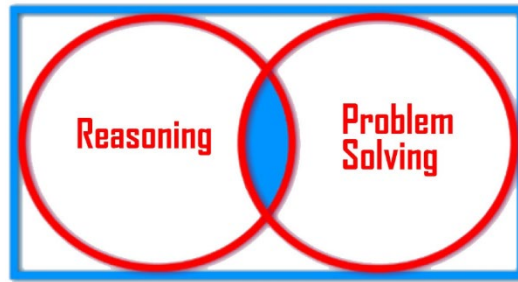


GCSE Foundation (5 – 1)



fluidmaths.co.uk

Mathematical Reasoning Questions (Simultaneous Equations) – Set 1 Solutions

The questions are repeated here for your convenience

1 Markus wants to check whether $x = 2$ and $y = -1$ are the answers to the simultaneous equations

$$3x + y = 8$$

$$5x - 2y = 15$$

Without solving the equations, explain what he could do.

Solution

He could substitute $x = 2$ and $y = -1$ into both equations to check whether he will get the answers 8 and 15 respectively [1mark]

2 Given that $y = -3$ and $2y + 5x = 24$

Circle the value of x

a) 5

b) -5

c) 6

d) -6

Solution

Substitute $y = -3$ into $2y + 5x = 24$

$$2(-3) + 5x = 24 \quad [1mark]$$

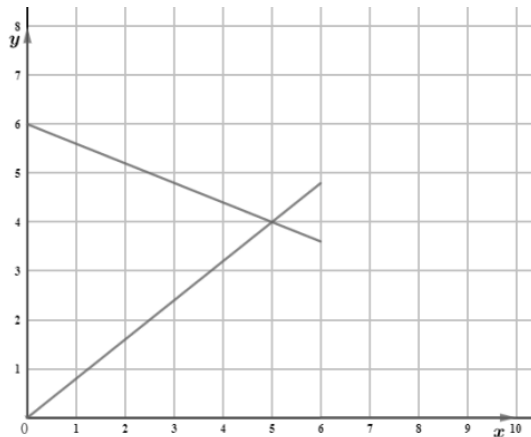
$$-6 + 5x = 24 \text{ \{Add 6 to both sides\}}$$

$$5x = 30 \text{ \{Divide both sides by 5\}} \quad [1mark]$$

$$\text{Therefore, } x = 6 \quad [1mark]$$

Correct Answer: C

3 The graphs of $y = -\frac{2}{5}x + 6$ and $y = \frac{4}{5}x$



Use the graph to find the solutions to the simultaneous equations
 $y = -\frac{2}{5}x + 6$ and $y = \frac{4}{5}x$

Solution

The two graphs intersect at the point (5,4)

So, the solution to the simultaneous equations

$y = -\frac{2}{5}x + 6$ and $y = \frac{4}{5}x$ is:

Therefore, $x = 5$ and $y = 4$

[1mark]

4 How could you check that, your answers in **Question 3** above are correct?

Solution

Substitute $x = 5$ into both equations and the righthand side of each equation, and they should both give a result of $y = 4$

[1mark]

<p>5</p>	<p>Here is a pair of simultaneous equations</p> $5x + 3y = 10$ $6x - 3y = 21$ <p>Check whether the equations will solve when $x = 2$ and $y = 5$</p> <p><u>Solution</u></p> <p>Substitute $x = 2$ and $y = 5$ into each equation to check whether the LHS will be equal to the RHS</p> $5 \times 2 + 3 \times 5 = 10 + 15 = 25$ <p>Since the $25 \neq 10$, it means that $x = 2$ and $y = 5$ will not be solutions for the equations.</p> <p>Therefore, is no need to check both equations</p> <p style="text-align: right;">[1mark]</p>
<p>6</p>	<p>Ishana is solving the simultaneous equations below</p> $6x - y = 20 \text{-----Equation 1}$ $3x + 2y = 35 \text{-----Equation 2}$ <p>Here is part of her answer</p> <p>Multiply Equation 1 by (2): $12x - 2y = 40 \text{-----Equation 3}$</p> <p>Add Equation 3 and Equation 2 together: $3x + 2y = 25$</p> $\begin{array}{r} 12x - 2y = 40 \\ \underline{3x + 2y = 25} \\ 15x = 75 \end{array}$ <p>Divide both sides by 15: $x = 5$</p> <p>Continue Ishana's solution to find the value of y.</p> <p><u>Solution</u></p> <p>Substitute $x = 5$ into one of the first equations.</p> $6(5) - y = 20 \text{-----Equation 1}$ $30 - y = 20 \text{ {subtract 20 from both sides} } \quad \quad \quad \mathbf{[1mark]}$ $10 - y = 0 \text{ {add y to both sides} }$ <p>Therefore, $y = 10$ [1mark]</p>

7

If $x = 2a$ and $4y = 8x - a$ Choose the value of y

a) $3.75a$

b) $-3.75a$

c) $4.75a$

d) $-4.75a$

**Solution**

$$4y = 8x - a \text{ \{substitute } x = 2a\}}$$

$$4y = 8(2a) - a \quad \text{[1mark]}$$

$$4y = 15a \text{ \{divide both sides by } y\}}$$

$$y = 3.75a \quad \text{[1mark]}$$

Correct Answer: A

8

Show that $x = 5$ and $y = \frac{1}{2}$ are not the solutions for the simultaneous equations

$$2x + 8y = -15$$

$$-3x + 4y = 30$$

**Solution**

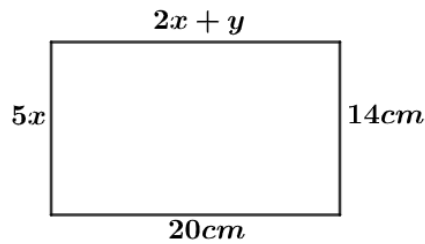
$$2x + 8y = 2(5) + 8(0.5) = 14$$

Therefore, $x = 5$ and $y = \frac{1}{2}$ could not be solutions to the simultaneous equations. **[1mark]**

{Note that you do not need to check both equations}

9

Here is a rectangle.

Use information from the diagram to find the values of x and y **Solution**

Opposite sides of a rectangle are the same.

Therefore, $5x = 14$ Therefore, $x = 2.8$ **[1mark]**Also $2x + y = 20$ Substitute, $x = 2.8$ into this equation $2 \times (2.8) + y = 20$ **[1mark]** $5.6 + y = 20$ $y = 14.4$ **[1mark]****10**

Two mars bars and a bar of snickers cost £1.62

A mars bar and two bars of snickers cost £1.71

Harley has £5.

Can he buy 10 mars bars?

SolutionLet the cost of one mars bar = m , and that of one snickers bar = s ,

Write two equations to represent the situation

$$2m + s = 1.62$$

$$m + 2s = 1.71$$

[1mark] {Multiply the first equation by 2}

$$4m + 2s = 3.24$$

$$m + 2s = 1.71$$

[1mark]

{Subtract the 2nd equation from the 1st equation}

$$3m = 1.53$$
 {divide both sides by 3} **[1mark]**

$$m = 0.51$$
 {multiply by 10 to find the cost of 10 mars bars}

$$10m = \text{£}5.10$$
 [1mark]

Harley has £5 so he cannot buy 10 mars bars. He is 10p short **[1mark]**