

Name _____

Date _____

2.5 Constructing and solving equations — worksheet

Write and use equations, and solve them to find an unknown value. · 56 questions · Show your working.

Remember

- An equation is a balance: the two sides are equal.
- To **solve**, do the **same thing to both sides** until the letter is alone.
- Use **inverse operations**: undo + with −, undo × with ÷.
- Undo in reverse order — deal with the + or − first, then the × or ÷.
- $x + 5 = 12 \rightarrow$ subtract 5 $\rightarrow x = 7$. $2y + 4 = 16 \rightarrow$ subtract 4 $\rightarrow 2y = 12 \rightarrow$ divide by 2 $\rightarrow y = 6$.
- With brackets you can divide by the number outside first: $4(x - 2) = 20 \rightarrow x - 2 = 5 \rightarrow x = 7$.
- **Always check** by substituting your solution back into the original equation.

A · Fluency — Solve one-step and two-step equations.

- 1 Solve: $x - 3 = 12$. Give the value of x .

- 2 Solve: $2y + 4 = 16$. Give the value of y .

- 3 Solve: $x + 5 = 12$. Give the value of x .

- 4 Solve: $a - 7 = 2$. Give the value of a .

- 5 Solve: $3n = 18$. Give the value of n .

- 6 Solve: $m/4 = 5$. Give the value of m .

- 7 Solve: $2x + 1 = 9$. Give the value of x .

- 8 Solve: $5p - 3 = 12$. Give the value of p .

- 9 Solve: $4k + 7 = 31$. Give the value of k .

- 10 Solve: $6w - 5 = 13$. Give the value of w .

- 11 Solve: $x/2 + 3 = 8$. Give the value of x .

- 12 Solve: $3y - 2 = 10$. Give the value of y .

13 Solve: $7 + 2c = 19$. Give the value of c .

14 Solve: $20 - 3d = 5$. Give the value of d .

15 Solve: $8 - x = 3$. Give the value of x .

16 Solve: $2(t + 3) = 14$. Give the value of t .

17 Solve: $3(u - 1) = 12$. Give the value of u .

18 Solve: $5(v + 2) = 35$. Give the value of v .

19 Solve: $4x = 10$. Give the value of x .

20 Solve: $2n + 7 = 2$. Give the value of n .

21 Solve: $3z + 11 = 5$. Give the value of z .

22 Solve: $x/3 = 4$. Give the value of x .

23 Solve: $10 - 2g = 16$. Give the value of g .

24 Solve: $6h + 1 = 1$. Give the value of h .

B · Reasoning — Choose the right step; build equations from words.

25 Solve $x + 5 = 12$ and check your answer. What is x ?

26 I think of a number and add 6. The answer is 15. What was my number?

27 I think of a number and multiply it by 4. The answer is 28. What was my number?

28 I think of a number, double it and add 3. The answer is 17. What was my number?

29 I think of a number, subtract 4 and then multiply by 3. The answer is 21. What was my number?

30 Write an equation for: “a number n multiplied by 5 gives 40”. Write the left-hand side only.

31 To solve $2y + 4 = 16$, what is the first step?

- ☐ Divide both sides by 2
- ☐ Subtract 4 from both sides
- ☐ Add 4 to both sides
- ☐ Multiply both sides by 2

- 32 Arun solves $3x = 12$ by subtracting 3 from both sides. Is he right?
☐ Yes
☐ No
- 33 The perimeter of a square is 36 cm. Write and solve an equation to find the side length, in cm.

- 34 A rectangle has perimeter 30 cm and width 5 cm. Find its length, in cm.

- 35 Three consecutive integers add up to 42. What is the smallest one?

- 36 Two numbers add up to 20 and one is 4 more than the other. What is the smaller number?

C · Challenge — Brackets, unknowns on both sides, geometry.

- 37 Solve $4(x - 2) = 20$. What is x ?

- 38 Solve $2(3x + 1) = 26$. What is x ?

- 39 Solve $5x + 3 = 3x + 11$. What is x ?

- 40 Solve $7x - 2 = 4x + 13$. What is x ?

- 41 The angles of a triangle are x , $2x$ and $3x$ degrees. What is the value of x ?

- 42 Ali is x years old. His mother is 3 times as old. Together their ages total 48. How old is Ali?

- 43 A rectangle has length $2x + 1$ and width x . Its perimeter is 26 cm. What is the value of x ?

- 44 The formula $T = 25h + 40$ gives a plumber's charge in dollars. A job cost \$215. How many hours did it take?

D · Word problems — Set up and solve equations in context.

- 45 A taxi charges \$3 plus \$2 per kilometre. A journey cost \$23. How many kilometres was it?

- 46 A cinema ticket costs \$9. Mia spent \$63 on tickets. How many did she buy?

- 47** A number of students share 84 pencils equally, getting 7 each. How many students are there?

- 48** A book costs \$12 more than a pen. Together they cost \$20. How much is the pen, in dollars?

- 49** A gym charges \$50 to join plus \$30 a month. Ravi paid \$290 in total. For how many months?

- 50** A phone plan costs \$15 plus \$0.20 per extra minute. A bill was \$23. How many extra minutes were used?

- 51** Five identical boxes and a 3 kg bag weigh 43 kg altogether. What is the mass of one box, in kg?

- 52** A farmer has c cows. He buys 12 more and then has 3 times as many as he started with. How many did he start with?

- 53** A rope 60 m long is cut into two pieces, one twice as long as the other. How long is the shorter piece, in metres?

- 54** The mass of a parcel is p kg. Four such parcels plus a 2 kg box weigh 22 kg. What is p ?

- 55** A cafe sells t teas at \$3 each and 5 coffees at \$4 each, taking \$47 altogether. How many teas were sold?

- 56** A rectangle is 3 cm longer than it is wide. Its perimeter is 34 cm. What is its width, in cm?
