

Lesson 6

Number Theory : Year 9

6.1 TEST

Calculator needed

Question 1

Write down the *hcf* and the *lcm* requested;

(i) $hcf \{14, 21\} =$ $lcm \{14, 21\} =$

(ii) $hcf \{11, 12\} =$ $lcm \{11, 12\} =$

(iii) $hcf \{66, 99\} =$ $lcm \{66, 99\} =$

(iv) $hcf \{40, 48\} =$ $lcm \{40, 48\} =$

[8 marks]

Question 2

Is 1001 a prime number ?

Explain your answer

[3 marks]

Question 3

(i) List the first ten multiples of 45

(ii) List the first ten multiples of 54

(iii) Which is the first multiple that is common to both
your part (i) and part (ii) lists ?

(iv) Is this number the *hcf* or the *lcm* ?

[6 marks]

Question 4

Write down a prime number that is divisible by 3 or, if there is not one, write NONE

[1 mark]

Question 5

(i) Write down all the factors of 90

(ii) Write down all the prime factors of 90

(iii) Write down the highest prime factor of 90

[4 marks]

Question 6

Which of the following pairs of numbers are coprime ?

(*coprime means have no common factors, except 1*)

(i) 9 and 25

(ii) 9 and 12

(iii) 9 and 13

[3 marks]

Question 7

(i) Write down three square numbers

(ii) Can a square number be a factor of 125 ?

[4 marks]

Question 8

The **FUNDAMENTAL THEOREM OF ARITHMETIC** says that any number which is not prime can be written as a product of primes in, essentially, a unique way.

- (i) Within the context of the above, what does the word product mean ?

[1 mark]

- (ii) Show a method that does not require a calculator to write 180 as a product of primes.
(You may check your answer using the FACT button on your calculator)

[4 marks]

- (iii) Write 2695 as a product of primes.
You may use the FACT button on your calculator

[2 marks]

- (iv) Write 910 871 875 as a product of primes.
You may use the FACT button on your calculator

[2 marks]

Question 9

Kate is trying to work out the highest common factor of 27783 and 53361
She's used the FACT button on her calculator and set out the results as follows;

$$27783 = 3 \times 3 \times 3 \times 3 \times 7 \times 7 \times 7$$

$$53361 = 3 \times 3 \times \quad \quad \quad 7 \times 7 \times \quad \quad \quad 11 \times 11$$

(i) Annotate the above, to show the factors in common.

[2 marks]

(ii) What is the *hcf* {27783, 53361} ?

[2 marks]

(iii) What is the *lcm* {27783, 53361} ?

[2 marks]

The 53361 is now tripled to become 160083

(iv) What is the *hcf* {27783, 160083} ?

[2 marks]

(v) What is the *lcm* {27783, 160083} ?

[2 marks]

Question 10

Find the *highest common factor* of 210 and 525

(You may use the factorise button on your calculator if you wish)

[5 marks]

Question 11

Find the *lowest common multiple* of 105 and 150

(You may use the factorise button on your calculator if you wish)

[5 marks]

Question 12

A number is said to be **PERFECT** if that number is equal to half the sum of its factors.

For example, $6 = \frac{1}{2} (1 + 2 + 3 + 6)$ $\therefore$ 6 is perfect.

Which of the following numbers are perfect ?

In each case evidence your answer with working.

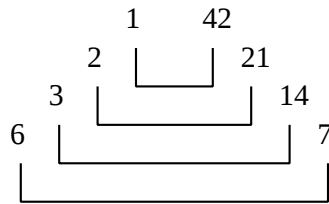
(i) 24 (ii) 28 (iii) 31

[6 marks]

Question 13

The number 42 has a lot of factors.

Here is a way of finding all eight factors by making a factor pyramid.



So the factors of 42 are; 1, 2, 3, 6, 7, 14, 21, 42

Build a factor pyramid to help find all the factors of 198

You may use your calculator in any way you like to help you build

[6 marks]

Question 14

Find the *highest common factor* of 126, 196 and 350.

[6 marks]

Question 15

Find the *lowest common multiple* of 16, 28 and 40.

[6 marks]

Question 16

Look at the following table:

	1	2	3	4	5
6	7	8	9	10	11
12	13	14	15	16	17
...					

(i) Continue this table for five more lines.

[1 mark]

(ii) Circle the prime numbers.

[2 marks]

(iii) Explain what you see.

[6 marks]