Sample 7
Simple Maths
Fractions

In a fraction such as $\frac{3}{5}$ the top number, 3, is called the *numerator* and the bottom number, 5, is called the *denominator*.

In a *proper fraction* the numerator is smaller than the denominator, for example $\frac{4}{9}$.

In an *improper fraction* the numerator is larger than the denominator, for example $\frac{12}{7}$.

A *mixed number* is an integer plus a proper fraction, for example $2\frac{1}{4}$, which means $2 + \frac{1}{4}$.

Changing mixed numbers to improper fractions

Examples

$$2\frac{3}{4} = 2 + \frac{3}{4} = \frac{8}{4} + \frac{3}{4} = \frac{11}{4}$$

$$5\frac{4}{7} = 5 + \frac{4}{7} = \frac{35}{7} + \frac{4}{7} = \frac{39}{7}$$

Changing improper fractions to mixed numbers

Examples

$$\frac{17}{5} = \frac{15}{5} + \frac{2}{5} = 3 + \frac{2}{5} = 3\frac{2}{5}$$

$$\frac{13}{3} = \frac{12}{3} + \frac{1}{3} = 4 + \frac{1}{3} = 4\frac{1}{3}$$

Squares and square roots

$$3^2 = 9,\ 7^2 = 49,\ 15^2 = 225,\ 34^2 = 1156$$

9, 49, 225 and 1156 are examples of *perfect squares*.

$(-3)^2$ is also 9, therefore 9 has two *square roots*, 3 and −3. Similarly, 225 has two square roots, 15 and −15.

$\sqrt{\ }$ is the sign for the positive square root, so we can write: $\sqrt{225} = 15$.

Using factors to find square roots of perfect squares

For $\sqrt{n}$ we need to find a number r such that $n = r \times r$.

We express n as the product of prime factors, and then regroup these primes to find r.

Example

$$441 = 3 \times 3 \times 7 \times 7 = (3 \times 7) \times (3 \times 7) = 21 \times 21$$

so $\sqrt{441} = 21$.

The square root of a perfect square that ends in an even number of noughts can be found as follows:

$$490000 = 49 \times 10000 = 7 \times 7 \times 100 \times 100$$
$$= (7 \times 100) \times (7 \times 100) = 700 \times 700$$

so $\sqrt{490000} = 700$.

Geometry

Triangles

A triangle is half a parallelogram.

$$\text{Area of } \Delta = \frac{1}{2}(\text{base} \times \text{height})$$

$$A = \frac{1}{2}bh$$

Circles

$$\text{circumference} = \pi \times \text{diameter}$$

$$c = \pi d$$

or

$$c = 2\pi r$$

since $d = 2r$.

The area, A, of a circle is given by:

$$A = \pi r^2$$

The value of π cannot be given exactly. It is an irrational number. Correct to 3 d.p. it is 3.142.