfrac{37}{100}$ 1

   B1

   (b)   1, 3, 7, 21   2

   B2 for 4 correct factors, no extras (B1 for 2 factors)

                                                              [3]

14. (i)   4   3

   B1 cao

   (ii)   8

   B1 cao

   (iii)   3

   B1 cao

                                                              [3]

15. (a)   12   1

   B1 accept twelve

   (b)   5   1

   B1 accept five

   (c)   9   1

   B1 accept 9

                                                              [3]

16. (a)   4 or 16   1

   B1 for either 4 or 16 or both

   (b)   4   1

   B1 cao

   (c)   8   1

   B1 cao

   (d)   2   1

   B1 cao

                                                              [4]

17. $2 \times 3 \times 5$ 2

      $3 \times 3 \times 5$

      $= 15$

M1 for $2 \times 3 \times 5$ or $3 \times 3 \times 5$
A1 cao
OR
M1 for listing at least 3 factors of each number
(condone one error in each list)
A1 cao
[SC: B1 for 3 or 5 if M0 scored]

*One correct factor tree is **not** enough to justify the award of the method mark. Without the explicit product, eg $2 \times 3 \times 5$ being given, the factor tree just shows the factors 2, 3, 5 and 15 (or 6, 10) ie a list of 3 or more factors of, in this case, 30*

*Two factor trees **does** earn the M1 since this is the equivalent to "listing at least 3 factors of each number" provided there is no more than one error in each factor tree.*
*The number 1 is **NOT** to be counted as one of the 3 factors in a list. The number itself, either 30 or 45 may be considered to be a factor if it is more than just the heading of the list. Example 30, 3, 10 IS acceptable, but $30 = 3 \times 10$ or $30 = 3, 10$ is NOT.*

A correct Venn Diagram is also sufficient for the award of M1
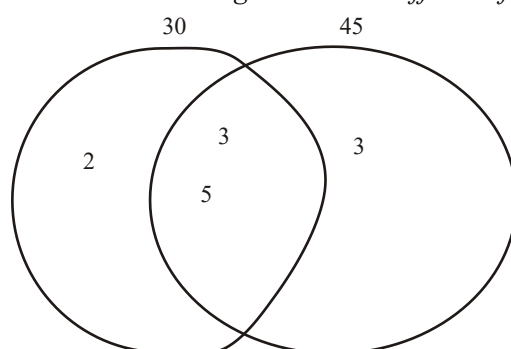
                                                          [2]

18. A

                                                          [1]

19. E

                                                          [1]

20. E

                                                          [1]

21. (a) 8   1

                B1 for 8 cao

     (b) 25   1

                B1 for 25 cao

     (c) 33   1

                B1 for 33 (or 11)

                                                                                                         [3]

23. E

                                                                                                                  [1]

23. B

                                                                                                                  [1]

24. B

                                                                                                                  [1]

01. Answers to this varied widely both within and between centres. As far as any pattern was discernible, candidates appeared to be most familiar with multiples and factors and least familiar with cube numbers.

02. There were less completely correct responses to part (a) than might have been expected. Many candidates wrote down two or three prime numbers and gained at least one mark but 49 was often included. Some simply listed all the odd numbers. There were more successful attempts in part (b) but some candidates left the answer as '10^3'. Common incorrect answers were '30', '100' and '10000'.

03. Thus was well understood and well answered with over two thirds of candidates obtaining the correct answer to parts (a) (ii), (iii) and (iv). The idea of a square number however was only understood by 25% of candidates. In the explain question in part (b) there were only 19% of candidates with the correct response. A significant number of candidates thought that Tony was actually correct in his assumption that $2^3 = 6$.

04.   **Specification A**

Most candidates achieved some success but few gained full marks. Part (b)(i) (multiple of 9) was well answered but it was not unusual for candidates to then give "multiple" as their answer to part (c). In the final part (symmetry), candidates performed best on part (ii), perhaps helped by the fact that there were two possible answers.

Specification B

Most candidates were able to successfully access at least 4 marks on this question. In part (a) and (b) they were able to write down two numbers from the list with a sum of 87 and write down a number which was a multiple of 9 but found providing a square number a more challenging task. Although candidates clearly understood the term 'multiple', they very often went on to state that 11 was a *multiple* of 88.
Many candidates could identify the number with 2 lines of symmetry in (d) they had more trouble recognising that 18 was the required answer to (i) and 69 was the answer to (iii).

05.   Parts (i) and (ii) were successfully answered by more than 9 in every 10 candidates. About 55% of candidates could give a factor of 30 from the list as their response to part (c) of the question. The most common incorrect answer given was 30 suggesting that they probably confused "factors" for "multiples".

06.   In part (a) of this question recognition of the correct word proved to be beyond most candidates. "Factor" was chosen by more candidates than the correct answer. "Half" was also commonly seen. Most, but by no means all candidates, could identify 15 as the odd number in part (b). Part (c) was answered correctly by less than half of the candidates. "14" and "18" were commonly seen incorrect answers. Some candidates gave more than one number in their answers to (b) and (c), despite the question implying that only one number satisfied the criteria.

07.   Most parts of this question were well attempted, but in part (ii) performance was poor, with many candidates unable to identify the "4" from the list as the square number.

08.   95% of candidates could identify 2 odd numbers from the list given and the great majority could identify a pair of numbers whose sum was 15 though some gave the pair whose product was 15. Parts (c) and (d) of the question were also well answered though some candidates gave 4, a number which did not appear in the list given, as a factor of 12. Explanations given in part (e) were generally correct, clear and succinct. The main loss of marks in this part was due to attempts to explain that square numbers "go into themselves" or confusion between the terms square and prime.

09. Part (i) was well answered. However, in parts (ii) and (iii) there was much miss-understanding of the terms "factor" and "prime". In the former candidates chose numbers that were not factors, or 42, and in the latter chose numbers that were not prime numbers.

10. (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.

11. Many correct answers; however an alarming number of candidates showing no understanding of the concept of a prime number. Odd numbers, particularly 27 were often chosen although 8 and 32 were also seen more than a few times.

12. (i) Candidates understood that the number required was larger than 40 with 88% of the candidates scoring the available mark, but a few were unsure as to whether 43 or 44 was the odd number.
(ii) Over ¾ of the candidates were able to state that 35 was the multiple of 7 in the list.
(iii) The concept of 'difference' confused many candidates with over 57% writing a variety of incorrect responses.
(iv) 25 was by far the most popular answer with candidates preferring to calculate from left to right obtaining $5 \times 5 = 25$ rather than having an understanding of the order of operations. Only 11% of the candidates realised that multiplication comes before addition and provided the correct answer of 17.

13. Writing 0.37 as a fraction proved to be somewhat challenging for most candidates as they struggled to produce $\dfrac{37}{100}$ with over 80% obtaining the incorrect answer. The most common error was to split the 3 and the 7 to give $\dfrac{3}{7}$ as the fraction.

In part (b) over 60% of the candidates were able to demonstrate that they understood the meaning of the word 'factor' by providing some correct factors, and over a quarter of the candidates were able to provide the 4 correct factors with no extra numbers.

14. It was disappointing to see that around 60% of the candidates could not pick the square number from the list of numbers provided and over 70% unable to provide a cube number. However over 70% were able twrite down '3' as the answer to part (iii). There was not any particular pattern to the incorrect responses in all three parts.

15.   This question was well understood with 90% of candidates understanding the difference between a factor and a multiple, however only 40% of candidates could identify a square number.

16.   Only half candidates realized that 4 or 16 was a square number and just under a half of the candidates recognised that the square root of 16 was 4. Cubing 2 caused more problems with 6 being a common incorrect response. Just under 40% of the candidates knew that 2 was the prime number from the numbers in the cloud.

17.   Most gained at least one mark here and often two. The factor tree method was the most popular approach; this usually resulted in an answer of 3 or 5. There was, again, the misconception from several candidates that HCF actually meant finding the LCM.

18.   No Report available for this question.

19.   No Report available for this question.

20.   No Report available for this question.

21.   This question too was well understood with almost all candidates gaining full marks; however a small minority gave odd numbers instead of evens and 3 instead of a square number.

22. No Report available for this question.

23. No Report available for this question.

24. No Report available for this question.