

Writing and Solving Linear Equations – W/C 11/05/2020

Firstly, some Vocabulary:

You need to be familiar with all of these

Term	A number, variable or combination of both which forms part of an expression e.g. $4x$, $5y^3$, $-12ab$, $\frac{x}{5y}$, -46
Expression	A collection of terms joined together by + or - e.g. $4pq - q + 7$
Equation	Two expressions which have the same value, separated by an '=' sign. e.g. $3y = 9 + y$
Formula	An equation used to describe a relationship between two or more variables (Letters or words that vary in value). e.g. $Speed = \frac{Distance}{Time}$
Identity	This is when both sides are EQUAL for ALL values of x – unlike an equation which has a specific number of solutions. (All of the equations you will solve will have only 1 or 2 solutions). It is written using a different symbol e.g. $(x + 3)^2 \equiv x^2 + 6x + 9$

Linear equations are a type of equation that appear all over the place in maths. Linear means there are no powers to worry about (i.e. no x^2 etc)

The golden rule when solving these equations (and indeed, equations of all kinds) is that whenever you apply some operation to one side of the equation (e.g you add 5 to it, or multiply it by 3, etc), you must also do the **same thing to the other side**.



Think of an equation like a perfectly balanced pair of scales – if you want to keep it balanced, any time you remove/add some weights to the one side, you must also do the same thing to the other side.

To solve an equation means to find the value of the letter (often x, but not always) that makes both sides equal. The 3 examples below are a couple of reminders of how to set the work out.

e.g. 1) Solve:

$X + X + X = 54$	First Collect the terms together
$3X = 54$	\div both sides by 3
$\frac{3x}{3} = \frac{54}{3}$	
$X = 18$	Substitute back into the original equation to check that it works ($18 + 18 + 18 = 54 \checkmark$)

Remember to line up the equals lines.

2) Solve:

$\frac{y}{5} = 4$	The opposite of $\div 5$ is $\times 5$ so multiply both sides by 5
$\frac{y}{5} \times 5 = 4 \times 5$	
$y = 20$	Substitute back into the original equation to check that it works ($20 \div 5 = 4 \checkmark$)

3) Solve:

$2g + 8 = 17$	-8 from both sides (inverse of +8)
$2g + 8 - 8 = 17 - 8$	
$2g = 9$	$\div 2$ on both sides (inverse of $\times 2$)
$\frac{2g}{2} = \frac{9}{2}$	
$g = \frac{9}{2}$	You can leave the answer in this form as long as you can't simplify it OR you could write $g = 4.5$

One final thing is about expanding brackets, which is introduced in some of the questions.

Examples:

1) $5(3x + 6)$ $=15x + 30$	This means 5 lots of $3x + 6$ but rather than writing $3x + 6$ out 5 times we can just multiply everything inside the bracket with what is outside the bracket – in this case 5.
2) $4(8 - 2x)$ $=32 - 8x$	This time we multiply everything in the bracket by 4. 4×8 gives the 32 and $4 \times -2x$ gives $-8x$ (The x's all a bit confusing here!) WATCH THE NEGATIVE numbers
3) $3(x - 4)$ $=3x - 12$	This time we multiply everything in the bracket by 3. Notice the negative again $3 \times -4 = -12$

Hopefully this all makes sense and you can remember doing this before. It might be worth quickly reading it again and making relevant notes in your book.

You now need to start working through the following tasks. Remember, this is your weeks work, so you should spread it out throughout the week.

Task 1: Work through the following clips on mathswatch, completing all of the practice questions within the clip.

Clip 100	Solving Equations using Flow Charts
Clip 135a	Solving Equations – Balancing
Clip 137	Forming Formulae and Equations

Task 2: I recommend that you watch the following **You tube** clips.

mr T maths linear_equations_1

and

mr T maths linear_equations_2

https://www.youtube.com/results?search_query=mr+T+maths+linear_equations_1

https://www.youtube.com/results?search_query=mr+T+maths+linear_equations_2

My brother has done this for his students and I thought you may find it useful!

Task 3:

Work through these in your book. Show each step and keep the = lined up!
(I will send you the answers next week)

1) $3n + 4 = 19$	2) $4n + 5 = 13$	3) $4n - 3 = 25$
4) $2n + 6 = 18$	5) $3n - 2 = 16$	6) $5n + 4 = 34$
7) $3n + 7 = 19$	8) $5n - 6 = 14$	9) $3n - 3 = 21$

10) $3n + 2 = 17$	11) $4n + 6 = 14$	12) $6n + 5 = 41$
13) $5n - 3 = 7$	14) $3n - 4 = 11$	15) $7n + 3 = 24$

Task 4: Are you ready for something a little more complicated?

Collect the n's on one side first and then proceed. A couple have been started for you.

1) $7n + 3 = 3n + 27$ $-3n \quad -3n$ $4n + 3 = 27$	2) $7n + 5 = 5n + 25$ $-5n \quad -5n$ $2n + 5 = 25$	3) $10n + 2 = 7n + 14$
4) $5n + 4 = 2n + 22$	5) $6n + 8 = 2n + 36$	6) $7n - 3 = 4n + 12$
7) $5n - 2 = n + 10$	8) $9n - 7 = 5n + 13$	9) $11n - 9 = 5n - 27$

10) $5n - 10 = 3n - 50$	11) $8n - 3 = 2n + 39$	12) $9n + 7 = 6n - 29$
13) $10n + 16 = 52 - 2n$ $+2n$ $+2n$	14) $5n + 16 = n - 20$	15) $3n - 7 = 8 - 2n$

Task 5: Finally, can you please complete the assignment in mathswatch. There are several tricky questions to challenge those of you that are finding this straight forward. You will need to have completed all of the above before starting this.

Hint: Angles at a point add up to 360° (more on this next week, but you need to know this to answer one of the questions)

Also remember that you do not use a 'x' (times) in algebra.

e.g. If b is the cost of 1 book

The cost of 5 books is written as $5b$ (always put the number first!)

$5b$ means 5 multiplied by b or b multiplied by 5