Highsted Knowledge Organiser
Maths
Year 9 Brackets

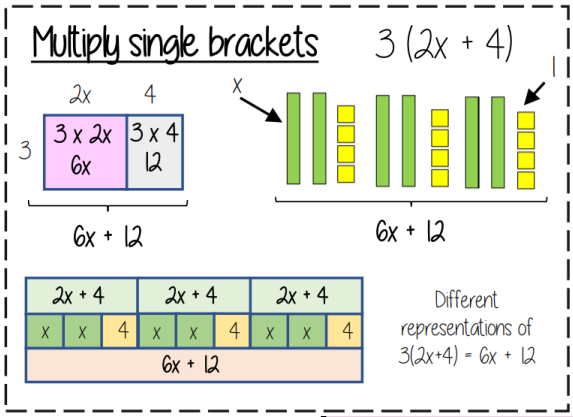
What I need to know

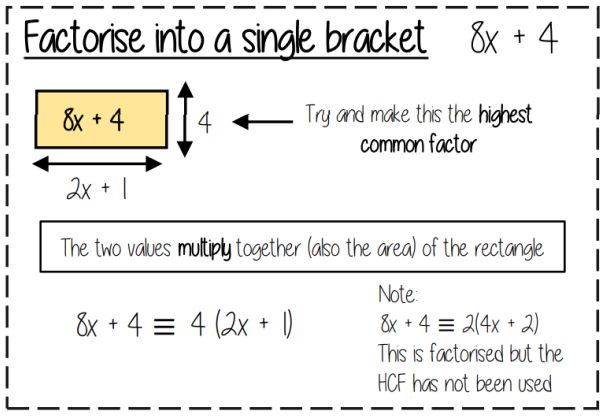
- Multiply out single brackets and collect like terms
- Factorise into single brackets
- Multiply out two brackets including the difference of two squares
- Factorise quadratic expressions
- Factorise quadratic expressions where coefficient of $x^2>1$

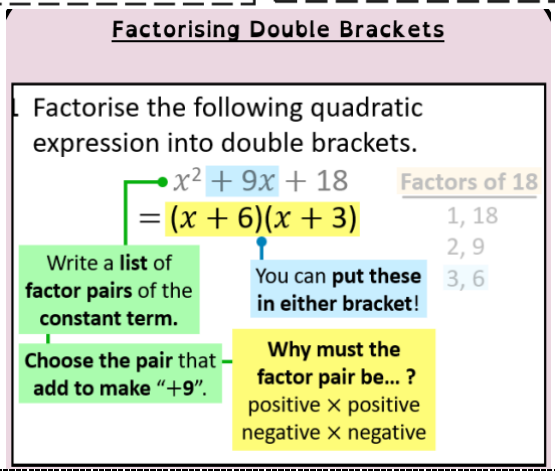
Key Vocabulary

Single brackets, double brackets, quadratics, expand, factorise, coefficient

Student reference point







Challenge question

Seventy pupils (37 boys and 33 girls) are divided into two groups, with 40 pupils in Group 1 and 30 pupils in Group 2.

What is the difference between the number of boys in Group 1 and the number of girls in Group 2?

Suggested reading

https://youtu.be/ZJA1qz4XovY (Corbettmaths Expanding Brackets)
https://youtu.be/434T2SsiTrU (Corbettmaths Expanding Double Brackets)
https://youtu.be/UrOJrsRv9iI (Corbettmaths Factorising Brackets)
https://youtu.be/X-djBcWVizM (Corbettmaths Factorising Double Brackets)
https://youtu.be/8lejlzdWV58 (Corbettmaths Factorising Harder Double Brackets)

Highsted Knowledge Organiser
Maths
Year 9 Fractions, Decimals and Percentages

What I need to know

- Review four rules for fractions including BIDMAS
- Converting factions and recurring decimals
- Review calculating percentages including percentage changes
- Understand the effect of a repeated percentage change
- Use index notation when repeating a percentage change
- Calculate an original amount given the final amount and the % increase or decrease
- Understand the effect of multiplying or dividing by numbers between 0 and 1
- Understand and calculate the reciprocal of a number
- Round to a number of significant figures and estimate the answer to calculations

Key Vocabulary

BIDMAS, Fraction, decimal, percentage, recurring decimal, simple interest, compound interest, original amount, reciprocal, estimate, significant figures

Student reference point

Convert FDP

$\frac{70}{100}$ → This also means 70 ÷ 100 → 70 out of 100 squares → 70 "hundredths" = 7 "tenths" = 0.7 → 70 hundredths = 70%

Using a calculator

S⇌D Convert to a decimal

This will give you the answer in the simplest form

× 100 converts to a percentage

Be careful of recurring decimals

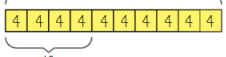
e.g. $\frac{1}{3}$ = 0.3333333 = $0.\dot{3}$

The dot above the 3

Reverse Percentages

40% of my number is 16. What am I thinking of?

Original Number (100%)



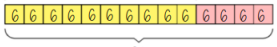
16

40% = 16
10% = 4
100% = 40

Try to scale down to 10% or 1% and then scale back up to 100%

140% of my number is 84. What is the original number?

Original Number (100%)



84

140% = 84
10% = 6
100% = 60

Simple Interest

For each year of investment the interest remains the same

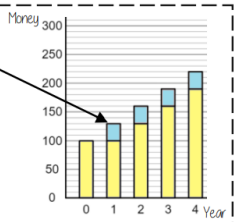
$$\frac{\text{Principal amount} \times \text{Interest Rate} \times \text{Years}}{100}$$

Principal amount is the amount invested in the account

e.g. Invest £100 at 30% simple interest for 4 years

$\frac{100 \times 30 \times 4}{100} = £120$

This account earned £120 interest
At the end of year 4 they have £220



The reciprocal

When you multiply a number by its reciprocal the answer is always 1

$3 \times \frac{1}{3} = 1$

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

The reciprocal of 3 is $\frac{1}{3}$ and vice versa

Reciprocals for division

e.g. $5 \div \frac{1}{4} = 20$

$5 \times 4 = 20$

Multiplying by a reciprocal gives the same outcome

Compound Interest

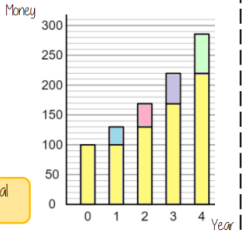
Interest is added to the current value of investment at the end of each year so the next year's interest is greater

$$\text{Principal amount} \times \text{Multiplier}^{\text{Years}}$$

e.g. Invest £100 at 30% compound interest for 4 years

$100 \times 1.3^4 = £285.61$

This account has £285.61 in total at the end of the 4 years



Estimate the calculation

Round to 1 significant figure to estimate

$4.2 + 6.7 \approx 4 + 7 \approx 11$ This is an **overestimate** because the 6.7 was rounded up more

The equal sign changes to show it is an estimation

$21.4 \times 3.1 \approx 20 \times 3 \approx 60$ This is an **underestimate** because both values were rounded down

It is good to check all calculations with an estimate in all aspects of maths – it helps you identify calculation errors

Challenge question

In Miss Quaffley's class, the girls make up more than 45% of the pupils, but less than 50%.
What is the smallest possible number of girls in her class?

Suggested reading

https://youtu.be/Q2gRAS08fE0 (Corbettmaths Percentage Change)
https://youtu.be/FBCs95Co_oU (Corbettmaths Compound Interest)
https://youtu.be/aG5zkrCiQpM (Corbettmaths Reverse Percentages)
https://youtu.be/eU7qknXw6U4 (Corbettmaths Reciprocals)

Highsted Knowledge Organiser
Maths
Year 9 Measures, Perimeter, Area and Volume

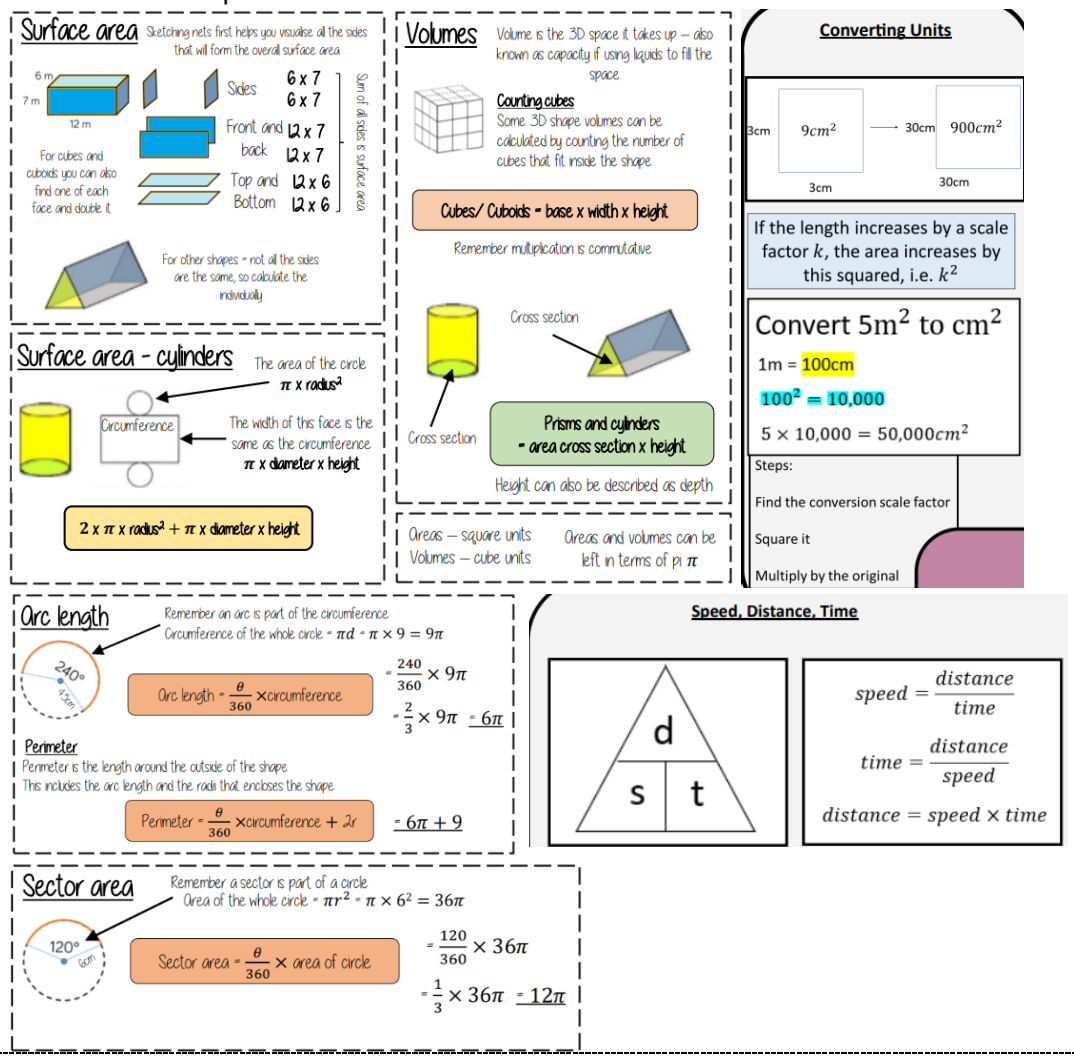
What I need to know

- Convert between metric units for area and volume
- Solve problems involving compound measures, e.g. speed and density.
- Calculate the length of an arc
- Calculate the area of a sector
- Calculate the volume of a cylinder
- Calculate the surface area of a cylinder

Key Vocabulary

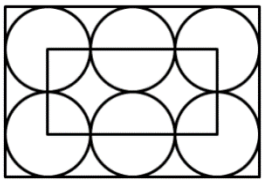
Metric units, area, volume, compound measures, arc, sector, cylinder, volume, surface area

Student reference point



Challenge question

In the diagram, six circles of equal size touch adjacent circles and the sides of the large rectangle.
Each of the corners of the small rectangle is the centre of one of the large circles.
The perimeter of the small rectangle is 60cm.
What is the perimeter of the large rectangle?



Suggested reading

https://youtu.be/XGhc_4ilUko (Corbettmaths Arc length)
https://youtu.be/jmFw7xZNZ_I (Corbettmaths Area of a sector)
https://youtu.be/n0t3x-I5d5A (Corbettmaths Surface area of a cylinder)
https://youtu.be/ExALFZ3mP0Y (Corbettmaths Volume of a cylinder)

Highsted Knowledge Organiser
Maths
Year 9 Simultaneous Equations

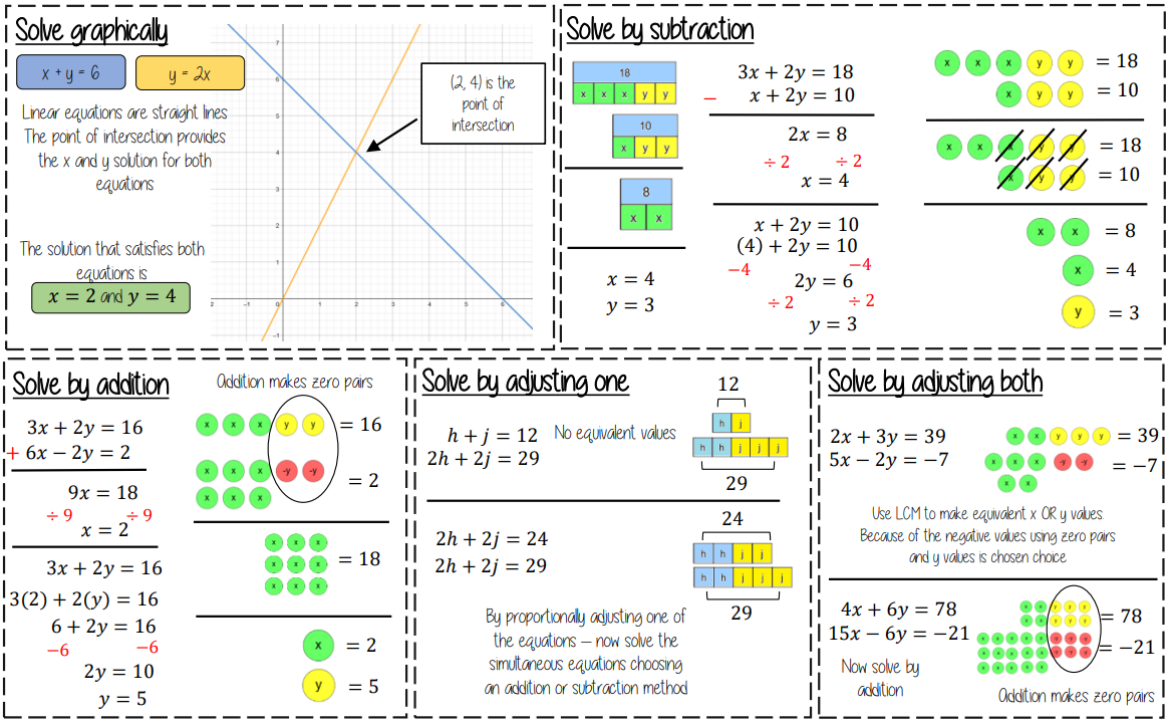
What I need to know

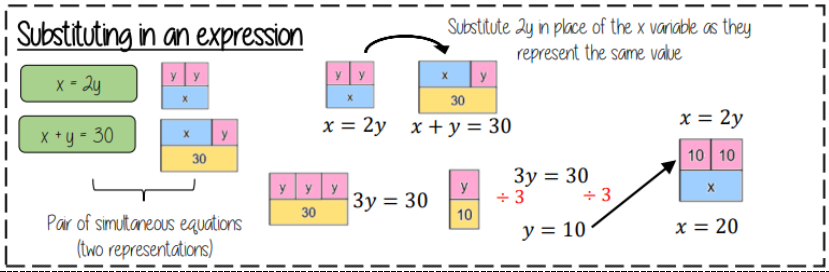
- Solve a pair of simultaneous equations by eliminating one variable including multiplying one or both equation(s)
- Solve a pair of simultaneous equations by the method of substitution
- Understand that an equation can be represented graphically
- Recognise that the point at which the graphs of 2 equations intersect gives the solution of the 2 equations
- Solve simultaneous equations graphically where one is non linear

Key Vocabulary

Simultaneous equations, eliminating, substituting, graphically, intersect, solve, linear, non-linear

Student reference point





Challenge question

If $a \times b = 2$, $b \times c = 24$, $c \times a = 3$ and a, b and c are all positive, what is the value of $a+b+c$?

Suggested reading

https://youtu.be/phlus4x0UqM (Corbettmaths Simultaneous Equations elimination)
https://youtu.be/FrECUQpaa80 (Corbettmaths Simultaneous Equations substitution)
https://youtu.be/20R39KaGwmc (Corbettmaths Simultaneous Equations graphically)
https://youtu.be/ozP-vf99DK4 (Corbettmaths Simultaneous Equations Advanced)