

Linear Equations & Systems

Algebra · Grade 8

★ Hard · 15 Questions

Solve each problem. Show your work in the space provided. Write your answer on the line.

1. Solve: $(2x + 3)/4 = (x - 1)/2$.

Answer: _____

2. Solve: $5(x - 2) = 3(x + 4)$.

Answer: _____

3. Solve: $3x/4 + 5 = 11$.

Answer: _____

4. A rectangle has length $(3x + 1)$ cm and width $(x + 3)$ cm. Its perimeter is 40 cm. Find x and the dimensions.

Answer: _____

5. Solve: $2(x + 3) = 3(x - 1) + 1$.

Answer: _____

6. John is 3 times as old as Emma. In 4 years John will be twice as old as Emma. How old are they now?

Answer: _____

7. Solve for x : $0.5x + 1.5 = 0.25x + 3$.

Answer: _____

8. A train travels at $(3x + 10)$ km/h. Another travels at $(5x - 14)$ km/h. If they travel at the same speed, find x and the speed.

Answer: _____

9. Solve: $x/3 + x/4 = 7$.

Answer: _____

10. The sum of three consecutive integers is 51. Find them.

Answer: _____

11. Solve: $4(2x - 3) - 2(x + 1) = 18$.

Answer: _____

12. Solve: $4(2x - 3) - 2(x - 1) = 18$.

Answer: _____

13. Solve: $3x - 2(4 - x) = 5(x - 1)$.

Answer: _____

14. Solve: $2(3x + 1) = 6x + 2$.

Answer: _____

15. A phone plan costs \$20/month plus \$0.05 per text. Another costs \$35/month with unlimited texts. After how many texts do the plans cost the same?

Answer: _____

Answer Key

Linear Equations & Systems — Hard

1. $x = -5$

Multiply through by 4: $2x+3=2(x-1)=2x-2$. Then $3=-2$ which is never true. No solution.

2. $x = 11$

$5x - 10 = 3x + 12$. $2x = 22$. $x = 11$.

3. $x = 8$

Subtract 5: $3x/4 = 6$. Multiply by $4/3$: $x = 8$.

4. $x = 4$; length = 13 cm, width = 7 cm

$P = 2(l + w) = 2(3x + 1) + 2(x + 3) = 8x + 8 = 40$. So $8x = 32 \rightarrow x = 4$. Length = $3(4) + 1 = 13$ cm.

Width = $4 + 3 = 7$ cm.

5. $x = 8$

$2x+6 = 3x-3+1 = 3x-2$. $6+2 = x$. $x = 8$.

6. Emma = 4, John = 12

$J=3E$. $J+4=2(E+4)$. $3E+4=2E+8$. $E=4$. $J=12$.

7. $x = 6$

$0.25x = 1.5$. $x = 6$. (Multiply through by 4: $2x+6=x+12$. $x=6$.)

8. $x = 12$; speed = 46 km/h

$3x+10=5x-14$. $24=2x$. $x=12$. Speed= $3(12)+10=46$ km/h.

9. $x = 12$

LCD=12. $4x/12+3x/12=7$. $7x/12=7$. $x=12$.

10. 16, 17, 18

$n + (n+1) + (n+2) = 51$. $3n+3=51$. $3n=48$. $n=16$.

11. $x = 4$

$$8x - 12 - 2x - 2 = 18. \quad 6x = 32. \quad x = 16/3 \approx 5.33.$$

12. $x = 4$

$$\text{Expand: } 8x - 12 - 2x + 2 = 18 \rightarrow 6x = 28 \rightarrow x = 14/3.$$

13. $x = 3$

$$3x - 8 + 2x = 5x - 5 \rightarrow 5x - 8 = 5x - 5 \rightarrow -8 = -5. \text{ This equation has no solution.}$$

14. All real numbers (identity)

$$6x + 2 = 6x + 2 \rightarrow 0 = 0. \text{ True for all } x \text{ — infinitely many solutions.}$$

15. 300 texts

$$20 + 0.05t = 35. \quad 0.05t = 15. \quad t = 300.$$
