YEAR 9 NUMERACY REVISION NOTES

SOME NUMERICAL FACTS

10mm	=	1cm	1000ml	=	1l	1000mg	=	1g
100cm	=	1m	1000cm^3	=	1l	1000g	=	1kg
1000m	=	1km				1000kg	=	1tonne
60secs	=	1min	1inch	=	2.5cm	One million = 1,000,000		
60mins	=	1hr	5miles	=	8km		(6 zeros)	
3600secs	=	1hr	2.2pounds	=	1kg			
			1 ¾ pints	=	1litre			

SQUARE NUMBERS AND SQUARE ROOTS

$1^2 = 1 \times 1 = 1$
$2^2 = 2 \times 2 = 4$
$5^2 = 5 \times 5 = 25$

$\sqrt{25} = 5$ (the square root of 25 = 5 because 5 x 5 = 25

CUBE NUMBERS AND CUBE ROOTS

$1^3 = 1x1x1 = 1$
$2^3 = 2x2x2 = 8$
$5^3 = 5x5x5 = 125$

$\sqrt[3]{125} = 5$ (the cube root of 125 = 5 because 5x5x5 =125)

RECIPROCAL

The reciprocal of $\frac{3}{2} = \frac{2}{3}$

The reciprocal of 5 is $\frac{1}{5}$

> Turn fraction upside down
> 5 can be written as $\frac{5}{1}$ first then turn upside down

BASIC DEFINITIONS

SUM (add -)

DIFFERENCE (subtract -)

PRODUCT (multiply x)

MULTIPLES

Multiples of 5 for example are the numbers in the 5 times table

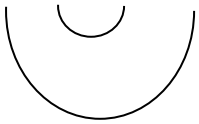
e.g. 5, 10, 15, 20, 25, ...

FACTORS

Factors of a number go into it exactly leaving no remainder

e.g. factors of 15 are:

1, 3, 5, 15



Notice that it is a good idea to list the factors in pairs – e.g.

1x15 = 15 & 3x5 = 15

PRIME NUMBERS

2,3,5,7,11,13,17,19,23,29,..... **A prime number has only two factors, 1 and itself**

DIVISION

Work out 322 ÷ 14

$$14 \overline{)\,3\ {}^{3}2\ {}^{4}2}\qquad 2\ 3$$

- 14 into 3 doesn't go so carry the 3 onto the next number
- 14 into 32 goes twice with 4 left over – carry this onto next number.
- 14 into 42 goes 3 times.
- Answer = 23

It helps to write the 14 times table!

1 x 14 = 14
2 x 14 = 28
3 x 14 = 42
4 x 14 = 56
5 x 14 = 70
6 x 14 = 84
7 x 14 = 98
8 x 14 = 112
9 x 14 = 126
10 x 14 =140

ORDER OF OPERATION

B - bracket
I - indices
D - division
M - multiplication
A - addition
S - subtraction

5 + 3 x 4
= 5 + 12
= 17

Do x before +

3 x (5-2)
= 3 x 3
= 9

Do bracket before x

4×3^2
= 4 x 9
= 36

Do power before x

ROUNDING

Decimal Places

3·78 (1dp) = 3·8

3.443 (2dp) = 3·44

If the number after the line is 5 or more – add 1 to the number before the line.

Significant Figures

31 (1sf) = 30

475 (1sf) = 480

387 (1sf) = 400

31 has been rounded to the nearest 10

475 has been rounded to the nearest 10

387 has been rounded to the nearest 100

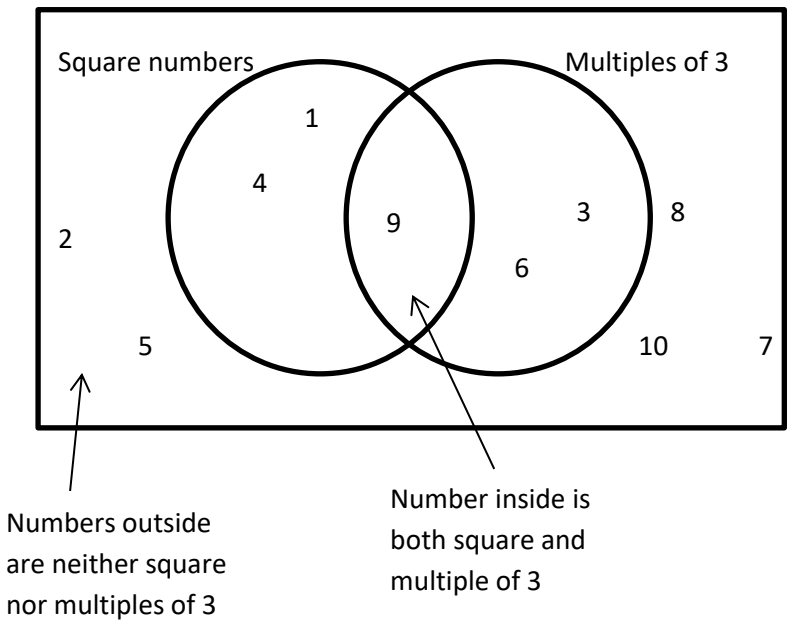
Estimation

Estimate the sum of £4.99, £6.02, £3.52

£5 + £6 + £3.50 = £14.50

VENN DIAGRAMS

Put the numbers 1 -10 into the Venn Diagram



FRACTIONS, DECIMALS AND PERCENTAGES

Simplifying Fractions

Simplify the following:

$\frac{20}{25} = \frac{4}{5}$ ← Divide top and bottom by 5

$\frac{12}{18} = \frac{2}{3}$ ← Divide top and bottom by 6

Mixed Numbers and Improper Fractions

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

Adding and Subtracting Fractions

$\frac{2}{3} + \frac{1}{4}$

$= \frac{8}{12} + \frac{3}{12}$

$= \frac{11}{12}$

We can't add fractions unless the denominator is the same – choose 12 because it is in the 3 and 4 times tables.

If we wanted to subtract the answer would be $\frac{5}{12}$

Common Fraction, Decimal and Percentage Equivalents

The following table contains commonly used fraction, decimal and percentage equivalents – they need to be learned.

Fraction	Decimal	Percentage
½	0.5	50%
¼	0.25	25%
⅛	0.125	12.5%
¾	0.75	75%
⅓	$0.\dot{3}$	$33.\dot{3}\ \%$
⅔	$0.\dot{6}$	$66.\dot{6}\ \%$
$^1/_{10}$	0.1	10%
$^1/_5$	0.2	20%

Fractions of Quantities

Find $\frac{3}{4} of\ 24$

= 24 ÷ 4 x 3

= 18

Divide by the bottom and **T**imes by the **T**op

Percentages of Quantities

Examples

10% of 350 = 35

1% of 350 = 3.5

10% of 47 = 4.7

For 10% ÷ 10,

For 1% ÷ 100

15% of 420 10% = 42,

5% = 21

15% = 42+21 = 63

Increase 320 by 20% 10% = 32

20% = 64

320 + 64 = 384

Increase means add on
decrease means subtract

COMPARING FRACTIONS DECIMALS AND PERCENTAGES

We may be asked to compare using the symbols “>”, “<” or “=”

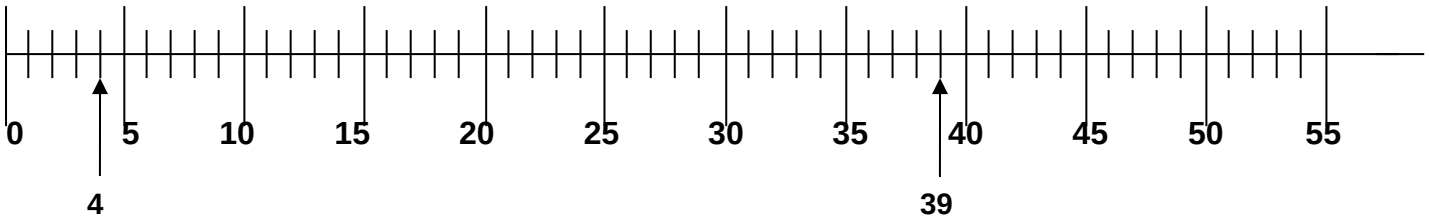
2/5 = 40% so
45% is bigger

45% > 2/5 or ¼ < 0.26

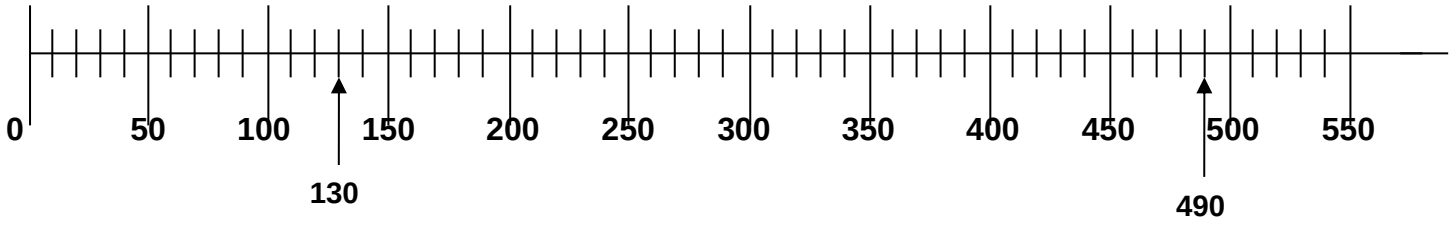
1/4 = 25%,
0.26 = 26% so
26% is bigger

READING SCALES

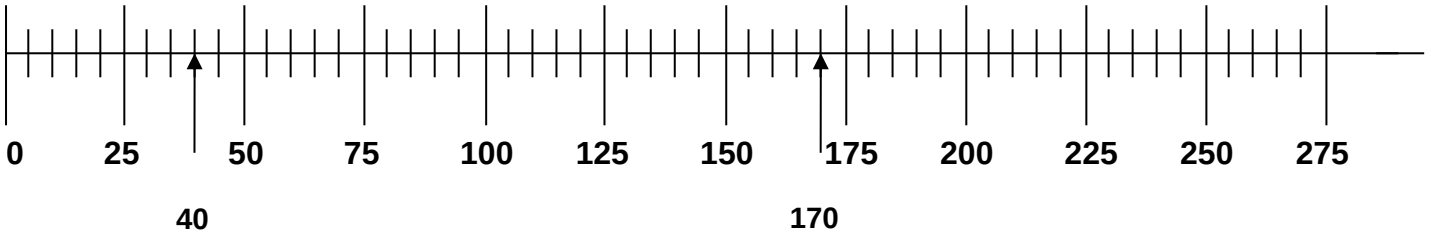
1) This scale is going up in 1



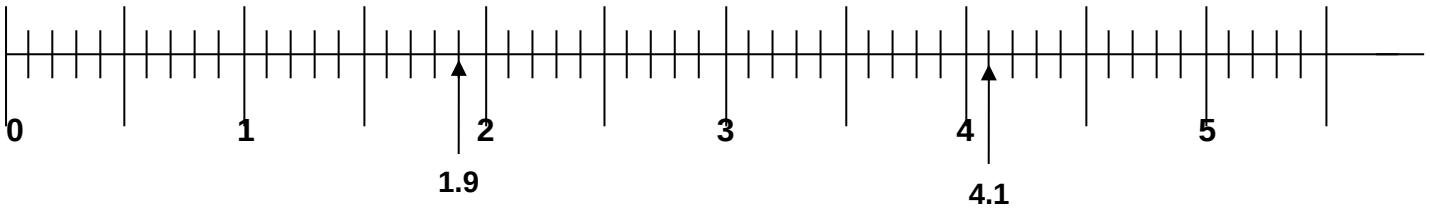
2) This scale is going up in 10



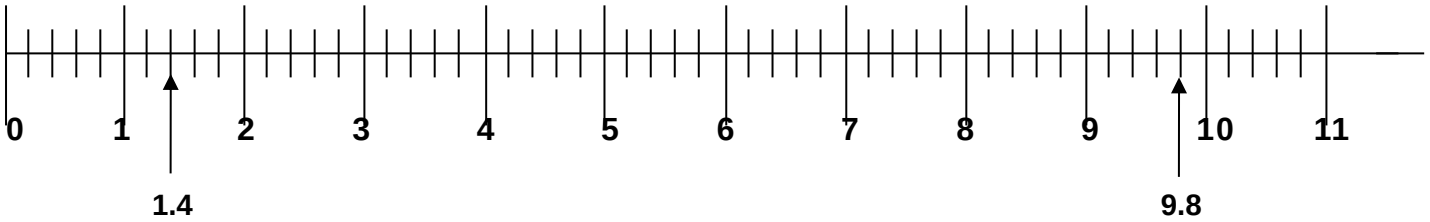
3) This scale is going up in 5



4) This scale is going up in 0.1



5) This scale is going up in 0.2



RATIO

Method 1

Ann : Bill

= 2 : 7

= ? : 35 ↓ X 5

7 x 5 = 35 so 2 x 5 = 10

So Ann has 10 pencils

Method 2

Ann and Bill share pencils in the ratio 2:7. If Bill has 35 pencils, how many does Ann have?

7 parts = 35

1 part = 5 (35 ÷ 7)

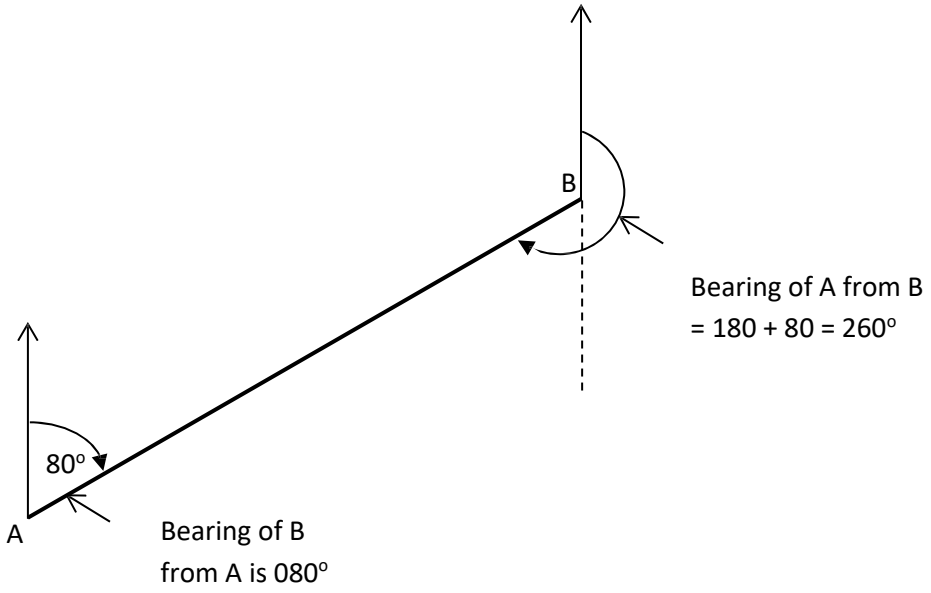
2 parts = 10

Ann has 10 pencils

BEARINGS

A bearing of one point from another is the **angle from north** you have to turn in a **clockwise direction** from the first point to face the second point.

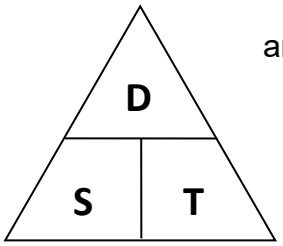
Bearings have to have three figures so for example a bearing of 87^{o} needs to be written as **087^{o}**



COMPOUND MEASURES

Speed – Distance - Time

$$\text{SPEED} = \frac{\text{DISTANCE}}{\text{TIME}}$$

It is worth remembering 

and use the "cover up" method.

COVER "D", D = SxT
COVER "S", $S = \frac{D}{T}$
COVER "T", $T = \frac{D}{S}$

Examples

1. A car travels at 30mph for 2hrs 30 mins – how far does it travel?

Distance = Speed x Time

= 30 x 2.5

= 75 miles

An easy mistake to make is that 2 hrs 30 mins = 2.3

Remember 2hrs 30 = 2 ½ hrs = 2.5

2. An ant travels 150 metres in 1.5 mins. What is its speed in metres per minute?

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{150}{1.5}$$

= 100 metres / min

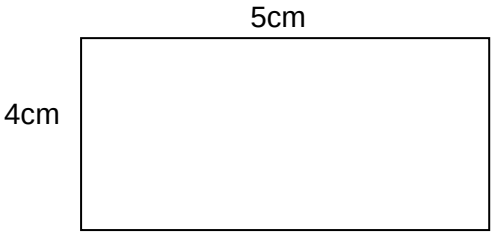
AREA

The **AREA** of a shape is the amount of space taken up inside the shape.

Note: The units of the answer will be squared. e.g. **cm^2** **mm^2** etc

Examples

Rectangle

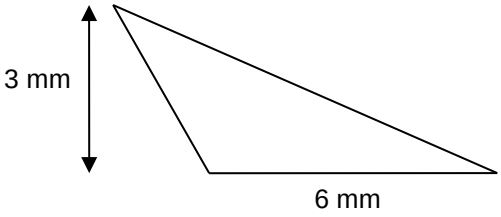


Area = length X width

Area = 5 x 4

= 20 cm^2

Triangle

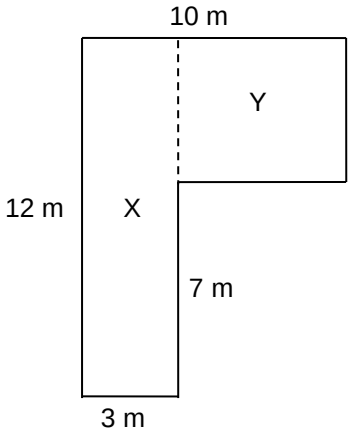


Area = base X perpendicular height
2

Area = $\frac{6 \times 3}{2}$

= $\frac{18}{2}$

= 9 mm^2



Area = X + Y

= (12 X 3) + (5 X 7)
= 36 + 35
= 71 m^2

CIRCUMFERENCE & AREA OF CIRCLES

FOR ANY CIRCLE, the circumference is equal to just over 3 times the length of its diameter.

This value is called "Pi" (Greek symbol π) where $\pi = 3.14\ (159265358979323846..)$

For the purposes of examinations, we usually use ...

$$\boldsymbol{\pi = 3.14}$$

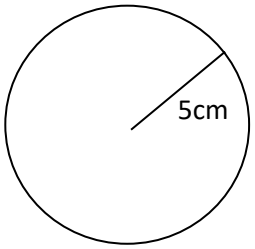
Circumference

$$\boldsymbol{C = 2\pi r}$$

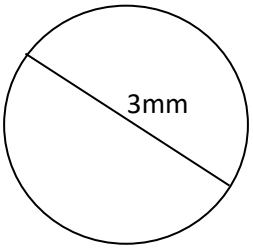
Some people prefer to use $C = \pi d$ but the following examples show use of $C = 2\pi r$.

Examples

Find the circumference of the following circles



$C = 2\pi r$
$C = 2 \times 3.14 \times 5$
$C = 31.4\ cm$



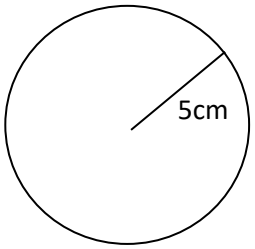
diameter = 3mm,
so, radius = 1.5mm

$C = 2\pi r$
$C = 2 \times 3.14 \times 1.5$
$C = 9.42\ cm$

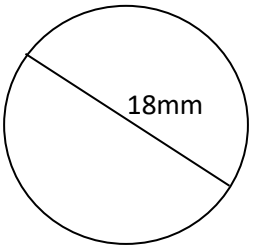
Area

$$\boldsymbol{A = \pi r^2}$$

Find the area of the following circles



$A = \pi r^2$
$A = 3.14 \times 5 \times 5$
$A = 78.5\ cm^2$



diameter = 18mm,
so, radius = 9mm

$A = \pi r^2$
$A = 3.14 \times 9 \times 9$
$A = 254.34\ mm^2$

VOLUME

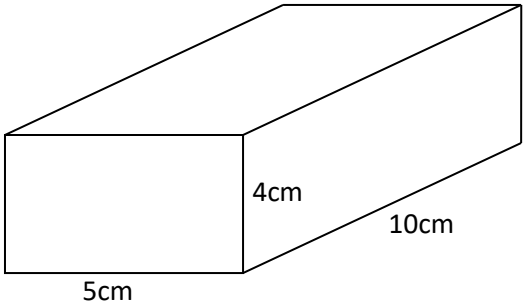
Example

Find the volume of the following prism:

Volume $= L \times W \times H$

$= 10 \times 5 \times 4$

$= 200 \text{ cm}^3$



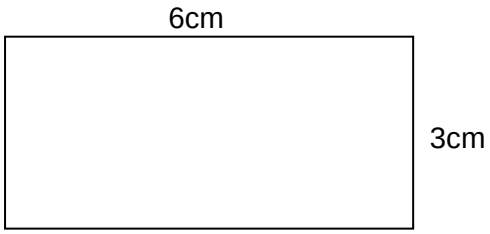
Notice units are cubed – i.e. the power is 3

PERIMETER

The **PERIMETER** of a shape is the total distance around its edge.

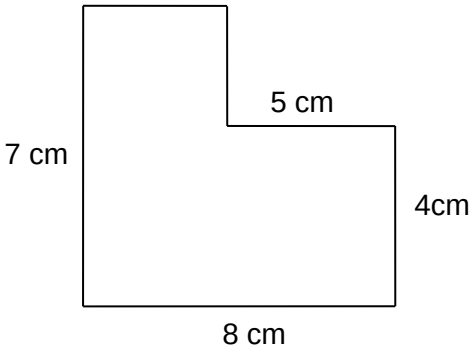
Note: The units of the answer will be the same as the ones used for each of the edges.

Examples



Perimeter = 6 + 6 + 3 + 3

= 18 cm



Perimeter = 7 + 8 + 4 + 5 + 3 + 3

= 30 cm

MEAN, MEDIAN, MODE AND RANGE

MODE

The mode is the number that occurs the MOST often in a list.

2, 3, 5, 6, 2, 3, 7, 8, 6, 3 The mode is 3

MEDIAN

The median is the middle number in a list of numbers that has been put in order from the smallest to the biggest. Sometimes there will be two middle numbers (if we have an even amount in the list). If this happens we have to find the mean of the two middle ones (add the middle ones up and divide by 2).

1) 2, 7, 8, 3, 4, 6, 3 Put them in order first

2, 3, 3, 4, 6, 7, 8 The median is 4

2) 5, 7, 3, 2, 5, 9, 10, 15

In order,

2, 3, 5, 5, 7, 9, 10, 15 5 + 7 = 12, 12 ÷ 2 = 6

The median = 6

MEAN

To find the mean from a list of numbers we need to add them up to get a total and then divide the total by how many numbers in the list.

If we have 12, 6, 17, 5, 10

Total = 12+6+17+5+10
= 50

Mean = 50 ÷ 5
= 10

RANGE

To find the range of a list of numbers, we take the smallest from the biggest.

3, 14, 21, 2, 6, 73 **Range** = 73 – 2
= 71