

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic

Number

Finding the HCF and LCM using prime factor decomposition

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 11 are **foundation** tier only

For questions 1 to 5 you must **NOT** use a calculator.



Q1.

(a) Write 126 as a product of prime factors.

(2)

(b) Work out the Highest Common Factor (HCF) of 72 and 126.

(2)

(Total 4 marks)

Q2.

Write 36 as a product of prime factors.

Give your answer in index form.

(Total 3 marks)

Q3.

Write 200 as a product of prime factors.

Give your answer in index form.

(Total 3 marks)

Q4.

(a) Write 36 as the product of prime factors.

Give your answer in index form.

(3)

(b) Work out the Highest Common Factor (HCF) of 36 and 81.

(2)

(Total 5 marks)

Q5.

(a) Work out the Highest Common Factor (HCF) of 24 and 42

(2)

(b) As a product of prime factors $36 = 2^2 \times 3^2$

Write 48 as a product of prime factors.

(2)

(Total 4 marks)

For questions 6 to 11 you may use a calculator.



Q6.

Write 280 as a product of its prime factors.

(Total 2 marks)

Q7.

Write 300 as a product of its prime factors.

(Total 2 marks)

Q8.

Write 140 as a product of prime numbers in index form.

(Total 3 marks)

Q9.

Write 225 as the product of its prime factors.

(Total 2 marks)

Q10.

- (a) As a product of prime factors $40 = 2^3 \times 5$
Write 50 as a product of prime factors.

(2)

- (b) Work out the Least Common Multiple of 40 and 50

(2)

(Total 4 marks)

Q11.

$$k = n^2 + 9n + 1$$

Mo says, “ k will be a prime number for all integer values of n from 1 to 9”

Show that Mo is wrong.

You **must** show that your value of k is **not** prime.

(Total 3 marks)

Questions 12 to 22 are **higher** tier only

For questions 12 to 14 you must **NOT** use a calculator.



Q12.

- (a) Write 200 as the product of prime factors.
Give your answer in index form.

(3)

- (b) Circle the **two pairs** of numbers that have
Highest Common Factor (HCF) 4

and

Least Common Multiple (LCM) 60

4 and 60 4 and 30 4 and 12 12 and 30 12 and 20

(2)

(Total 5 marks)

Q13.

- (a) Write 132 as a product of prime factors.

(2)

- (b) Work out the Highest Common Factor (HCF) of 110 and 132

(2)

(Total 4 marks)

Q14.

Write 56 as a product of prime factors.

(Total 2 marks)

For questions 15 to 22 you may use a calculator.



Q15.

$$x = 2^2 \times 3 \times 5 \quad y = 2 \times 3^2 \times 5^2$$

(a) Work out the Highest Common Factor (HCF) of x and y .

(1)

(b) Work out the Least Common Multiple (LCM) of x and y .

(2)

(Total 3 marks)

Q16.

Written as the product of its prime factors

$$672 = 2^5 \times 3 \times 7$$

(a) Write 252 as the product of its prime factors.

(2)

(b) Work out the value of the highest common factor of 672 and 252

(1)

(Total 3 marks)

Q17.

(a) I am thinking of two different numbers.

They are both greater than 10

Their highest common factor (HCF) is half the smaller number.

Work out one possible pair of numbers.

(1)

(b) a , b and c are prime numbers.

$$N = a^3 \times b^2 \times c$$

Is N always odd?

Tick a box.

Yes

☐

No

☐

Give reasons for your answer.

(2)

(Total 3 marks)

Q18.

N is a number.

As a product of prime factors in index form $N = 2 \times 3^4 \times y^3$

Work out $3N^2$ as a product of prime factors in index form.

Give your answer in terms of y .

(Total 3 marks)

Q19.

a and b are different prime numbers.

$$a^3 \times b^2 = 200$$

Work out the value of $a^4 \times b$

(Total 3 marks)

Q20.

c and d are different prime numbers.

Circle the equation for which $c^4 \times d^2 \times e$ is a cube number.

$e = cd$

$e = c^2d$

$e = c^2d^2$

$e = c^3d^3$

(Total 1 mark)

Q21.

Q and R are two numbers.

As a product of prime factors,

$$Q = 2^3 \times 3 \times a^3$$

$$R = 2^4 \times 3^2 \times a^2$$

- (a) The highest common factor (HCF) of Q and R is 4056
Work out the value of a .

(2)

- (b) Work out the lowest common multiple (LCM) of Q and R .

(2)

(Total 4 marks)

Q22.

- (a) I am thinking of two different integers.

They are both less than 10

Their lowest common multiple (LCM) is four times the larger number.

Work out one possible pair of numbers.

(1)

- (b) a , b and c are different prime numbers.

$$N = a \times b \times c$$

Is 6 the smallest possible value of N ?

Tick a box.

Yes

☐

No

☐

Give reasons for your answer.

(2)

(Total 3 marks)