Foundation Check In - 6.03 Algebraic equations

Solve the following equations:

1. $x + 3 = 7$

2. $2x + 1 = 11$

3. $3(x - 2) = 4$

4. $2(x - 2) + 3x = 6$

5. $3x - 1 = 9 - 2x$

6. Given that $213x + 431 = 548$, what is $426x + 862$ equal to? Explain why.

7. Explain how the graph of $y = 2x + 5$ could be used to find the value of x when $y = 3$.

8. Explain why the equation $2(x - 1) + 3(2 - 3x) = 4 - 7x$ appears to have no solutions.

9. 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?

10. 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.

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

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

Answers

1. 4

2. 5

3. $3\frac{1}{3}$

4. 2

5. 2

6. 1096, the numbers have all doubled.

7. Draw the line $y = 3$ and read the x coordinate where the 2 lines intersect oe.

8. 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 oe.

9. $2d + 5 = 15$ so $d = 5$ for journey one. $2d + 5 = 30$ so $d = 12.5$ for journey two. Therefore it is 7.5 miles further.

10. $3u + 50 = 2u + 200$ 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) $(2n + 6)/2 - n = n + 3 - n = 3$

GCSE (9–1)
MATHEMATICS

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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.			
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