Basic Maths Revision

DECIMALS

FRACTIONS

PERCENTAGES

RATIOS

AREAS

DECIMALS – Adding and subtracting

* Write down the numbers, one under the other, with the decimal points line up
* Put in the zeros so the numbers have the same length
* Then add normally, remembering to put the decimal point in the answer

Example: 1.452+1.3

Line the decimals up	1 . 452 + 1 . 3
Put in the zeros so numbers have same length	1 . 452 + 1 . 300
Add	1 . 452 + 1 . 300 2 . 752

DECIMALS – Multiplying

* Multiply normally,, ignoring decimal points
* Then put in the decimal point in the answer – it will have as many decimal places as the two original numbers combined

Example: 0.03x1.1

start with:	0.03 x 1.1
multiply without decimal points:	3 x 11 = 33
0.03 **has 2 decimal places**	
1.1 **has 1 decimal places**	
so the answer **has 3 decimal places**:	0.03

DECIMALS – Dividing

* Use long division (ignoring decimal places)
* Then put in the decimal point in the same spot as the dividend (the number being divided)

Example: 9.1 divided by 7

Ignore the decimal point and use long division

```
   13
7 ) 91
    7
    21
    21
     0
```

Put the decimal point in the answer directly above the decimal point in the dividend

```
   1.3
7 ) 9.1
```

The answer is **1.3**

DECIMALS – converting to fractions

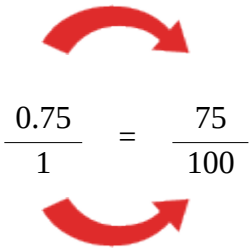
* Write down the decimal divided by 1
* multiply both top and bottom by 10 for every number after decimal point
  (for example, if there are 2 numbers after the decimal, then use 100, if there are 3 numbers, then use 1000 etc)

Example: Convert 0.75 to a fraction

Write down:

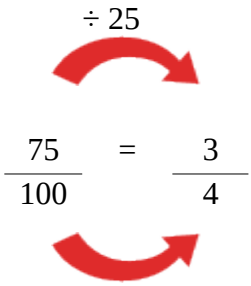
$$\frac{0.75}{1}$$

Multiply both top and bottom by 100 (because there are 2 digits after the decimal place)



(see how it turns top number into a whole number?) x 100

Simplify the fraction:



Answer = 3/4

FRACTIONS – Adding and subtracting same type of fraction (same denominator)

* Make sure the bottom numbers are the same (the denominators)
* Add top numbers together (the numerators) and put the answer of the same denominator
* simplify the fraction if needed

Example: $\frac{1}{4} + \frac{1}{4}$

Add top numbers and put answer over same denominator

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

Simplify fraction:

$$\frac{2}{4} = \frac{1}{2}$$

FRACTIONS – Adding and subtracting (different denominators)

* Make sure the bottom numbers are the same (the denominators) by finding the common denominator
* Add top numbers together (the numerators) and put the answer of the same denominator
* simplify the fraction if needed

Example $\frac{1}{3} + \frac{1}{6}$

As the **3** is half of **6**, we multiply the top and bottom of the first fraction by **2** to find the common denominator

$$\frac{1 \text{ x } 2 = 2}{3 \text{ x } 2 = 6} = \frac{2}{6}$$

Now we can add the two fractions together

$$\frac{2}{6} + \frac{1}{6} = \frac{2+1}{6} = \frac{3}{6}$$

Finally, we can simplify the fraction

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

FRACTIONS – multiplying

* multiply the top numbers
* multiply the bottom numbers
* simplify fraction if needed

Example: $\frac{1}{2} \times \frac{2}{5} = \frac{1 \times 2}{2 \times 5} = \frac{2}{10}$

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

FRACTIONS – dividing

* Turn the second fraction (the one you want to divide by) upside-down
* Multiply the first fraction by this new fraction
* Simplify the fraction if needed

Example: $\frac{1}{2} \div \frac{1}{6}$

Turn second fraction upside-down $\frac{1}{6} = \frac{6}{1}$

Multiply first fraction by this new fraction $\frac{1}{2} \times \frac{6}{1} = \frac{1 \times 6}{2 \times 1} = \frac{6}{2}$

Simplify the fraction $\frac{6}{2} = 3$

PERCENTAGE – calculating percentage change

* divide the amount of increase by the initial value and multiply by 100

Example:

Longsands School had 20 teachers in 2008. The next year, there were 12 teachers. What is the percentage change from 2008 to 2009

20 – 12 = 8

8 ÷ 20 = 0.4

0.4 x 100 = 40

Therefore the percentage change is 40%

PERCENTAGE – How to increase a number by a set percentage

* convert the percentage to a decimal
* multiply the original number by the resulting decimal (this is the actual increase)
* add the result to original number

Example: Increase £34 by 20%

20 ÷ 100 = 0.2 34 x 0.2 = 6.8 6.8 + 34 = 40.8 = £40.80

PERCENTAGE – How to decrease a number by a set percentage

* convert the percentage to a decimal
* multiply the original number by the resulting decimal (this is the actual decrease)
* subtract the result from original number

Example: Decrease £120 by 3%

3 ÷ 100 = 0.03 120 x 0.2 = 3.6 120 – 3.6 = 116.4 = £116.40

RATIOS

* If you are making blackcurrant squash and you mix use 4 parts of water for every part of juice, you are using a ratio of **4:1**
* If you are making rice and you use two teacups of water for every teacup of rice you are using a ratio of **2:1**

Breakdown a figure into its Ratio

* Add ratios together
* Divide number by the result
* Multiply this new figure by the individual ratio figures

Example 1: Split £24 into the ratio of 1:5

Add ratio 1 + 5 = 6

Divide 24 by 6 $24 \div 6 = 4$

Multiply result by both individual ratio figures $4 \times \mathbf{1} = 4$ and $4 \times \mathbf{5} = 20$

Answer is £4 and £24

Example 2: Split £120 in the ratio of 2:3:5

Add ratio 2 + 3 + 5 = 10

Divide 120 by 10 $120 \div 10 = 12$

Multiply result by both individual ratio figures $12 \times 2 = 24$, $12 \times 3 = 36$ and $12 \times 5 = 60$

Answer is £24 , £36 and £60

AREAS

Definitions:

Polygons - *a closed shape bounded by only straight lines*

T**riangles** - *a three sided polygon*

P**arallelograms** - *a 4 sided figure formed by two pairs of parallel lines. Opposite sides are equal in length and opposite angles have equal measure*

Acute angle - *the angle measures between 0 and 90 degrees*

Right Angle - *the angle measures 90 degrees*

Obtuse Angle - *the angle measures between 90 and 180 degrees*

The area of a **polygon** is the number of square units inside that polygon

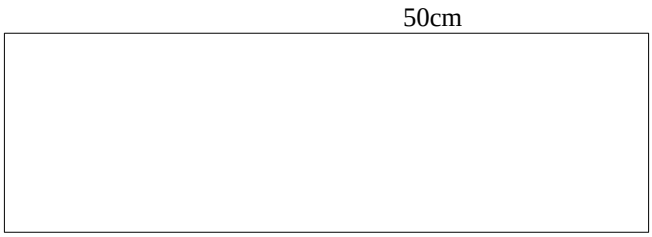
* SQUARES and RECTANGLES

To calculate the area (a) of a square or a rectangle, we multiply the height (h) by the width or base (b) so the formula is a = h x b

Example:

h = 10 and b = 50 so the area is

10 x 50 = 500cm^2

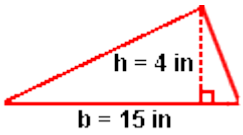


* TRIANGLES

To find the area of a triangle, multiply the base (b) by the height (h), and then divide by 2. The division by 2 comes from the fact that a **parallelogram** can be divided into 2 triangles. For example, in the diagram below, the area of each triangle is equal to one-half the area of the parallelogram.

Since the area of a parallelogram is a = h x b as shown above for *squares* and *rectangles*, the area of a *triangle* must be 1 half of the area of a parallelogram. Therefore, the formula for the area of a triangle must be: a = ½ x h x b

* **Example 1:** Acute Triangle

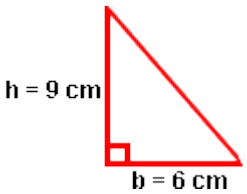


Using our formula a = ½ x h x b

the area must be a = ½ x 4 x 15 = ½ x 60 = 30 in^2

therefore the area is 30 in^2

* **Example 2:** Right Angle Triangle

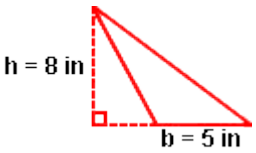


Using our formula a = ½ x h x b

the area must be a = ½ x 9 x 6 = ½ x 54 = 27 cm^2

therefore the area is 27 cm^2

* **Example 3:** Obtuse Triangle



Using our formula a = ½ x h x b

the area must be a = ½ x 8 x 5 = ½ x 40 = 20 cm^2

therefore the area is 20 in^2

* CIRCLES

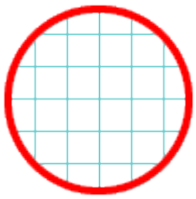
Definitions:

Circumference - *the distance around the circle*

Diameter - *the distance across a circle through its centre*

Radius - *half of the diameter*

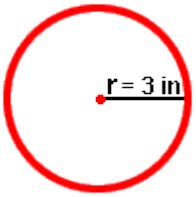
π (Pi) - *circumference divided by diameter = 3.14 to 2 decimal places*



The area of a circle is the number of square units inside that circle. If each square in the circle to the left has an area of 1 cm^2, you could count the total number of squares to get the area of this circle. Therefore, if there were a total of 28.26 squares, the area of this circle would be 28.26 cm^2. However, it is easier to use the following formula:

$a = \pi \times r^2$ or as is more commonly known, $a = \pi r^2$

* **Example 1**: finding the area with a known radius

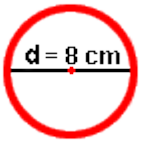


using the above formula $a = \pi r^2$, and filling in the known values,

$a = 3.14 \times 3^2 = 3.14 \times (3 \times 3) = 3.14 \times 9 = 28.26cm^2$

therefore, the area is $28.26cm^2$

* **Example 2**: finding the area with a known diameter



In order to use our above formula $a = \pi r^2$, we first have to find the radius. As the radius is half the diameter, we are able to work out the area by filling in the known values,

$a = 3.14 \times (8 / 2)^2 = 3.14 \times 4^2 = 3.14 \times (4 \times 4) = 3.14 \times 16 = 50.24cm^2$

therefore, the area is $50.24cm^2$