Y9 Maths Knowledge Organiser Topic 4: Solving Linear Equations

What must I be able to do?	Key vocabulary	
You may need to revise the following:	Linear equation	An equation where the <u>highest power is only 1</u>, e.g. does not contain an x^2 or higher power.

You may need to revise the following:
- <u>Year 8 Topic 5: Solving Equations 2</u>
- <u>Year 7 Topic 11: Solving Equations 1</u>

Recap content:
- ☐ Solve linear equations where the unknown appears on only one side
- ☐ Solve equations where the unknown appears in the numerator of a fraction
- ☐ Solve equations which involve brackets
- ☐ Solve equations where the unknown appears on both sides
    - ➢ Sparx M707, M509, M554, M387, M957

Solving equations which require more steps

e.g. $\dfrac{2x + 6}{3} = 7$

The unknown (x) is on one side of the equals sign only. There is a fraction, a constant term and a coefficient all on the left hand side which need to be dealt with.

- Step 1: Remove the fraction by multiplying all terms by the denominator
- Step 2: Do the inverse of the constant
- Step 3: Do the inverse of the coefficient

So...

$$\dfrac{2x + 6}{3} = 7$$

×3 $2x + 6 = 21$ ×3

−6 $2x = 15$ −6

÷2 $x = \dfrac{15}{2}$ ÷2

This could also be written as $7\frac{1}{2}$ or 7.5

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e.g. $3(2 - w) = 5(1 - w)$

The unknown (w) is on both sides of the equals sign. There are brackets on both sides, coefficients on both sides and both w are negative.

- Step 1: Multiply out the brackets
- Step 2: Do the inverse of the smallest amount of w
- Step 3: Do the inverse of the constant
- Step 4: Do the inverse of the coefficient

So...

expand $3(2 - w) = 5(1 - w)$ expand

+5w $6 - 3w = 5 - 5w$ +5w

−6 $6 + 2w = 5$ −6

÷2 $2w = -1$ ÷2

$w = -\dfrac{1}{2}$

−5w is smaller than −3w so we do the inverse of −5w not the inverse of −3w

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e.g. $4n - 9 = 6 + n$

The unknown (n) is on both sides of the equals sign. There is also a constant term on both sides and a coefficient of 4 on the left hand side.

- Step 1: Do the inverse of the smallest amount of n
- Step 2: Do the inverse of the constant
- Step 3: Do the inverse of the coefficient

So...

−n $4n - 9 = 6 + n$ −n

+9 $3n - 9 = 6$ +9

÷3 $3n = 15$ ÷3

$n = 5$

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e.g. $3x - 8 = \dfrac{5x}{2} + 4$

The unknown (x) is on both sides of the equals sign. There is also a constant term on each side and a fraction to undo.

- Step 1: Remove the fraction by multiplying all terms by the denominator.
- Step 2: Do the inverse of the smallest amount of x
- Step 3: Do the inverse of the constant

So...

×2 $3x - 8 = \dfrac{5x}{2} + 4$ ×2

−5x $6x - 16 = 5x + 8$ −5x

+16 $x - 16 = 8$ +16

$x = 24$

The +4 is also multipled by 2