The Institution of Engineering and Technology

Secondary

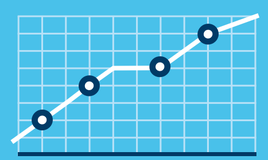
Education

Core maths for designers

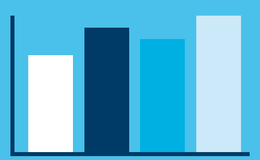
Graphs

Graphs are used to communicate data and show relationships between data. Commonly used graphs include **line graphs**, **bar graphs** and **pie charts**.

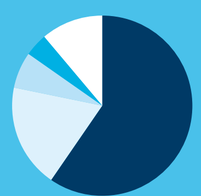
Formula for a straight line graph:
y = mx + c



Line graph



Bar graph



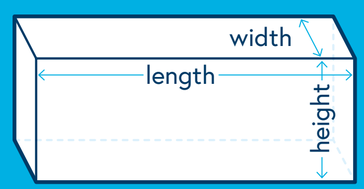
Pie chart

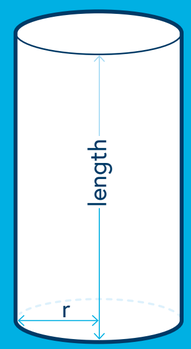
Volume and density

Volume of a cuboid V = length x width x height = L x W x H

Volume of a cylinder
V = area of circle x length = A x L = π r^2 x L

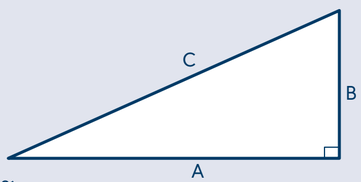
Density ρ = mass / volume = m / V





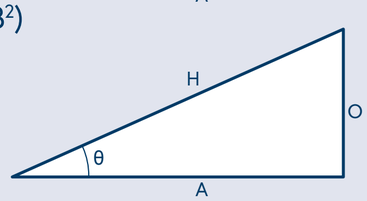
Dimensions of a triangle

Pythagoras theorem (for right angled triangles)
$A^2 + B^2 = C^2$



Rearranging: A = √ (C^2 - B^2), B = √ (C^2 - A^2), C = √ (A^2 + B^2)

Trigonometry
tan θ = O / A sin θ = O / H cos θ = A / H

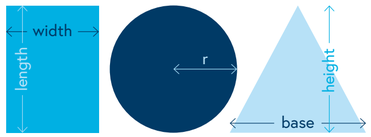


Area

Area of a rectangle length x width = L x W

Area of a circle π r^2

Area of a triangle half (base x height) = ½ (B x H)



For complicated shapes, calculate the area by breaking them down into simple shapes.

Cost

Cost of material in a part =
mass of material x cost per unit mass
(or cost of material = area of material x cost per unit area)

Labour to make a product =
labour time x charge rate

Total cost of parts in a product =
£ part1 + £ part2 + £ part3 etc.

Total cost to make a product =
cost of parts + cost of materials + labour cost

Profit = sales price – total cost