Order of Operations

- When performing calculations

Remember BIDMAS

Brackets
Indices
Division/Mult
Add/Sub

Eg3 a) $2+9\times10^2-(7\times3) = 2+9\times10^2-21$ (B)

$= 2+9\times100-21$ (I)

$= 2+900-21$ (M)

$= 902-21$ (A)

$= 881$

b) $21+(-3)^2\times2 = 21+9\times2$

$= 21+18$

$= 39$

c) $21-3^2\times2 = 21-9\times2$

$= 21-18$

$= 3$

d) $\frac{30}{3+7} = 30\div(3+7) = 30\div10 = 3$

e) $5+4^2\div8-(3+8\div2) = 5+4^2\div8-(3+4)$

$= 5+4^2\div8-7$

$= 5+16\div8-7$

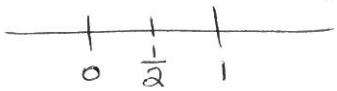
$= 5+2-7$

$= 0$

Fractions

= part of whole
= part of unit

$\frac{1}{2}$ ← n° of parts whole is divided into
how many we choose



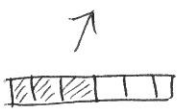
written as $\frac{\text{whole n°}}{\text{whole n°}}$ ← numerator
← denominator

Defn: A fraction is written as $\frac{a}{b}$ where a, b are whole numbers + $b \neq 0$.

Equivalent Fractions

- represent the same thing

$$\frac{1}{2} = \frac{3}{6} = \frac{20}{40} = \dots$$



Notice $\frac{3}{6} = \frac{1 \times \cancel{3}}{2 \times \cancel{3}} = \frac{1}{2}$

simplifying Fractions by cancelling common factors

eg) $\frac{12}{30} = \frac{2 \times 6}{2 \times 15} = \frac{2 \times 3 \times 2}{2 \times 3 \times 5} = \frac{2}{5}$

$\frac{12}{30}$ in its simplest form is $\frac{2}{5}$

Be careful: $\frac{\cancel{2}+4}{\cancel{2}+5} \neq \frac{4}{5}$

(instead $\frac{2+4}{2+5} = \frac{6}{7}$)

* cancel only Factors
* cancel top with bottom

Mixed Numerals & Improper Fractions

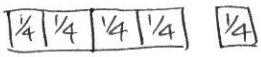
↑ when numerator bigger than denominator

↑ mixture of whole & fractions

eg: $\frac{5}{4} = 1\frac{1}{4}$

↑ Improper fraction

↑ mixed numeral.



4 goes into 5 once with 1 remaining

eg) $\frac{7}{3} = 2\frac{1}{3}$

↖ 3 goes into 7 twice with 1 rem

Going the other way

1) $2\frac{3}{4} = \frac{4\times2+3}{4} = \frac{11}{4}$ ← working in ¼s.

2) $5\frac{2}{7} = \frac{37}{7}$ ← $7\times5+2$

Operations with Fractions

Addition & Subtraction:

Eg~~4~~.

(a) $\frac{1}{2}+\frac{2}{3}$ =  +  ← can't combine until they are the same sized pieces.

$= \frac{3}{6} + \frac{4}{6}$

∴ Get a <u>common Denominator</u>

$= \frac{3+4}{6}$

$= \frac{7}{6}$

$= 1\frac{1}{6}$

(b) $\frac{1}{2}+\frac{3}{8}-\frac{7}{12}$

$= \frac{12}{24} + \frac{9}{24} - \frac{14}{24}$

$= \frac{12+9-14}{24}$

$= \frac{7}{24}$

<u>Steps</u>

- Get a common denominator
- Adjust the top
- Then combine

Multiplication:

(c) $\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{6}{12}$ ← Mult across top + across bot

$= \frac{1}{2}$ ← notice we can simplify.

OR : $\frac{2^{1}}{\cancel{3}} \times \frac{\cancel{3}}{\cancel{4}_{2}} = \frac{1}{2}$

(d) $\frac{4}{10} \times \frac{2}{3} = \frac{4 \times 2}{10 \times 3} = \frac{8}{30} = \frac{4}{15}$

OR $\frac{4}{\cancel{10}_{5}} \times \frac{2}{3} = \frac{4}{15}$

Division:

(e) $\frac{2}{3} \div \frac{1}{2} = \frac{2}{3} \times \frac{2}{1}$ * Invert and Multiply !!

$= \frac{4}{3}$ ← Invert second fraction

(f) $\frac{5}{8} \div \frac{3}{4} = \frac{5}{\cancel{8}_{2}} \times \frac{\cancel{4}}{3}$

$= \frac{5}{6}$ ← $\frac{4}{3}$ is the reciprocal of $\frac{3}{4}$

(g) $\frac{4}{5} \div 2 = \frac{4}{5} \div \frac{2}{1} = \frac{4}{5} \times \frac{1}{2}$

$= \frac{4}{10}$

$= \frac{2}{5}$

Decimals

- think of this as a fraction but now in Base 10.

$$0.5 = \frac{5}{10} = \frac{1}{2}$$

73.4
tens ↑ units ↑ tenths ↖

Common decimals

$0.5 \leftarrow 1/2$

$0.25 \leftarrow 25/100 = 1/4$

$0.75 \leftarrow 3/4$

$0.3333\ldots \leftarrow 1/3$

$0.6666\ldots \leftarrow 2/3$

On calc $1 \div 3 = 0.3333\ldots$ ← repeating decimal

$= 0.\dot{3}$

- Repeating decimals can be written as fractions = $\frac{\text{whden}^{\circ}}{\text{whole n}^{\circ}}$
- $0.125 \leftarrow$ Terminating decimal $= \frac{125}{1000} = \frac{1}{8}$
- Terminating decimals can be written as fractions
- Some decimals can't be written as fractions.

$\pi = 3.1415\ldots$ ← goes on forever

(* In any circle $\frac{\text{circumf}}{\text{diameter}} = \pi$)

Decimals + Powers of 10

$7.3 \times 10 = 73$

$7.32 \times 10 = 73.2$

$7.32 \times 100 = 732$ ← also can write this as 7.32×10^2

$7.32 \times 10^4 = 73200$

$7.32 \div 10 = 0.732$

$7.32 \div 10^2 = 0.0732$

Scientific Notation

- useful when talking about extremly large or extremely small numbers.

eg 1) $300\,000\,000 = 3 \times 10^8$

2) The mass of the sun is 1.988×10^{30} ← Scientific Notation

eg) 7325 written in scientific notation is 7.325×10^3

↑ this must be between 0 and 10

Percentages

= fraction with denominator of 100
= fraction out of 100

$\frac{1}{2} = 0.5 = 50\%$

↖ reps $\frac{50}{100}$

Eg5. Find 60% of $500.

$\frac{60}{100} \times 500 = \$300$

Eg6. I invest $1000 in a term deposit. Each year it increases its value by 5.2%.

(a) How much will I have after 1 year? 5.2% of $1000 = 0.052 \times 1000 = 52$

∴ After 1 year : $1000 + 52 = \$1052$.

(b) How much will I have after 2 years.?

5.2% of $1052 = $0.052 \times 1052 = 54.704$

↑ round

∴ After 2 years : $1052 + 54.70$

$= \$1106.70$