

Topic 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 $2(x - 1) + 3(2 - 3x) = 4 - 7x$ has no solution.
- 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?
- Can you write your own version of the trick that results in the audience thinking of the number 3 in the end?



GCSE (9-1) MATHEMATICS

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



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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. | | | |
| AO3 | 9 | Solve equations in a worded problem. | | | |
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