

## Foundation Check In - 6.03 Algebraic equations

Solve the following equations:

- $x + 3 = 7$
- $2x + 1 = 11$
- $3(x - 2) = 4$
- $2(x - 2) + 3x = 6$
- $3x - 1 = 9 - 2x$
- Given that  $213x + 431 = 548$ , what is  $426x + 862$  equal to? Explain why.
- Explain how the graph of  $y = 2x + 5$  could be used to find the value of  $x$  when  $y = 3$ .
- Explain why the equation  $2(x - 1) + 3(2 - 3x) = 4 - 7x$  appears to have no solutions.
- The cost £ $C$  of a taxi journey is calculated using the equation  $C = 2d + 5$  where  $d$  is the distance in miles. If the cost of a journey doubles from £15 to £30, how much further is it?

- The cost of electricity tariffs provided by 'Green Electric' is calculated using the following:

Tariff A:  $C = 3u + 50$

Tariff B:  $C = 2u + 200$

where  $u$  is the number of units used and  $C$  is the total cost.

How many units must a customer use for the cost of each tariff to be exactly the same?

### Extension

A magician has a magic trick. He instructs the audience to do the following:

- Think of a number
- Double it
- Add 10
- Divide by 2
- Subtract the original number.

The magician then tells the audience that the final number they are thinking of is 5.

- Write an equation using the letter  $n$  to represent the unknown number following the steps of the trick. Can you explain why it works?



# GCSE (9-1) MATHEMATICS

- b) Can you write your own version of the trick that results in the audience thinking of the number 3 in the end?

## Answers

- 4
- 5
- $3\frac{1}{3}$
- 2
- 2
- 1096, the numbers have all doubled.
- Draw the line  $y = 3$  and read the  $x$  coordinate where the 2 lines intersect.
- Multiplying out the brackets and collecting like terms gives  $4 - 7x = 4 - 7x$ . This simplifies to  $0 = 0$  because the  $x$  terms and constant terms cancel out.
- $2d + 5 = 15$  so  $d = 5$  for journey one.  $2d + 5 = 30$  so  $d = 12.5$  for journey two. Therefore it is 7.5 miles further.
- $3u + 50 = 2u + 200$  solves to give  $u = 150$ . Students could also solve graphically or use trial and error.

## Extension

a)  $(2n + 10) / 2 - n$

It works because  $(2n + 10) / 2 - n = n + 5 - n = 5$ .

b)  $(2n + 6) / 2 - n = n + 3 - n = 3$

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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Solve one step linear equations in one unknown algebraically.			
AO1	2	Solve two step linear equations in one unknown algebraically.			
AO1	3	Solve linear equations with brackets and one unknown algebraically.			
AO1	4	Solve linear equations with multiple terms in one unknown algebraically.			
AO1	5	Solve linear equations with one unknown on both sides of the equation algebraically.			
AO2	6	Understand the relationship between linked equations.			
AO2	7	Use a graph to find an approximate solution to a linear equation.			
AO2	8	Recognise when there are no solutions for a linear equation.			
AO3	9	Solve equations in a worded problem.			
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