Inequalities - Worksheet

Skill

Group A - Inequalities on number lines

Represent the following inequalities on a number line:

1) $x > 2$ **2)** $x \geq 2$ **3)** $x \leq -2$

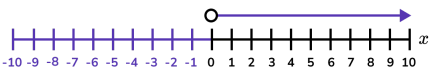
4) $1 < x < 4$ **5)** $1 \leq x \leq 4$ **6)** $-1 \leq x < 4$

Write the inequality represented on each number line:

7)

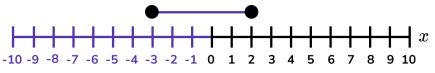
8)

9)

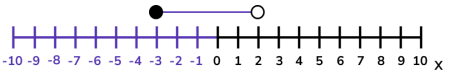


10)

11)



12)



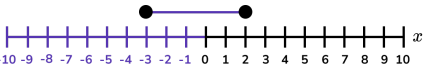
Group B - Integer solutions

State the integer solutions to the following inequalities:

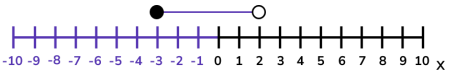
1) $1 < x < 4$ **2)** $1 \leq x \leq 4$ **3)** $-1 \leq x < 4$

4)

5)



6)



Group C - Solving linear inequalities

Solve the following inequalities.

Represent the solutions on a number line.

1) $x + 3 > 7$ **2)** $x - 3 < 7$ **3)** $5x \geq 20$

4) $3x < 12$ **5)** $2x + 1 < 9$ **6)** $2x - 1 \leq 7$

7) $3x + 2 > 14$ **8)** $2(x + 1) \leq 10$ **9)** $3(x + 2) \geq 18$

10) $4(x + 6) \geq 16$ **11)** $3x + 2 < x + 8$ **12)** $4x + 3 > 2x + 13$

Inequalities - Worksheet

Group D - Quadratic inequalities

Solve the following inequalities and represent the solutions on a numberline when suitable:

1) $x^2 + 12x + 32 < 0$

2) $x^2 + 12x + 32 \geq 0$

3) $x^2 - 12x + 32 \leq 0$

4) $x^2 + 4x - 32 \leq 0$

5) $x^2 - 4x - 32 > 0$

6) $x^2 < 64$

7) $x^2 + 16x + 64 \leq 0$

8) $x^2 - 16 > 0$

9) $2x^2 - 7x - 4 < 0$

10) $x^2 - 8x - 32 < 0$

11) $x^2 + 12x - 16 \leq 0$

12) $x^2 + 16x > 8$

Inequalities - Worksheet

Applied

1) a) A secondary school only has students who are age 11 or older. Write this as an inequality.

b) The oldest students in the same secondary school are 16 years old. Write an inequality to show the ages of their students.

2) a) Sam is thinking of a number. He doubles it, adds 3 and the result is larger than 11. Write an inequality to represent this and solve it.

b) What is the smallest integer Sam could have been thinking of?

3) a) John has three identical rods. He puts all three in a line, adds another rod which has a length of $5cm$. The total length of all of the rods is less than $23cm$. Write this as an inequality and solve it to find the possible lengths of the three identical rods.

b) Represent this solution a number line.

4) a) A rectangle has a length of $l$cm. The width is $5cm$ shorter than the length. The total area is greater than or equal to $24cm^2$. Write an inequality to represent the area and solve it.

b) Karen says it is not possible to calculate the area as there are two possible solutions. What is the shortest the length could be and why is Karen wrong?

Inequalities - Exam Questions

1) **(a)** Solve $4x - 1 > 9$

.....

(2)

(b) What is the smallest integer that satisfies the inequality in part (a)?

.....

(1)

(3 marks)

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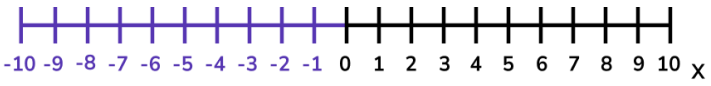
2) **(a)** Solve $5x - 2 < 3x + 6$

.....

(2)

(b) Represent your solution to part (a) on a number line



(1)

(3 marks)

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3) **(a)** Write down the inequality represented on this number line.

.....

(2)

(b) List the integer values that are satisfied by the inequality in part (a)

.....

(1)

(3 marks)

Inequalities - Exam Questions

4) **(a)** Solve the inequality: $x^2 + 6x - 7 \leq 0$

.....

(3)

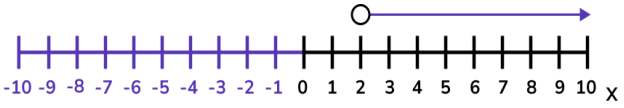
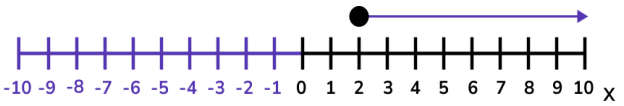
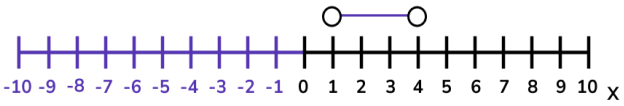
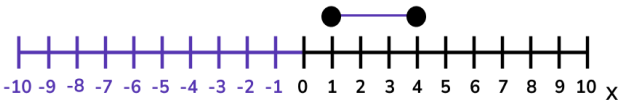
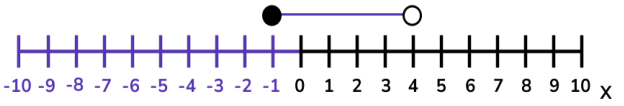
(b) List the integer values that satisfy the inequality in part (a)

.....

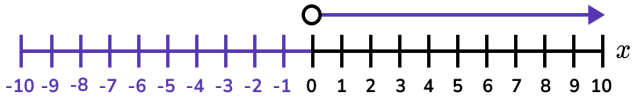
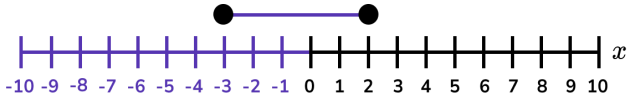
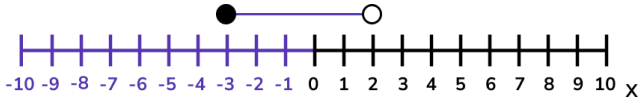
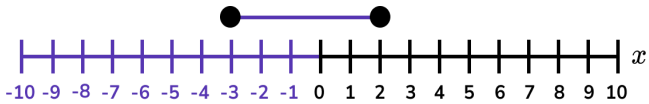
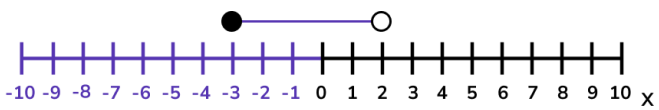
(1)

(4 marks)

Inequalities - Answers

	Question	Answer
	Skill Questions	
Group A	Represent the following inequalities on a number line	
	1) $x > 2$	**1)** 
	2) $x \geq 2$	**2)** 
	3) $x \leq -2$	**3)** 
	4) $1 < x < 4$	**4)** 
	5) $1 \leq x \leq 4$	**5)** 
	6) $-1 \leq x < 4$	**6)** 

Inequalities - Answers

Group A contd	Write the inequality represented on the number line. **7)**  **8)**  **9)**  **10)**  **11)**  **12)** 	**7)** $x \geq 4$ **8)** $x < -4$ **9)** $x > 0$ **10)** $-2 < x < 3$ **11)** $-3 \leq x \leq 2$ **12)** $-3 \leq x < 2$
Group B	State the integer solutions to the following inequalities: **1)** $1 < x < 4$ **2)** $1 \leq x \leq 4$ **3)** $-1 \leq x < 4$ **4)**  **5)**  **6)** 	**1)** $2, 3$ **2)** $1, 2, 3, 4$ **3)** $-1, 0, 1, 2, 3$ **4)** $-1, 0, 1, 2$ **5)** $-3, -2, -1, 0. 1. 2$ **6)** $-3, -2, -1, 0, 1$

Inequalities - Answers

Group C

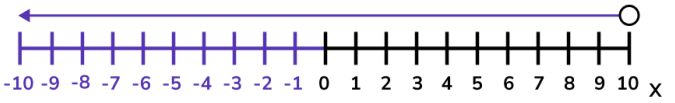
Solve the following inequalities. Represent the solutions on a number line.

1) $x + 3 > 7$

1) $x > 4$

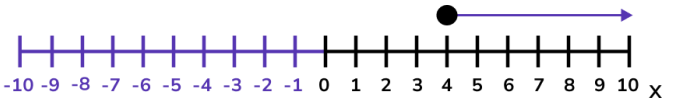
2) $x - 3 < 7$

2) $x < 10$



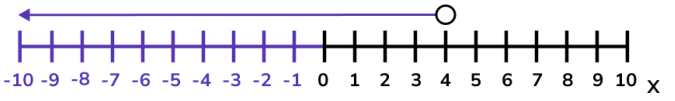
3) $5x \geq 20$

3) $x \geq 4$



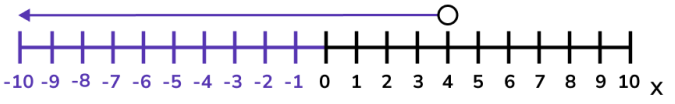
4) $3x < 12$

4) $x < 4$



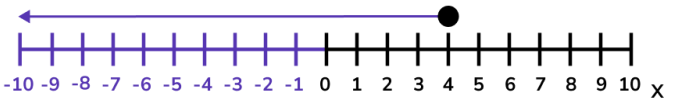
5) $2x + 1 < 9$

5) $x < 4$



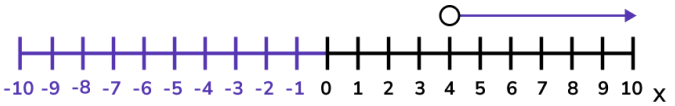
6) $2x - 1 \leq 7$

6) $x \leq 4$



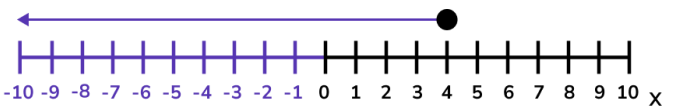
7) $3x + 2 > 14$

7) $x > 4$



8) $2(x + 1) \leq 10$

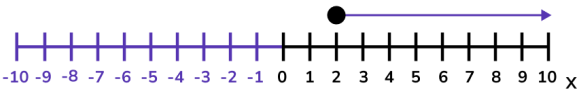
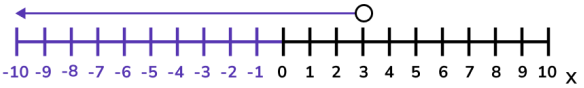
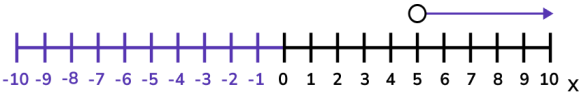
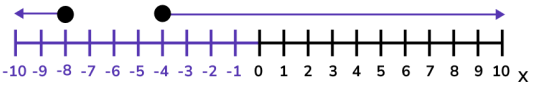
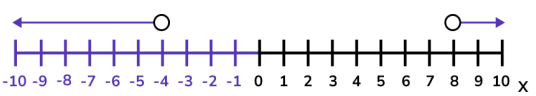
8) $x \leq 4$



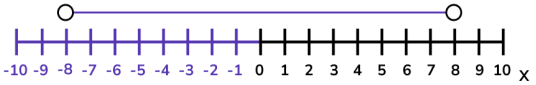
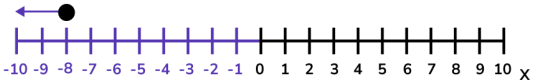
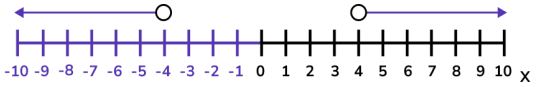
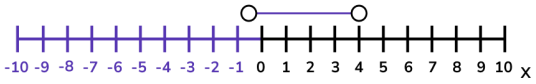
9) $3(x + 2) \geq 18$

9) $x \geq 4$

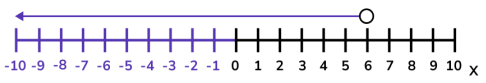
Inequalities - Answers

Group C contd	**10)** $4(x + 6) \geq 16$	**10)** $x \geq -2$ 
	11) $3x + 2 < x + 8$	**11)** $x < 3$ 
	12) $4x + 3 > 2x + 13$	**12)** $x > 5$ 
Group D	Solve the following inequalities and represent the solutions on a number line when suitable:	
	1) $x^2 + 12x + 32 < 0$	**1)** $-8 < x < -4$ 
	2) $x^2 + 12x + 32 \geq 0$	**2)** $x \geq -4$ and $x \leq -8$ 
	3) $x^2 - 12x + 32 \leq 0$	**3)** $4 \leq x \leq 8$ 
	4) $x^2 + 4x - 32 \leq 0$	**4)** $-8 \leq x \leq 4$ 
	5) $x^2 - 4x - 32 < 0$	**5)** $x > 8$ and $x < -4$ 

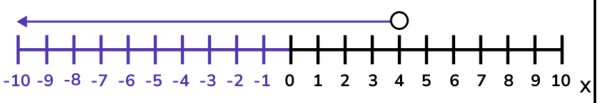
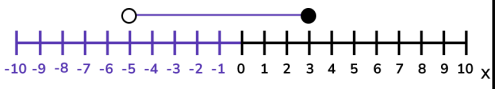
Inequalities - Answers

Group D contd	**6)** $x^2 < 64$	**6)** $-8 < x < 8$ 
	7) $x^2 + 16x + 64 \leq 0$	**7)** $x < -8$ 
	8) $x^2 - 16 > 0$	**8)** $x > 4$ and $x < -4$ 
	9) $2x^2 - 7x - 4 < 0$	**9)** $-\frac{1}{2} < x < 4$ 
	10) $x^2 - 8x - 32 < 0$	**10)** $-2.93 < x < 10.93$
	11) $x^2 + 12x - 16 \leq 0$	**11)** $-13.2 \leq x \leq 1.2$
	12) $x^2 + 16x > 8$	**12)** $x < -16.5$ and $x > 0.5$

Inequalities - Answers

	Question	Answer
	Applied Questions	
1)	**a)** A secondary school only has students who are age 11 or older. Write this as an inequality. **b)** The oldest students in the same secondary school are 16 years old. Write an inequality to show the ages of their students.	**a)** $a \geq 11$ **b)** $11 \leq a \leq 16$
2)	**a)** Sam is thinking of a number. He doubles it, adds 3 and the result is larger than 11. Write an inequality to represent this and solve it. **b)** Sam was thinking of an integer, what is the smallest integer he could have been thinking of?	**a)** $2n + 3 > 11$ $2n > 8$ $n > 4$ **b)** 5
3)	**a)** John has three identical rods. He puts all three in a line, adds another rod which has a length of $5cm$. The total length of all of the rods is less than $23cm$. Write this as an inequality and solve it to find the possible lengths of the three identical rods. **b)** Represent this solution a number line.	**a)** $3r + 5 < 23$ $3r < 18$ $r < 6$ **b)** 
4)	**a)** A rectangle has a length of $l$cm. The width is $5cm$ shorter than the length. The total area is greater than or equal to $24cm^2$. Write an inequality to represent the area and solve it. **b)** Karen says it is not possible to calculate the area as there are two possible solutions. What is the shortest the length could be and why is Karen wrong?	**a)** $l^2 - 5l \geq 24$ $l^2 - 5l - 24 \geq 0$ $(l - 8)(l + 3) \geq 0$ $l \leq -3$ and $l \geq 8$ **b)** The shortest the length could be is $8cm$. There is only one solution as you cannot have a negative distance for length.

Inequalities - Mark Scheme

	Question	Answer	
	Exam Questions		
1) (a)	Solve $4x - 1 > 9$	**(a)** $4x - 1 > 9$ $4x > 10$ $x > 2.5$	 **(1)** **(1)**
(b)	What is the smallest integer that satisfies the inequality in part a)?	**(b)** 3	**(1)**
2) (a)	Solve $5x - 2 < 3x + 6$	**(a)** $5x - 2 < 3x + 6$ $2x - 2 < 6$ $2x < 8$ $x < 4$	 **(1)** **(1)**
(b)	Represent your solution to part a) on a number line	**(b)** 	**(1)**
3) (a)	Write down the inequality represented on this number line. 	**(a)** -5 and 3 **seen** $-5 < x \leq 3$	**(1)** **(1)**
(b)	List the integer values that are satisfied by the inequality in part a)	**(b)** $-4, -3, -2, -1, 0, 1, 2, 3$	**(1)**
4) (a)	Solve the inequality $x^2 + 6x - 7 \leq 0$	**(a)** $x^2 + 6x - 7 \leq 0$ $(x + 7)(x - 1) \leq 0$ -7 and 1 **seen** $-7 \leq x \leq 1$	 **(1)** **(1)** **(1)**
(b)	List the integer values that satisfy the inequality in part a)	-7, -6, -5, -4, -3, -2, -1, 0, 1	**(1)**