

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic

Number

Finding prime numbers

v1.0

Name _____

Materials

For this paper you must have:

- Mathematical instruments

Information

- The marks for questions are shown in brackets

Advice

- In all calculations, show clearly how you work out your answer

Questions 1 to 21 are **foundation** tier only

For questions 1 to 6 you must **NOT** use a calculator.



Q1.

Two prime numbers are multiplied together.
The answer is an **even** number between 50 and 60
Complete the calculation.

$$\square \times \square = \square$$

(Total 3 marks)

Q2.

Write down the **two** prime numbers between 20 and 30

(Total 2 marks)

Q3.

You are given that $P = x^2 - y^2$

(a) Show that P is a prime number when $x = 4$ and $y = 3$

(2)

(b) Work out **two** other pairs of values for x and y so that P is a prime number.

(3)

(Total 5 marks)

Q4.

The number 57 can be written as the product of two prime numbers.

$$57 = 3 \times 19$$

Find **three** other numbers between 50 and 60 that can be written in this way.

You **must** show the products with each answer.

(Total 3 marks)

Q5.

(a) Circle the prime number in this list.

25 26 27 28 29

(1)

(b) The number 39 can be written as the product of two prime numbers.

$$39 = 3 \times 13$$

Write **three** other numbers between 30 and 40 as the product of two prime numbers.

(3)

(Total 4 marks)

Q6.

(a) Circle **all** the prime numbers in this list.

3 6 7 9 10 13 15

(2)

(b) n is a positive whole number.

$6n - 1$ is **not** a prime number.

Work out a possible value for n .

(2)

(Total 4 marks)

For questions 7 to 21, you may use a calculator.



Q7.

There are four numbers that are
prime
less than 50
1 more than a square number.

For example

One of the numbers is 2

2 is prime

2 is less than 50

2 is one more than the square number 1.

Work out the other **three** numbers.

(Total 3 marks)

Q8.

(a) Put four **different** prime numbers into the boxes to make the calculation true.

$$\square + \square + \square = \square$$

(2)

(b) Why can 2 never be one of the four prime numbers used in part (a)?

(2)

(Total 4 marks)

Q9.

What is the largest two-digit prime number?

Circle your answer.

93

95

97

99

(Total 1 mark)

Q10.

I am thinking of a number.

It has two digits.

It is 3 more than a number that is **both** a square and a cube number.

Is the number I am thinking of a prime number?

Tick a box.

☐

Prime

☐

Not prime

You **must** show working to support your answer.

(Total 2 marks)

Q11.

Zoe's password is made up of four **different** digits.

She remembers it as two 2-digit numbers.

The first 2-digit number is a prime number between 10 and 20

The second 2-digit number is a prime number between 20 and 30

List **all** her possible passwords.

(Total 3 marks)

Q12.

Write down the **two** prime numbers between 25 and 35

(Total 2 marks)

Q13.

I am thinking of a prime number.

Its digits add up to a square number.

Write down a prime number that I could be thinking of.

(Total 2 marks)

Q14.

a and b are both prime numbers.

They are each less than 20

Give an example where $a + b$ is odd but **not** prime.

(Total 2 marks)

Q15.

Write down **all** the prime numbers between 40 and 50

(Total 2 marks)

Q16.

Erik thinks of a prime number between 20 and 30

His number is $x\%$ of 125

Work out **one** possible value of x .

(Total 3 marks)

Q17.

A number has one digit.

It is 1 more than a number that is **both** a square and a cube number.

Is the number a prime number?

Tick a box.

Prime ☐ Not prime ☐

You **must** show your working.

(Total 2 marks)

Q18.

Zoe's password is made up of four digits.

She remembers it as two 2-digit numbers.

The first 2-digit number is a prime number between 10 and 20

The second 2-digit number is a prime number between 20 and 30

List her **eight** possible passwords.

(Total 3 marks)

Q19.

I am thinking of a two-digit square number.

Its digits add up to a prime number.

Write down a square number that I could be thinking of.

(Total 2 marks)

Q20.

The perimeter of a triangle is 27 cm.
The length of each side, in cm, is a prime number.
Work out the lengths of the sides of a possible triangle.

(Total 4 marks)

Q21.

The first two cube numbers are 1 and 8
Show that
the 3rd cube number can be written as the sum of three different prime numbers.

$$\boxed{} = \boxed{} + \boxed{} + \boxed{}$$

(Total 3 marks)

Questions 22 to 28 are **higher** tier only

For questions 22 to 23 you must **NOT** use a calculator.



Q22.

x , y and $x - y$ are all two-digit numbers.
 x is a square number
 y is a cube number
 $x - y$ is a prime number
Find **one** possible pair of values for x and y .

(Total 3 marks)

Q23.

a and b are different prime numbers less than 12.
Work out **three** pairs of numbers a and b such that $\sqrt{(2a + b)}$ is a whole number.

(Total 3 marks)

For questions 24 to 28 you may use a calculator.



Q24.

a , b and c are **different** prime numbers less than 20

$$a = \sqrt{4b + c}$$

Work out **two** possible sets of values of a , b and c .

(Total 3 marks)

Q25.

b and c are **different** prime numbers between 15 and 30. a is an integer.

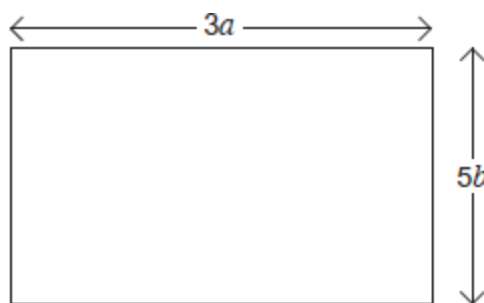
$$a = \sqrt{4b + c}$$

Work out a possible set of values for a , b and c

(Total 3 marks)

Q26.

The diagram shows a rectangle.



- (a) Write down an expression for the **area** of the rectangle.
Simplify your answer.

(2)

- (b) You are given that a and b are prime numbers.
The **area** of the rectangle is 315 cm^2
Work out the values of a and b .

(2)

(Total 4 marks)

Q27.

a and b are different prime numbers with $a > b$

- (a) Give an example to show that $a^2 + b^2$ could be even.
- (b) Give an example to show that $a^2 + b^2$ could be odd.

(1)

(1)

(Total 2 marks)

Q28.

A code is a three-digit number.

The first digit is a square number greater than 1.
The second digit is a cube number greater than 1.
The third digit is a prime number.
The three-digit number is divisible by 3.

Work out the **two** possible codes.

(Total 3 marks)