

Factors, Multiples, Primes, Squares and Cubes

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (5 marks)

Here is a list of numbers.

2 8 15 19 25 30 49 125

From the numbers in the list, write down

(a) a factor of 45

A factor of 45 divides into 45 exactly.

$45 \div 15 = 3$, so 15 is a factor of 45.

Answer: 15

Tip: A factor divides **into** the number, so it cannot be bigger than 45. A multiple is in the number's times table.

(b) a multiple of 6

A multiple of 6 is in the 6 times table.

$6 \times 5 = 30$

Answer: 30

(c) a square number

A square number is a number multiplied by itself.

$25 = 5 \times 5$

$$49 = 7 \times 7$$

Answer: 25 or 49

Tip: When the question asks for one number, write just one. If you write a wrong number as well, you may lose the mark.

(d) a cube number

A cube number is a number multiplied by itself three times.

$$8 = 2 \times 2 \times 2$$

$$125 = 5 \times 5 \times 5$$

Answer: 8 or 125

(e) two prime numbers

A prime number has exactly two factors: 1 and itself.

2 has factors 1 and 2 only.

19 has factors 1 and 19 only.

The rest are not prime, e.g. $15 = 3 \times 5$, $25 = 5 \times 5$, $49 = 7 \times 7$.

Answer: 2 and 19

2 (2 marks)

Write down all the factors of 36

Find the factor pairs, starting with 1:

$$1 \times 36$$

$$2 \times 18$$

$$3 \times 12$$

$$4 \times 9$$

$$6 \times 6$$

5 does not divide into 36, and after 6×6 the pairs repeat.

List each number once (6 only appears once).

Answer: 1, 2, 3, 4, 6, 9, 12, 18, 36

Tip: Work in pairs so you do not miss any. Remember to include 1 and 36.

Marks: 2 marks for all nine factors and no extra numbers. 1 mark for at least 7 correct factors.

3 (1 mark)

Write down the smallest multiple of 8 that is greater than 100

$8 \times 12 = 96$, which is less than 100.

$8 \times 13 = 104$, which is greater than 100.

Answer: 104

Tip: 100 is not a multiple of 8, because $100 \div 8 = 12.5$ is not a whole number.

4 (1 mark)

Write down a common multiple of 6 and 8

Multiples of 6: 6, 12, 18, 24, 30, 36, 42, 48, ...

Multiples of 8: 8, 16, 24, 32, 40, 48, ...

24 is in both lists (so is 48).

Answer: 24

Tip: A common multiple is in both times tables. Do not confuse it with a common factor (like 2), which divides into both.

5 (1 mark)

Find the two prime numbers between 30 and 40

Even numbers (32, 34, 36, 38) are not prime.

Check the odd numbers:

$33 = 3 \times 11$, $35 = 5 \times 7$, $39 = 3 \times 13$ are not prime.

31 and 37 have no factors except 1 and themselves.

Answer: 31 and 37

6 (2 marks)

Two prime numbers are both greater than 10

When the two prime numbers are added together, the answer is 40

Find two prime numbers that fit these facts.

Prime numbers greater than 10 and less than 40: 11, 13, 17, 19, 23, 29, 31, 37

Take each one away from 40 and check if the answer is also in the list:

$$40 - 11 = 29 \quad \checkmark$$

$$40 - 17 = 23 \quad \checkmark$$

$$40 - 13 = 27, \quad 40 - 19 = 21 \quad \text{are not prime.}$$

There are two possible pairs, and either one is correct.

Answer: 11 and 29 (or 17 and 23)

Tip: $3 + 37 = 40$ uses two primes, but 3 is not greater than 10. Check every condition in the question.

Marks: 2 marks for a correct pair. 1 mark for two prime numbers greater than 10, or two numbers that add to 40 where one is prime.

7 (2 marks)

Work out $\sqrt{64} + 2^3$

$$\sqrt{64} = 8, \text{ because } 8 \times 8 = 64$$

$$2^3 = 2 \times 2 \times 2 = 8$$

$$8 + 8 = 16$$

Answer: 16

Tip: 2^3 means $2 \times 2 \times 2$, not 2×3 .

Marks: 1 mark for 8 from either part. 1 mark for 16.

8 (1 mark)

Write down the value of $\sqrt{0.09}$

Which number times itself makes 0.09?

$$3 \times 3 = 9$$

$$0.3 \times 0.3 = 0.09 \text{ (1 decimal place + 1 decimal place = 2 decimal places)}$$

Answer: 0.3

Tip: Check by squaring your answer. $0.03 \times 0.03 = 0.0009$, not 0.09.

9 (1 mark)

Show that 91 is not a prime number.

Try dividing by small primes: 2, 3, 5 do not work.

$$91 \div 7 = 13$$

$$\text{So } 91 = 7 \times 13$$

91 has factors other than 1 and 91, so it is not prime.

Answer: $91 = 7 \times 13$

10 (2 marks)

Ben thinks of a number.

It is a multiple of 5

It is a factor of 60

It is not a multiple of 10

It is greater than 10

What number is Ben thinking of?

Factors of 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

Multiples of 5 from this list: 5, 10, 15, 20, 30, 60

Not multiples of 10: 5, 15

Greater than 10: 15

Answer: 15

Marks: 1 mark for a correct list, e.g. the factors of 60 that are multiples of 5. 1 mark for 15.

11 (1 mark)

Rhys says,

‘All odd numbers are prime numbers.’

Is Rhys correct?

You must give a reason for your answer.

Find an odd number that is not prime.

$9 = 3 \times 3$, so 9 is odd but not prime.

So Rhys is not correct.

Answer: No, e.g. 9 is odd but not prime

12 (2 marks)

Here are two statements.

Both statements are wrong.

For each statement, give an example to show that it is wrong.

- (a) All multiples of 3 are odd.

$$6 = 3 \times 2, \text{ so } 6 \text{ is a multiple of } 3.$$

But 6 is even.

Answer: e.g. 6

- (b) The sum of two prime numbers is always even.

2 and 3 are both prime.

$$2 + 3 = 5, \text{ which is odd.}$$

Answer: e.g. $2 + 3 = 5$

13 (2 marks)

Ravi chooses a square number greater than 1 and two different prime numbers.

He multiplies his three numbers together.

His answer is 90

Find the three numbers that Ravi chose.

Write 90 as a product of smaller numbers: $90 = 9 \times 10$

$$10 = 2 \times 5$$

$$\text{So } 90 = 9 \times 2 \times 5$$

9 is a square number (3×3), and 2 and 5 are different prime numbers ✓

Answer: 9, 2 and 5

Tip: 1 is a square number, but the question says the square number is greater than 1. Also remember that 1 is not a prime number.

Marks: 1 mark for writing 90 as a product that includes a square number or two primes, e.g. 9×10 or 2×45 . 1 mark for 9, 2 and 5.

14 (2 marks)

Find the smallest number that is a multiple of both 4 and 6 and is also a square number.

Multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32, 36, ...

Multiples of 6: 6, 12, 18, 24, 30, 36, ...

Common multiples: 12, 24, 36, ...

12 and 24 are not square numbers.

$36 = 6 \times 6$, so 36 is a square number.

Answer: 36

Marks: 1 mark for listing common multiples of 4 and 6. 1 mark for 36.
