1. Determine the number of solutions for $3x + 4 = 19$. If there is a single solution, find it.

2. Determine the number of solutions for $5x - 7 = 5x - 7$.

3. Determine the number of solutions for $2(x + 3) = 2x + 7$.

4. Determine the number of solutions for $0x = 0$.

5. Determine the number of solutions for $0x = 9$.

6. Worked example: Determine the number of solutions for $4x - 6 = 2(2x - 3)$. (Show reasoning.)

7. Determine the number of solutions for $-3x + 2 = 14$. If one solution, find it.

8. Determine the number of solutions for $7(x - 1) = 7x - 7$.

9. Determine the number of solutions for $6x + 2 = 3(2x + 1)$.

10. Determine the number of solutions for $(\frac{1}{2})x + 3 = x - 2$. If unique, find x.

11. Determine the number of solutions for $8x + 5 = 8x + 2$.

12. Determine the number of solutions for $-4x + 9 = 2 - 4x$.

13. Determine the number of solutions for $10 = 2x + 2$.

14. Determine the number of solutions for $(\frac{3}{4})x - 1 = (\frac{3}{4})x - 1$.

15. Determine the number of solutions for $-2(x - 3) = -2x + 6$.

16. Determine the number of solutions for $9x - 3 = 3(3x - 1)$.

17. Determine the number of solutions for $x/3 + 2 = (x + 6)/3$.

18. Determine the number of solutions for $5x + 1 = 2(2x + 1)$.

19. Determine the number of solutions for $4x + 7 = 4x - 1$.

20. Word problem: Sarah says, "I have 3 more than twice Tom's marbles." Tom says, "I have 3 more than twice my marbles." Set up equations for both statements and decide if there is a unique solution, no solution, or infinitely many solutions.

21. Word problem: A taxi charges a fixed starting fee of $4 plus 2$ per mile. Another taxi claims its fare is $4+2$ per mile. If you compare the cost formulae, how many values of miles give the same cost? (Decide number of solutions.)

22. Word problem: Alex claims his age is x, and twice his age plus 5 equals three times x minus 1. Set up and analyze $2x + 5 = 3x - 1$. How many solutions?

23. Word problem: Two recipe versions say the number of cups of flour needed is $(3x + 2)$ and $(3x + 2)$. How many values of x make the recipes equal?

24. Word problem: A teacher writes two expressions for the class total: $(4n + 6)$ and $(4n + 9)$. For how many integer n are these expressions equal?

25. Word problem: One store sells a shirt for p dollars and the discount is p - 10; another store has price $(p - 10)$. Are these two expressions equal for all p? Decide number of solutions.

26. Create an equation (linear in x) that has exactly one solution. Give one example with integer coefficients.

27. Worked example: Create and then analyze the equation $2(3x - 4) = 6x - 8$. Determine the number of solutions (show steps).

28. Create an equation (linear in x) that has no solutions. Give one example with integer coefficients.

29. Create an equation (linear in x) that has infinitely many solutions. Give one example with integer coefficients.

30. Create an equation in x with fractional coefficients that has no solution.

31. Create an equation in x with fractional coefficients that has infinitely many solutions.

32. Create a linear equation that has exactly one solution which is x = 5. (Give one valid equation.)

33. Create a linear equation that has no solution and where both sides contain the variable x.

34. Create a linear equation that has infinitely many solutions using parentheses (distributive property).

35. Create a linear equation with one solution where the solution is x = -3.

36. Create an equation with integer coefficients that becomes 0 = nonzero after simplification (hence no solutions).

37. Create an equation with integer coefficients that simplifies to 0 = 0 (hence infinitely many solutions).

38. Parameter: For which value(s) of k does $kx + 3 = 5x + 3$ have infinitely many solutions?

39. Parameter: For which value(s) of k does $kx + 3 = 5x + 2$ have no solution?

40. Parameter: For which value(s) of k does $(k - 1)x + 2 = 3x + 2$ have infinitely many solutions?

41. Parameter: For which value(s) of k does $(k - 1)x + 2 = 3x + 5$ have no solution?

42. Parameter: For which value(s) of k does $x + k = x + 7$ have infinitely many solutions? For what k is there no solution?

43. Parameter: For which value(s) of k does $(2k)x + 4 = 6x + 4$ have infinitely many solutions?

44. Parameter: For which values of k does $2(k)x + 3 = 2x + 3$ have a unique solution? (State condition on k.)

45. Parameter: For what values of k does $kx + 5 = 0$ have exactly one solution for x?

46. Parameter: For which values of k does $0x = k$ have (a) infinitely many solutions, (b) no solution?

47. Parameter: For which value(s) of k does $(k + 2)x = (k + 2)x + 1$ have no solutions? (If any.)

48. Which of the following equations has no solution? Explain briefly.

a) $3x + 1 = 3x + 2$

b) $4x + 5 = 4x + 5$

c) $2x + 3 = 3x + 1$

49. Which of the following equations has infinitely many solutions? Explain briefly.

a) $5x - 2 = 5x - 2$

b) $x + 4 = x + 5$

c) $6x = 6x + 1$

50. Consider the equation $a x + b = c x + d$.

a) If a ? c, how many solutions does the equation have?

b) If a = c and b = d, how many solutions?

c) If a = c and b ? d, how many solutions?