Foundation GCSE: Solving Inequalities

Name: _____ Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Working out should be shown where appropriate.

1. Solve the inequality $x + 3 > 7$.
2. Solve the inequality $x - 4 \leq 5$.
3. Solve the inequality $2x < 12$.
4. Solve the inequality $3x \geq 15$.
5. Solve the inequality $2x + 1 > 9$.
6. Solve the inequality $3x - 5 \leq 10$.
7. Solve the inequality $4x - 3 < 2x + 5$.
8. Solve the inequality $5x + 2 \geq 3x + 12$.
9. Solve the inequality $-2x < 10$.
10. Solve the inequality $-3x \geq -15$.
11. Solve the inequality $6 - x > 2$.
12. Solve the inequality $10 - 2x \leq 4$.
13. Solve $3(x - 1) < 15$.
14. Solve $2(2x + 3) \geq 14$.
15. Find all integer values of x satisfying $3 < 2x \leq 10$.
16. Find all integer values of x satisfying $-2 \leq 3x - 1 < 8$.
17. Solve $5(x - 2) \leq 2(x + 5)$.
18. Represent the inequality $-2 \leq x < 3$ on a number line (state the integer solutions).
19. Solve the inequality $\dfrac{x}{4} + 1 > 3$.
20. Solve the inequality $\dfrac{2x - 3}{3} \geq 3$.

Answers & Worked Solutions

1. $x > 4$
   Subtract 3 *from both sides.*

2. $x \leq 9$
   Add 4 *to both sides.*

3. $x < 6$
   Divide both sides by 2.

4. $x \geq 5$
   Divide both sides by 3.

5. $x > 4$
   Subtract 1*, then divide by* 2*:* $2x > 8 \implies x > 4$.

6. $x \leq 5$
   Add 5*, then divide by* 3*:* $3x \leq 15 \implies x \leq 5$.

7. $x < 4$
   Subtract $2x$*, add* 3*:* $2x < 8 \implies x < 4$.

8. $x \geq 5$
   Subtract $3x$*, subtract* 2*:* $2x \geq 10 \implies x \geq 5$.

9. $x > -5$
   Divide by -2 *and flip the inequality sign:* $x > -5$.

10. $x \leq 5$
    Divide by -3 *and flip the inequality sign:* $x \leq 5$.

11. $x < 4$
    Add x*, subtract* 2*:* $4 > x$*, which means* $x < 4$.

12. $x \geq 3$
    Add $2x$*, subtract* 4*:* $6 \leq 2x \implies 2x \geq 6 \implies x \geq 3$.

13. $x < 6$
    Expand brackets: $3x - 3 < 15 \implies 3x < 18 \implies x < 6$.

14. $x \geq 2$
    Expand: $4x + 6 \geq 14 \implies 4x \geq 8 \implies x \geq 2$.

15. $x = 2, 3, 4, 5$
    Divide by 2*:* $1.5 < x \leq 5$*. Integers are* $2, 3, 4, 5$.

16. $x = 0, 1, 2$
    Add 1*:* $-1 \leq 3x < 9$*. Divide by* 3*:* $-\frac{1}{3} \leq x < 3$*. Integers:* $0, 1, 2$.

17. $x \leq \frac{20}{3}$ (or 6.67)
    Expand: $5x - 10 \leq 2x + 10 \implies 3x \leq 20 \implies x \leq \frac{20}{3}$.

18. $-2, -1, 0, 1, 2$
    Integers included are from -2 *up to (but not including)* 3.

19. $x > 8$
    Subtract 1*:* $\frac{x}{4} > 2 \implies x > 8$.

20. $x \geq 6$
    Multiply by 3*:* $2x - 3 \geq 9 \implies 2x \geq 12 \implies x \geq 6$.