

**Area of Sector** =  $\frac{\text{Angle at Centre}}{360^\circ} \times \pi r^2$

**Arc length** =  $\frac{\text{Angle at Centre}}{360^\circ} \times \pi D$

**Process**

Decide the 2 ratios to use.

Identify what you want to find

What you know

Solve

**Angles**

Outside  $< 90^\circ$

Circumference  $= 90^\circ$

Inside  $> 90^\circ$

**Pythagoras Theorem**

Two key points when dealing with right-angled triangles

The longest side in a right-angled triangle is called The **HYPOTENUSE**

The **HYPOTENUSE** is ALWAYS opposite the right angle

$c^2 = a^2 + b^2$

$(xz)^2 = (xy)^2 + (yz)^2$

Converse Theorem states that if

$a^2 + b^2 = c^2$

1. Then triangle **MUST** be right-angled.

2. Right-angle is directly opposite C.

Hypotenuse

**Special Property**

The point of contact radius is always perpendicular (right-angled) to the tangent line.

**The Circle**

**Speed time Distance**

$D = S \times T$

$S = \frac{D}{T}$

$T = \frac{D}{S}$

Simple way to remember the 3 formulae!

To change minutes to decimal hours 'divide minutes by 60'

To change decimal time to minutes 'multiply the decimal part by 60'

Take any common factors out and put them outside the brackets.

Check for the difference of two squares.  $6x^2 - 24 = 6(x + 2)(x - 2)$

Factorise any quadratic expression left using St. Andrew's cross.

$3x^2 - x - 4$

$(3x - 4)(x + 1)$

**Factorisation**

- Basic Factorisation

**S3 Mathematics Credit Course**

**Simultaneous Equations**

One evening 4 adults and 6 children visited the sports centre. The total collected in entrance fees was £97.60

The next evening 7 adults and 4 children visited the sports centre. The total collected in entrance fees was £126.60

Calculate the cost of an adult price and a child price.

Solve the equations

$4x + 6y = 97.60$

$7x + 4y = 126.60$

by elimination

**Step 1: Label the equations**

$4x + 6y = 97.6$  (A)

$7x + 4y = 126.6$  (B)

**Step 2: Decide what you want to eliminate**

Eliminate x by:

$16x + 24y = 390.4$  (A) x4

$42x + 24y = 759.6$  (B) x6

$-26x = -369.2$

$x = (-369.2) \div (-26) = \text{£}14.20$

**Step 3: Sub into one of the equations to get other variable**

Substitute  $y = 14.20$  in equation (A)

$4 \times 14.20 + 6y = 97.60$

$6y = 97.60 - 56.80$

$6y = 40.80$

$y = \text{£}6.80$

The solution is  $x = \text{adult price} = \text{£}14.20$

$y = \text{child price} = \text{£}6.80$

Check answers by substituting into both equations

$4x + 6y = 97.60$  ( $56.80 + 40.80 = \text{£}97.60$ )

$7x + 4y = 126.60$  ( $99.40 + 27.20 = \text{£}126.60$ )

**Standard Deviation**

Smaller deviation data more **CONSISTENT** (less variation)

Heart rate (x)	$x^2$
70	4900
72	5184
73	5329
74	5476
75	5625
76	5776
76	5776
76	5776
Totals	$\Sigma x = 592$ $\Sigma x^2 = 43842$

$s = \sqrt{\frac{(\Sigma x^2) - \frac{(\Sigma x)^2}{n}}{n-1}}$

$= \sqrt{\frac{(43842) - \frac{(592)^2}{8}}{8-1}}$

$= 2.2$  (to 1 d.p.)

**Variation**

Write down equation with constant k.

Calculate the value of k.

Write out the equation with the value of k.

Use the equation for the rest of the question.

Q. The cost (C) of producing a football magazine varies as the square root of the number of pages (P). Given 36 pages cost 45p to produce. Find a formula connecting C and P.

Since C is directly proportional to "square root of" P the formula is of the form

$C = k\sqrt{P}$

$48 = k\sqrt{36}$

$k = 48 \div 6 = 8$

$C = 8\sqrt{P}$

**Box and Whisker Diagrams.**

Box plots are useful for comparing two or more sets of data like that shown below for heights of boys and girls in a class.

**Anatomy of a Box and Whisker Diagram.**

Lowest Value, Lower Quartile, median, Upper Quartile, Highest Value

Whisker, Box, Whisker

Boys, Girls

Smaller box = data more **CONSISTENT** (less variation)

**Boxplots / Stem Leaf**

Weight (kgs)
1 2 2 3 5 5
2 1 3 9
3 2 2
4 0 0 1 1
5 1 4 5 5 5 7
stem leaves

n = 20 Key : 2 | 3 means 23

- Basic Percentages

A car has lost 15% of its value in a year. It is now valued at £2550. What was its original price.

Deduce from question:  $100\% - 15\% = \text{£}2\ 550$

We have:  $85\% = \text{£}2\ 550$

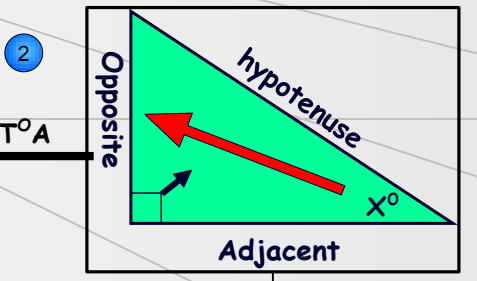
$1\% \Rightarrow \text{£}2550 \div 85 = \text{£}30$

Price before is 100%  $\Rightarrow \text{£}30 \times 100 = \text{£}3\ 000$

**Percentage Original Price**

**Process**

- Write down  $(SOH)(CAH)(TOA)$
- Identify what you want to find
- what you know



$\sin x^\circ = \frac{\text{Opp}}{\text{Hyp}}$   $\cos x^\circ = \frac{\text{Adj}}{\text{Hyp}}$   $\tan x^\circ = \frac{\text{Opp}}{\text{Adj}}$

**SOHCAHTOA**