Inequalities

GCSE Mathematics • **Higher Tier** • Grades 6–7 • Non-calculator

WORKED SOLUTIONS

Name: worked example Class: _____ Total: 54 / 54

Show all your working. Marks are given for correct method as well as the final answer.

1. Write down the meaning of $x > 3$. **[1 mark]**

3 itself is NOT included

Answer: x is greater than 3

2. Write down the meaning of $x \leq -2$. **[1 mark]**

−2 IS included

Answer: x is less than or equal to −2

3. Solve $x + 5 > 9$. **[2 marks]**

take 5 from both sides

Answer: $x > 4$

4. Solve $3x \leq 21$. **[2 marks]**

divide by 3

Answer: $x \leq 7$

5. Solve $2x - 3 \geq 7$. **[2 marks]**

$+3$: $2x \geq 10$
$\div 2$

Answer: $x \geq 5$

6. Solve $4x + 1 < 13$. **[2 marks]**

-1: $4x < 12$
$\div 4$

Answer: $x < 3$

7. Solve $-2x > 8$. **[3 marks]**

divide by −2
dividing by a negative FLIPS the sign
$x < -4$

Answer: $x < -4$

8. Solve $5 - x \leq 2$. **[3 marks]**

-5: $-x \leq -3$
$\div -1$ and FLIP
$x \geq 3$

Answer: $x \geq 3$

9. Solve $3 - 2x > 11$. **[3 marks]**

-3: $-2x > 8$
$\div -2$ and FLIP
$x < -4$

Answer: $x < -4$

10. Solve $3(x + 2) < 18$. **[3 marks]**

expand: $3x + 6 < 18$
$3x < 12$
$x < 4$

Answer: $x < 4$

11. Solve $5x - 2 \geq 2x + 7$. **[3 marks]**

$-2x$: $3x - 2 \geq 7$
$3x \geq 9$
$x \geq 3$

Answer: $x \geq 3$

12. Solve $4 < 2x \leq 10$. **[3 marks]**

divide all three parts by 2

Answer: $2 < x \leq 5$

13. Solve $-3 \leq x + 2 < 5$. **[3 marks]**

take 2 from all three parts

Answer: $-5 \leq x < 3$

14. Solve $1 < 3x - 5 \leq 13$. **[4 marks]**

$+5$: $6 < 3x \leq 18$
$\div 3$: $2 < x \leq 6$

Answer: $2 < x \leq 6$

15. List the integers that satisfy $-2 < x \leq 3$. **[2 marks]**

-2 is NOT included
3 IS included

Answer: $-1, 0, 1, 2, 3$

16. List the integers that satisfy $1 \leq x < 6$. **[2 marks]**

1 included, 6 not

Answer: $1, 2, 3, 4, 5$

17. n is an integer and $2n + 1 < 15$. Write down the largest possible value of n. **[3 marks]**

$2n < 14$
$n < 7$
$n = 7$ does NOT work
largest is 6

Answer: 6

18. Describe how you show $x \geq 4$ on a number line. **[2 marks]**



≥ means the value is included, so FILLED
open circle for > or <

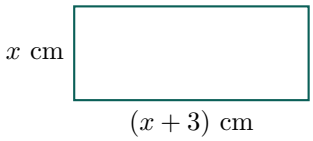
Answer: filled circle at 4, arrow right

19. Solve $x^2 < 25$. **[3 marks]**

$x^2 - 25 < 0$
$(x + 5)(x - 5) < 0$
between the roots for <

Answer: $-5 < x < 5$

20. A rectangle has width x cm and length $(x + 3)$ cm. Its perimeter is less than 26 cm.



(a) Form an inequality in x and solve it. **[4 marks]**

perimeter $= 2x + 2(x + 3) = 4x + 6$
$4x + 6 < 26$
$4x < 20$
$x < 5$

(b) Given x is a positive integer, list the possible widths. **[3 marks]**

x must be positive: $0 < x < 5$
1, 2, 3, 4 cm

Answer: $x < 5$; widths 1, 2, 3, 4 cm

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