NUMBERS

- NATURAL NUMBERS (N) — POSITIVE WHOLE NUMBERS eg: 1, 2, 3, 4...
- INTEGERS (Z) — ANY WHOLE NUMBERS (INCL 0) eg −1, 0, 7, ...
- RATIONAL (Q) — CAN BE WRITTEN AS FRACTION eg $\frac{7}{11}$, $\frac{-21}{13}$ ...
- REAL (R) — ANY NUMBER (INCLUDING IRRATIONAL) eg π, $\sqrt{2}$, $\sqrt{11}$ ...

NATURAL NUMBERS

YOU MUST KNOW THE DIFFERENCE BETWEEN FACTORS / MULTIPLES

- A FACTOR IS A NUMBER THAT DIVIDES EVENLY INTO THE ORIGINAL NUMBER

eg THE FACTORS OF 32 ARE 1, 2, 4, 8, 16, 32

32
1 × 32
2 × 16
4 × 8

FACTORS OCCUR IN PAIRS

REMINDER

IN A FACTORY YOU MAKE BIG THINGS (PRODUCTS) BY COMBINING SMALLER THINGS (FACTORS)

- A MULTIPLE IS WHAT YOU GET WHEN YOU MULTIPLY BY THE ORIGINAL NUMBER

eg
4 × 1 = 4
4 × 2 = 8
4 × 3 = 12
4 × 4 = 16
⋮
etc.

→ THESE ARE THE "MULTIPLES" OF 4

[YOU CAN WORK THESE OUT BY COUNTING UP IN 4's, 4, 8, 12, 16, ...]

IF A QUESTION MENTIONS FACTORS OR MULTIPLES, STOP AND THINK ABOUT WHICH ONE THEY MEAN

PRIME NUMBERS (HAVE ONLY 2 FACTORS, ITSELF AND 1)

eg 2, 3, 5, 7, 11, 13, 17

9 IS NOT A PRIME NUMBER BECAUSE

9
1 × 9
FACTORS → 3 × 3

A NUMBER WHICH IS NOT A PRIME NUMBER IS CALLED **COMPOSITE**

H.C.F. (HIGHEST COMMON FACTOR)

eg WHAT IS THE H.C.F. OF 24 and 40

- START BY WRITING OUT ALL THE **FACTORS**

TRY 1
TRY 2
TRY 3
TRY 4
TRY 5

24
1 × 24
2 × 12
3 × (8)
4 × 6
~~5 ×~~

40
1 × 40
2 × 20
~~3~~
4 × 10
5 × (8)

- NOW CIRCLE THE HIGHEST NUMBER THAT IS COMMON TO BOTH LISTS

eg **THE BIGGEST NUMBER THAT DIVIDES INTO 24 AND 40**

L.C.M. (LOWEST COMMON MULTIPLE)

SNAP!!

- FIRST WE NEED TO REMEMBER WHAT A MULTIPLE IS (CHECK ON PREVIOUS PAGE)
- THE EASIEST WAY TO WRITE OUT A LIST OF MULTIPLES IS TO COUNT UP IN WHATEVER NUMBER YOU'RE INTERESTED IN
- TO FIND THE LOWEST COMMON MULTIPLE, DO THIS FOR THE TWO NUMBERS, THEN PLAY SNAP!!

eg LCM OF 3 AND 5

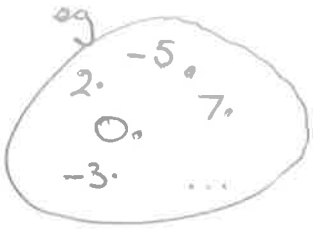
3	5
6	10
9	(15)
12	SNAP!!
(15)	

LCM = 15

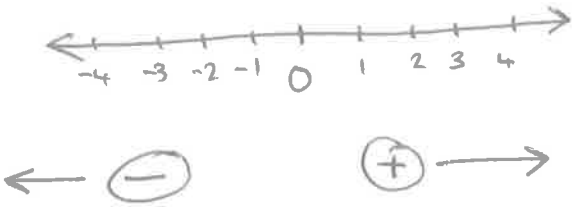
INTEGERS

$\mathbb{Z}$

- WHOLE NUMBERS
- CAN BE POSITIVE OR NEGATIVE
- ZERO IS AN INTEGER



ADDING AND SUBTRACTING



(USE NUMBERLINE OR THINK OF IT LIKE
+ MONEY YOU HAVE
− MONEY YOU OWE.

MULTIPLYING / DIVIDING

+	×	+	=	+
+	×	−	=	−
−	×	+	=	−
−	×	−	=	+

SAME SIGNS = +

DIFFERENT SIGNS = −

VERY IMPORTANT

THIS ONLY WORKS FOR × OR ÷

eg $(2)+(-4) = -2$

$(2)\times(-4) = -8$

$(-2)+(-4) = -6$

$(-2)\times(-4) = +8$

MAKE SURE YOU GET THIS STUFF!

WHEN IN DOUBT, YOU SHOULD

USE A CALCULATOR

RATIONAL NUMBERS

ANY NUMBER WHICH CAN BE WRITTEN AS A FRACTION. (CAN BE + OR −)

BE VERY CAREFUL ABOUT ADDING / SUBTRACTING FRACTIONS.

IN GENERAL, USE YOUR CALCULATOR FOR FRACTIONS.

THE **MAGIC FRACTION BUTTON** IS BRILLIANT → 

THERE ARE SOME VERY STRANGE NUMBERS WHICH CAN'T BE REPRESENTED AS FRACTIONS.

eg $\sqrt{2}$ π

THESE ARE CALLED **IRRATIONAL** NUMBERS

IRRATIONAL NUMBERS HAVE

- NON - TERMINATING
- NON - RECURRING

DECIMALS

DECIMALS

eg 5 · 34

ROUNDING (PEOPLE GET VERY CONFUSED BY THIS !)

DECIMAL PLACES

"2 DECIMAL PLACES" MEANS THERE WILL BE 2 DIGITS AFTER THE DECIMAL POINT

eg 3.16 OR 5.27

eg IF WE WANT TO ROUND

23.483

TO (i) 2 DECIMAL PLACES
(ii) 1 DECIMAL PLACE

(i) 23.48|3

2 DECIMAL PLACES

DRAW A LINE AFTER THE REQUIRED NUMBER OF DECIMAL PLACES

CHECK THE NEXT NUMBER - IF THIS IS 5 OR BIGGER WE NEED TO ROUND 23.48 UP

ANS = 23.48

(ii) 23.4|8|3

THIS BIGGER THAN 5, SO I ROUND 23.4 UP TO 23.5

ANS = 23.5

ONE DECIMAL PLACE

SIGNIFICANT FIGURES

IGNORE ZEROS AT START / END

1ST SIGNIFICANT FIGURE
2ND S.F. etc.

eg 183,000

OR

0.000354

1ST SIGNIFICANT FIGURE

OTHERWISE, IT'S VERY SIMILAR TO

eg ROUND (i) 72,471
(ii) 0.00456
TO 2 SIGNIFICANT FIGURES

(i) 72,|4|71

LESS THAN 5: DON'T ROUND UP

ANS = 72,000

2 SIGNIFICANT FIGURES

EVERYTHING ELSE BECOMES A 0

(ii) 0.00456

0.0045|6| → GREATER THAN 5 ⇒ ROUND UP

2 S.F.

ANS = 0.0046

SCIENTIFIC NOTATION

[FOR VERY BIG / VERY SMALL NUMBERS]

eg $725,000,000,000 = 7.25 \times 10^{11}$

DECIMAL POINT MOVES 11 PLACES.

THIS NUMBER HAS TO BE BETWEEN 1 AND 10

OR

0.0000056

→ 6 PLACES

$= 5.6 \times 10^{-6}$

VERY BIG NUMBERS	10^{+}
VERY SMALL NUMBERS	10^{-}

METHOD

1. WRITE NUMBER
2. PUT THE DECIMAL POINT IMMEDIATELY AFTER THE 1ST SIGNIFICANT FIGURE.
3. COUNT HOW MANY PLACES THE DECIMAL PLACE HAS HAD TO MOVE

IF YOU'RE GIVEN A QUESTION WITH SCIENTIFIC NOTATION, YOU MIGHT NEED TO CONVERT FROM SCIENTIFIC NOTATION INTO NORMAL NOTATION

RW

eg $3.5 \times 10^{7} + 4.36 \times 10^{-4}$

3.5000000 ← 0.000436

$= 35,000,000 + 0.000436$

$= 35,000,000.000436$

BIMDAS

[WHAT ORDER DO I HAVE TO DO STUFF?]

B = BRACKETS

THIS MEANS IF THERE IS ANYTHING INSIDE A BRACKET, DO THIS FIRST.

I = INDICES

THEN DO YOUR INDICES / POWERS

eg $3 \times 2^4 = 3 \times 16 = 48$

NOT

~~$3 \times 2^4 = 6^4 = 1296$~~

M = MULTIPLICATION

D = DIVISION

→ ACTUALLY, IT COULD BE DM OR MD

A = ADDITION

S = SUBTRACTION

→ OR SA INSTEAD.

eg $$\frac{2 \times 4 + 3}{(6+5)}$$

$$= \frac{2 \times 4 + 3}{11}$$

THIS IS LIKE AN "AUTOMATIC BRACKET"

$$= \frac{8+3}{11} = \frac{11}{11} = \boxed{1}$$