Welcome to the official start of your GCSE course. As I said last week, the course includes a lot of prior knowledge. Whilst you will find that some of the topics are not completely new, hopefully in each case you will begin to feel more confident with them and will be able to use your skills to answer more complex questions.

We start on fairly familiar territory with some key Number Vocabulary, most of which you have met before; but still can get muddled with.

Make relevant notes in your books and write the answers to any questions in your books.

Multiple: in the multiplication table. For example, the multiples of 7 are 7, 14, 21, 28, 35, …

Factor: Any number that goes <u>exactly </u>into a given number. For example, the factors of 12 are 1, 2, 3, 4, 6 and 12. (It is best to do this in pairs starting from 1)

Prime number: Any number that only has two factors, 1 and itself. For example, 2, 3, 5, 7 and 11 are prime numbers. Note that 1 is not a prime number, as it only has 1 factor.

Square: A number that results from multiplying a number by itself. For example, 1, 4, 9, 16 and 25 are square numbers.

Square root: The square root of a given number is a number that, when multiplied by itself, produces the given number. For example, the square root of 9 is 3 (because 3×3=9)

A square root is represented by the symbol **√**.

For example, √16=4.
Note that −4×−4=16.

This means that every positive number has two square roots.

So √16=+4 or −4. This can be written as √16=±4 and you should read it as 'positive or negative four'.

<u>*A bit harder:</u> √a x √a=a   or $(\sqrt{a})^2 = a$ (this is because square root (√) is the opposite of squaring so one thing reverses the other!)

So √8 x √8= 8   or $(\sqrt{8})^2 = 8$

Cube: The cube of a number is a number multiplied by itself and then by itself again. For example, we say the cube of 4 is 4×4×4=64. (we write 4^3=64)

Cube root: The cube root of a number is the number that, when multiplied by itself and then multiplied by itself again, gives the number.

For example, the cube root of 27 is 3 (because 3×3×3=27). We write $\sqrt[3]{27}$ = 3

and the cube root of −8 is −2 because −2×−2×−2=−8.   We write $\sqrt[3]{-8}$ = -2

*A bit harder: If the cube root of *b* is written as $\sqrt[3]{b}$ then $\sqrt[3]{b}$ x $\sqrt[3]{b}$ x $\sqrt[3]{b}$ = b.
Or $\sqrt[3]{5}$ x $\sqrt[3]{5}$ x $\sqrt[3]{5}$ = 5   or $(\sqrt[3]{5})^3$ = 5

Powers: A square number may be written as 5^2 . A cube may be written as 6^3 . The small numbers are called powers and they tell you how many 'lots' of the number are multiplied together.

So 5^4 = 5 x 5 x 5 x 5 = 625

LCM (Lowest common multiple): – this is the smallest number that is the multiple of 2 or 3 given numbers.

e.g. the LCM of 5 and 6 is 30
the LCM of 4 and 6 is 12

You can find this by listing the multiples of each number and finding the smallest one. For much bigger numbers we can write each number as a Product of Primes and use Venn Diagrams to find the LCM and HCF (see below)

HCF (Highest Common Factor): - this is the biggest number that is a factor of 2 or 3 given numbers.

e.g. the HCF of 8 and 12 is 4

You can find this by listing the Factors of each number

NEW Reciprocal: The **reciprocal** of any number is 1 divided by the number.

e.g. The reciprocal of 2 is 1 ÷ 2 = ½ (or 0.5)

The reciprocal of 0.25 is 1 ÷ 0.25 = 4

You can find the reciprocal of a fraction by swapping the numerator and the denominator.

For example: The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$.

The reciprocal of $\frac{7}{4}$ is $\frac{4}{7}$.

To find the reciprocal of decimals without a calculator it is often easier to turn the decimal into a fraction and flip it over!

e.g. To find the reciprocal of 0.4

0.4 = $\frac{4}{10}$ so the reciprocal of 0.4 is $\frac{10}{4}$ = $\frac{5}{2}$ = 2.5

To find the reciprocal of a Mixed Number turn it into an Improper Fraction then flip it over!

e.g. To find the reciprocal of 2.75

2.75 = $2\frac{3}{4}$ = $\frac{11}{4}$ so the reciprocal of 2.75 is $\frac{4}{11}$ (check this on your calculator 1 ÷2.75)

Read this through again and make notes or if you can print this off and stick it into your book. Then work through the 3 tasks below:

Task 1: Work through the following clips on mathswatch:

Clip 28	Factors, Multiples and Primes
Clip 79	HCF
Clip 76	Reciprocals
Clip 81	Squares, Cubes and roots
Clip 82	Working with Indices

Task 2: Complete the 3 assignments that I have set you on mathswatch – due for 01/05020

Factors, Multiples and Primes
Reciprocals
Squares, Cubes and roots

Write the answers in your book, showing any relevant workings i.e. the list of multiples

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Question 1.

Hot-dog sausages are sold in packs of 10 and hot-dog buns are sold in packs of 8. How many of each do you have to buy to have complete hot dogs with no wasted sausages or buns?

Hint: Find the LCM of 8 and 10

Question 2.

A bell chimes every 6 seconds. Another bell chimes every 5 seconds. If they both chime together, how many seconds will it be before they both chime together again?

What hint would you give someone?

Question 3.

Fred runs round a running track in 4 minutes. Debbie runs round in 3 minutes. If they both start together on the line at the end of the finishing straight, when will they both be on the same line together again? How many laps will Debbie have run? How many laps will Fred have run?

Question 4.

Copy these sums and write out the *next four* lines.

$$1 = 1$$
$$1 + 3 = 4$$
$$1 + 3 + 5 = 9$$
$$1 + 3 + 5 + 7 = 16$$

1, 4, 9, 16 …. What kind of numbers are you generating?

Question 5.

Write down the <u>negative</u> square root of each number. (Do <u>not</u> use your calculator)

a) 4   b) 49   c) 144   d) 1   e) 900

e.g answer for a) is -2

Question 6.

Write down the cube root of each number. (Do <u>not</u> use your calculator)

   a) 1   b) 27   c) 64   d) 8   e) -64

Question 7.

Write down the value of each number. (Do <u>not</u> use your calculator)

   a) 20^2 b) 30^2 c) 50^2 d) 0.5^2 e) $(-4)^2$