

## Math Worksheet for 8th Grade

### Number of solutions to equations

Answers (corresponding to question numbers)

1. One solution ( $x = 2$ ).
2. One solution ( $x = 5$ ).
3. No solutions (simplifies to  $0 = 5$ ).
4. One solution ( $2x = 9 \rightarrow x = 4.5$ ).
5. One solution ( $\frac{x}{2} = 5 \rightarrow x = 10$ ).
6. Infinitely many solutions ( $0x + 6 = 6 \rightarrow 6 = 6$  true for all  $x$ ).
7. No solutions ( $0x + 5 = 0 \rightarrow 5 = 0$  impossible).
8. Infinitely many solutions (both sides equal; simplifies to  $0 = 0$ ).
9. Infinitely many solutions ( $2x + 2 = 2x + 2 \rightarrow 0 = 0$ ).
10. No solutions ( $3x - 6 = 3x - 5 \rightarrow$  simplifies to  $-6 = -5$ , impossible).
11. Infinitely many solutions ( $0.5x + 2 = 0.5x + 2 \rightarrow$  identity).
12. No solutions ( $(\frac{1}{3})x + 1 = (\frac{1}{3})x + 2 \rightarrow 1 = 2$  impossible).
13. One solution ( $6x = 9 \rightarrow x = 1.5$ ).
14. Infinitely many solutions ( $-4x + 8 = -4x + 8 \rightarrow$  identity).
15. One solution ( $3x = 6 \rightarrow x = 2$ ).
16. One solution ( $2x + 4 = 2x + 6 \rightarrow$  simplifies to  $4 = 6$ ? Wait — check:  $2(x+3)=2x+6$ ; equation is  $2x+4 = 2x+6 \rightarrow 4=6$  impossible). Correction: No solutions. (So answer: No solutions.)
17. Infinitely many solutions ( $5x - 5 = 5x - 5 \rightarrow$  identity).
18. No solutions ( $2x + 3 = 2x - 3 \rightarrow 3 = -3$  impossible).
19. One solution ( $x = 5$ ).
20. No solutions ( $3x + 6 = 3x + 7 \rightarrow 6 = 7$  impossible).

Worked-example answers with steps

21. Worked example A:  $2x + 3 = 2x + 3$

- Subtract  $2x$  from both sides:  $3 = 3$ .
- This is a true statement that does not depend on  $x$ , so the original equation is true for every real  $x$ .
- Number of solutions: infinitely many.

22. Worked example B:  $4(x - 2) = 4x - 9$

- Expand left side:  $4x - 8 = 4x - 9$ .
- Subtract  $4x$  from both sides:  $-8 = -9$ .
- This is a false statement (contradiction), so no value of  $x$  makes the equation true.
- Number of solutions: no solutions.

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### Number of solutions to equations

Create an equation with no solutions (sample answers)

23. Example:  $2x + 3 = 2x + 5$  (no solutions).

24. Example:  $(\frac{1}{2})x + 1 = (\frac{1}{2})x + 4$  (no solutions).

25. Example:  $0.3x + 2 = 0.3x + 5$  (no solutions).

26. Example:  $7 = 3$  (for a constructed linear setup, e.g.,  $2x + 7 = 2x + 3$  simplifies to  $7 = 3$ ) — no solutions.

27. Example:  $5x + 2 = 5x + 8$  (no solutions).

28. Example:  $4x + 1 = 4x + 6$  (a specific  $ax + b = ax + c$  with  $b \neq c \rightarrow$  no solutions).

29. Example:  $0x + 4 = 0$  (simplifies to  $4 = 0$ ) — no solutions.

30. Example:  $3x + 2 = 3x + 9$  (no solutions).

31. Example:  $2(x + 1) = 2x + 5 \rightarrow 2x + 2 = 2x + 5 \rightarrow 2 = 5$  (no solutions).

32. Example: Simplifies to  $5 = 0$ , e.g.,  $2x + 5 = 2x$  (gives  $5 = 0$ ) — no solutions.

Create an equation with infinitely many solutions (sample answers)

33. Example:  $2x + 3 = 2x + 3$  (infinitely many solutions).

34. Example:  $(\frac{1}{4})x + 2 = (\frac{1}{4})x + 2$  (infinitely many solutions).

35. Example:  $0.5x + 1 = 0.5x + 1$  (infinitely many solutions).

36. Example:  $3(x + 2) = 3x + 6$  (both sides simplify to same expression  $\rightarrow$  infinitely many).

37. Example:  $7x + 4 = 7x + 4$  ( $ax + b = ax + b \rightarrow$  infinitely many).

38. Example:  $0x + 5 = 5$  (simplifies to  $5 = 5$ ) — infinitely many solutions.

39. Example:  $4x + 8 = 4x + 8$  (infinitely many).

40. Example:  $2(x - 1) = 2x - 2$  (infinitely many).

41. Example:  $0 = 0$  can come from  $3x - 3 = 3x - 3$  (infinitely many).

42. Example:  $x + 2 = x + 2$  (infinitely many solutions).

More practice answers

43. One solution ( $8x - 4 = 12 \rightarrow 8x = 16 \rightarrow x = 2$ ).

44. No solutions ( $2(x + 3) = 2x + 5 \rightarrow 2x + 6 = 2x + 5 \rightarrow 6 = 5$  impossible).

45. Infinitely many solutions ( $(\frac{3}{4})x + 2 = (\frac{3}{4})x + 2 \rightarrow$  identity).

46. Infinitely many solutions ( $-2x + 5 = -2x + 5 \rightarrow$  identity).

47. One solution ( $10 = 2(x + 5) \rightarrow 10 = 2x + 10 \rightarrow 0 = 2x \rightarrow x = 0$ ).

48. Infinitely many solutions ( $0x = 0 \rightarrow 0 = 0$  true for all  $x$ ).

49. No solutions ( $0x = 7 \rightarrow 0 = 7$  impossible).

50. One solution ( $x - 4 = 0 \rightarrow x = 4$ ).