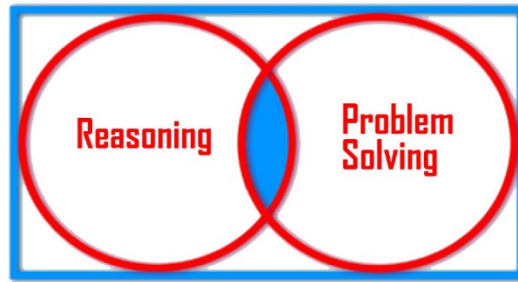


GCSE Foundation (5 – 1)



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Mathematical Reasoning Questions

(Inequalities) – Set 1

Solutions

The questions are repeated here for your convenience

- 1 Here is a set of numbers $\{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6\}$
How many members of the set will satisfy the inequality $-7 \leq 2x \leq 4$. Where x is an integer.

Solution

$$-7 \leq 2x \leq 4 \text{ \{Divide through the inequality by 2\}}$$
$$-3.5 \leq x \leq 2$$

Therefore, x is greater or equal to -3.5 but less than or equal to 2

Therefore, for the numbers in the given set,

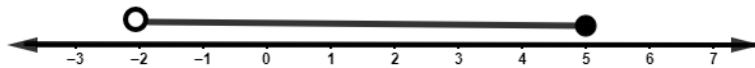
only $\{-3, -2, -1, 0, 1, 2\}$ will satisfy the inequality.

Since x is an integer, it means that it cannot take any decimal values.

Hence, five members from the set will satisfy the given inequality

[2marks]

- 2 Which inequality is represented on the number line below?



Choose one answer

- a) $-4 \leq 2x \leq 10$
- b) $-2 \leq 2x \leq 5$
- c) $-4 < 2x < 10$
- d) $-4 < 2x \leq 10$

Solution

The diagram represents the numbers between the numbers -2 and 5 , and the circle over 5 is filled in, so this means it can be equal to 5 but not -2 .

So, the inequality from the number line will be $-2 < x \leq 5$.

We need to double the whole inequality since all the answers are given in terms of $2x$.

$$-2 < x \leq 5 = -4 < 2x \leq 10$$

Correct Answer: D

[2marks]

<p>3</p>	<p>Given that $-5 < x \leq 2$ and $y < 10$ List all the numbers which could represent both x and y</p> <p style="text-align: center;"><u>Solution</u></p> <p>The highest value of x is 2 and its lowest value is -4 The highest value of y will be 9 since y is less than 10 Therefore, the numbers which could represent both x and y will be $\{-4, -3, -2, -1, 0, 1, 2\}$ [2marks]</p>
<p>4</p>	<p>Answer True or False for the following statements</p> <p>a) If $-6 \leq \frac{x}{2} \leq 1$, then x must be greater than -12 but less than 1 b) If $x > 7$ and $y < -1$, then x and y do not have a common value c) If $-2x \leq 12$, then x must be less than -6</p> <p style="text-align: center;"><u>Solution</u></p> <p>a) From $-6 \leq \frac{x}{2} \leq 1$ multiply through by 2. So, we can have, $-12 \leq x \leq 2$. Therefore, False [1mark]</p> <p>b) A number cannot be greater than 7 and be less than -1. Therefore, True [1mark]</p> <p>c) $x \geq -6$ $-2x \leq 12$ {Divide both sides by -2}</p> <p>$x \geq -6$. x must be greater than -6. Therefore, False [1mark]</p> <p>{Note that, since we have divided by a negative number, we also need to ‘flip’ the inequality sign}</p>

5 Choose all the integers which do **not** satisfy the inequality

$$-5 < x + 3 \leq 6$$

- a) -9
- b) 7
- c) -8
- d) 3

Solution

$-5 < x + 3 \leq 6$ {Subtract 3 from both sides of the inequality}

$-8 < x \leq 3$ {Numbers which do not satisfy the inequality are numbers less or equal to 3 but greater than -8 }

Therefore, we have $\{-9, -8\}$ which do not satisfy the inequality.

Correct Answers: A and C

[2marks]

6 If $-2 \leq x \leq 1$ and $y < -1$, what is the maximum value of $x + y$?

Choose one answer

- a) 1
- b) -2
- c) -1
- d) 2

Solution

The maximum value of $x + y$ is the maximum value of x plus the maximum value of y

The maximum value of x is 1 , and the maximum value of y is -2 .

So, the maximum value of $x + y$ will be $1 + (-2) = -1$

Correct Answer: C

[2marks]

7 Choose all the numbers which obey the inequality

$$6a + 5 \geq 4a - 15$$

- a) -11
- b) -8
- c) -12
- d) -9

Solution

$$6a + 5 \geq 4a - 15$$

{Subtract $4a$ from both sides then subtract 5 from both sides}

$$2a \geq -20 \quad \{\text{Divide both sides by 2}\}$$

$$a \geq -10 \quad \{a \text{ is greater than or equal to } -10\}$$

Correct Answers: B and D

[2marks]

8 Find the largest and smallest integers which satisfy the inequality

$$-18 \leq 4x + 5 \leq 60$$



Solution

$$-18 \leq 4x + 5 \leq 60 \quad \{\text{subtract 5 from all sides}\}$$

$$-23 \leq 4x \leq 55 \quad \{\text{divide both sides by 4}\}$$

$$-5.75 \leq x \leq 13.75$$

The largest integer that satisfies the inequality is 13, and the smallest is -5

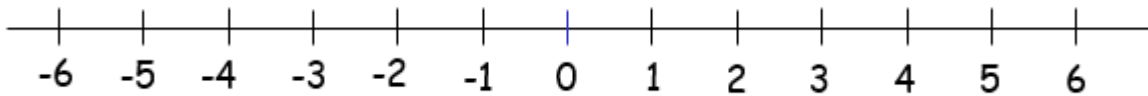
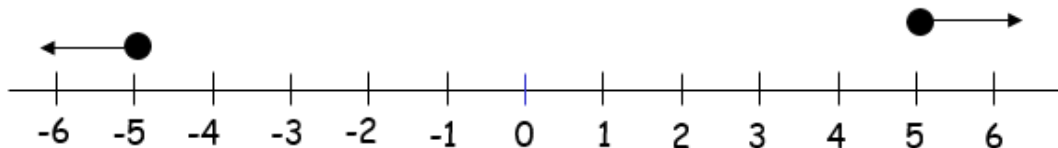
[4marks]

9If $y = 2$ and $2y < 15 - 2x$ Which of the following is the least integer value of x

- a) -5.5
- b) 5
- c) -5
- d) 5.5

SolutionSubstitute $y = 2$ into $2y < 15 - 2x$ $4 < 15 - 2x$ {add $2x$ to both sides and subtract 4 from both} $2x < 11$ {divide by 2} $x < 5.5$ Therefore, the largest integer value of x is 5

Correct Answer: B [2marks]

10 Use the number line below to show all the acceptable values of the inequality $2x^2 \geq 50$ **Solution** $2x^2 \geq 50$ {divide both sides by 2} $x^2 \geq 25$ {square root both sides} $x \geq 5$ or $x \leq -5$ **[4marks]**