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
$4 \times 1 = 4$
$4 \times 2 = 8$
$4 \times 3 = 12$
$4 \times 4 = 16$
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
3 × 3

FACTORS →

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

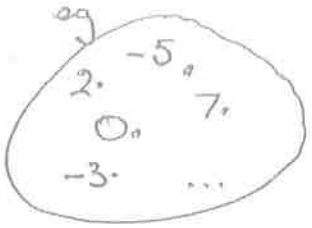
3	5
6	10
9	(15)
12	SNAP!!
(15)	

LCM = 15

INTEGERS

$\mathbb{Z}$

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



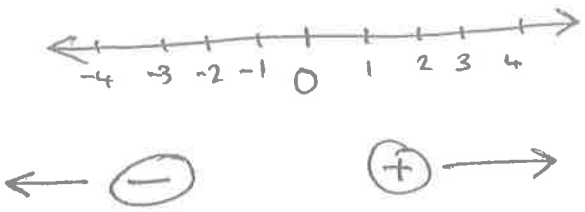
ADDING AND SUBTRACTING

(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 (FRACTIONS)

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 → $\frac{\square}{\square}$

MULTIPLYING = EASY

$\frac{\text{TOP}}{\text{BOT}} \times \frac{\text{TOP}}{\text{BOT}}$ eg $\frac{1}{2} \times \frac{3}{4} = \boxed{\frac{3}{8}}$

DIVIDING EASY BUT REMEMBER TRICK

TRICK: FLIP 2ND FRACTION THEN MULTIPLY

eg $\frac{1}{2} \div \frac{2}{3}$

$= \frac{1}{2} \times \frac{3}{2} = \boxed{\frac{3}{4}}$

ADDING / SUBTRACTING = HARD.

NEED SAME NUMBER ON BOTTOM → EASY eg $\frac{1}{7} + \frac{5}{7} = \frac{6}{7}$

eg HARD $\frac{2}{3} + \frac{3}{4}$

↓

$\frac{8}{12} + \frac{9}{12}$

$= \frac{17}{12}$

STEP ① GET SAME NUMBER ON BOTTOM (FIND L.C.D.) (SNAP)

3	4
6	8
9	12
12	

LCD = 12

STEP ② CONVERT EACH FRACTION TO HAVE LCD ON BOTTOM RW

$\frac{2}{3} = \frac{8}{12}$ (×4)

$\frac{3}{4} = \frac{9}{12}$ (×3)

STEP ③ ADD / SUBTRACT

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|83

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 $7\underset{\curvearrowleft}{2}5,000,000,000 = 7.25 \times 10^{11}$

DECIMAL POINT MOVES 11 PLACES.

THIS NUMBER HAS TO BE BETWEEN 1 AND 10

eg 368

$= 3.68 \times 10^{2}$

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

RECIPROCALS ("FLIP" WHAT'S A RECIPROCAL?)

A NUMBER × IT'S RECIPROCAL = 1

eg $\frac{2}{3} \times \frac{3}{2} = \frac{6}{6} = 1$

($\frac{3}{2}$ ↑ RECIPROCAL OF $\frac{2}{3}$)

TO FIND A RECIPROCAL, EITHER USE THE x^{-1} BUTTON ON YOUR CALCULATOR

OR

"FLIP" THE NUMBER UPSIDE-DOWN

(BE CAREFUL/REMEMBER eg 4 IS $\frac{4}{1}$)

SO RECIPROCAL OF 4 IS $\frac{1}{4}$

eg RECIPROCAL OF $\frac{2}{5}$ IS $\frac{5}{2}$

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"

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