Mathematics – Percentages

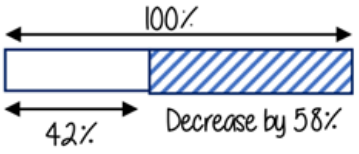
What do I need to be able to do?

- Convert between fractions, decimals and percentages
- Calculate percentages of amounts without a calculator
- Calculate percentages of amounts with a calculator
- Increase and decrease amounts by percentages
- Use multipliers to increase and decrease amounts by percentages
- Write one amount as a percentage of another, with and without a calculator
- Calculate the percentage change
- Find the original amount
- Find the original amount given the new amount – reverse percentages

Keywords:

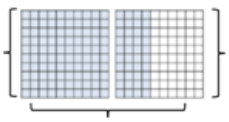
Percent: parts per 100 – written using the % symbol.
Decimal: a number in our base 10 number system. Numbers to the right of the decimal place are called decimals.
Fraction: a fraction represents how many parts of a whole value you have.
Equivalent: of equal value. Reduce: to make smaller in value.
Growth: to increase/ to grow.
Integer: whole number, can be positive, negative or zero.
Invest: use money with the goal of it increasing in value

Percentage decrease: Multipliers



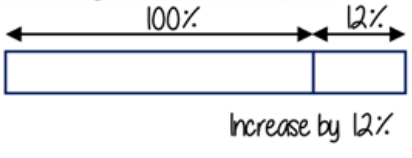
100% - 58% = 42%
100 – 058 = 042 ← Multiplier Less than 1

Convert FDP < and > 100%



100%+40%
1 + 0.40
= 140

Percentage increase: Multipliers

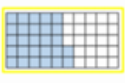


100% + 12% = 112%
100 + 0·12 = 1·12 ← Multiplier More than 1

Express as a % - Non-calculator

Percent – per hundred

7 per every 10 are orange $\frac{7}{10}$ This means that 70 per every 100 are orange $\frac{70}{100}$ 70%



27 per every 50 shaded $\frac{27}{50}$ 54 per every 100 shaded $\frac{54}{100}$ 54%

Denominator 100 | Equivalent fractions

Express as a % - Calculator

$\frac{13}{30}$ → $\frac{13}{30}$ × 100 → 43·3333...% 43%

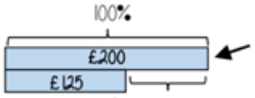
Can't use equivalence easily to find 'per hundred'

This the same as 13 ÷ 30

Decimal percentages are still a percentage

Percentage change

I bought a phone for £200
A year later sold it for £125

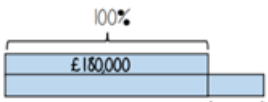


All values of change compare to the ORIGINAL value

Percentage loss
$\frac{75}{200}$ × 100 = 37·5%

Difference in value / Original value × 100

I bought a house for £180,000, I later sold it for £216,000



Percentage profit
Money made (profit value) $\frac{36000}{180000}$ × 100 = 20%

Choose appropriate method

The language and wording of the question is the key

Have you represented the question in a bar model?
Can you use a calculator?

Mathematics – Area and Perimeter

What do I need to be able to do?

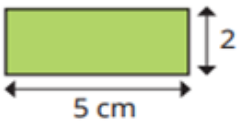
- Calculate the perimeter of a shape
- Calculate the area of rectangles
- Calculate the area of triangles
- Calculate the area of compound shapes made from rectangles and triangles
- Calculate the area of: a parallelogram, a trapezium, a circle with & without a calculator
- the circumference of a circle without a calculator
- the circumference of a circle with a calculator
- areas of more complex compound shapes, involving parts of circles
- the area of sectors

Keywords:

Perimeter: the distance around a shape
Area: the space contained within the perimeter
Rectangle: a quadrilateral with two pairs of equal sides and four right angles
Triangle: three sided shape
Parallelogram: a quadrilateral with two pairs of equal sides and angles
Trapezium: a quadrilateral with one pair of parallel sides
Circumference: the distance around a circle
Diameter: distance across circle through the centre
Radius: distance from the circumference to the centre
Pi: value for area & circumference formulae = 3.14
Sector: a fraction of a circle cut from the centre

Find the perimeter of a shape:

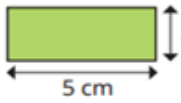
Add up the distances around a shape.



P = 5 + 2 + 5 + 2
P = 14cm

Find the area of a rectangle:

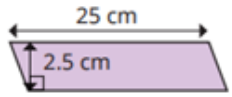
Area= length x width



A = 5 x 2
A = 10cm^2

Find the area of a parallelogram:

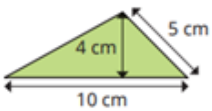
Area = base x vertical height



Area = 25 x 2.5 = 62.5cm^2

Find the area of a triangle:

Area= $\frac{\text{(base x vertical height)}}{2}$



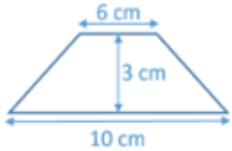
b = 10
h = 4

$A = \frac{10 \times 4}{2}$

A = 20cm^2

Find the area of a trapezium: a and b are the

Area= $\frac{(a + b) \times \text{vertical height}}{2}$



a = 6
b = 10
h = 3

$A = \frac{(6 + 10) \times 3}{2}$

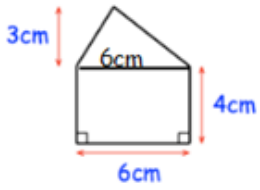
$A = \frac{16 \times 3}{2} = 24\text{cm}^2$

Find the area of a compound shape:

Break into rectangles and/or triangles.

Calculate the area of these shapes.

Add them together.

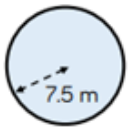


Area Triangle = $\frac{(6 \times 3)}{2}$ = 9cm^2

Area Rectangle = 6 x 3 = 18cm^2

Total Area = 18 + 9 = 27cm^2

Find the area and circumference of circles:



R = 7.5cm

Area = πr^2

Area = 3.14 x 7.5^2 = 176.6cm^2

D = 15cm

Circumference = π D

Circumference = 3.14 x 15 = 47.1cm

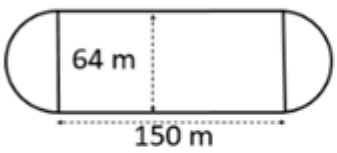
Area of complex shapes, involving circles:

Break into shapes you can calculate the area.

Work out the area of these shapes.

Add the areas:

Calculate the area.



Rectangle:

A = 64 x 150

A = 9,600m^2

Semi-circle: r = 32m

A = (πr^2) ÷ 2

A = π x 32^2 ÷ 2

A = 1,608.5m^2

Total Area = 9,600 + 1,608.5 + 1,608.5

Total Area = 12, 817.0m^2

Area of a sector:

Area = $\frac{\text{angle of sector}}{360}$ x radius^2

Calculate the area of the sector

Radius = 50cm

Angle = 60°

Area = $\frac{70}{360}$ x 50^2

Area = 486. 1cm^2

Notes: