

# Grade 7 · Two-Step Equations · Worksheet Answer Key

Common Core 7.EE.B.3, 7.EE.B.4a · mathovore.fr

Every one of the twenty solutions below shows each step and a check by substitution, so compare your method as well as your final answer. Final answers are in bold. If your answer differs, substitute it into the original equation and see which side comes out wrong.

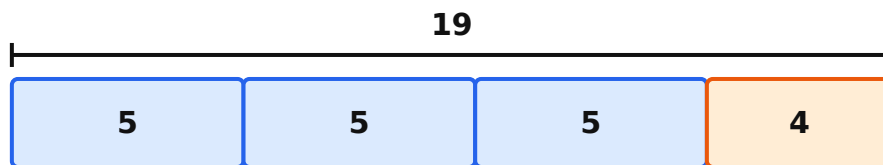
## Grade 7 Common Core: 7.EE.B.3 · 7.EE.B.4a

### Problem 1: Add, then multiply

Subtract 4 from both sides:  $3x = 15$ .

Divide both sides by 3:  $x = 5$ .

Check:  $3(5) + 4 = 19$ .



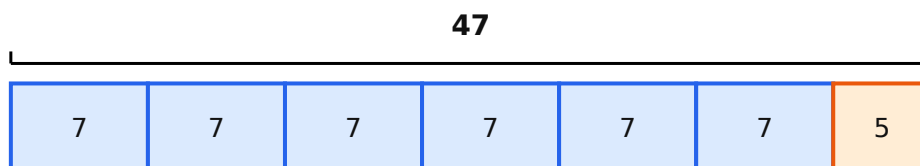
Each x is 5:  $5 + 5 + 5 + 4 = 19$ .

### Problem 2: Six groups plus five

Subtract 5 from both sides:  $6x = 42$ .

Divide both sides by 6:  $x = 7$ .

Check:  $6(7) + 5 = 42 + 5 = 47$ .



Each x is 7: six sevens and a 5 make 47.

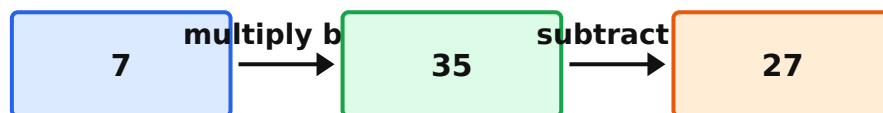
### Problem 3: Subtract, then divide

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Add 8 to both sides:  $5x = 35$ .

Divide both sides by 5:  $x = 7$ .

Check:  $5(7) - 8 = 35 - 8 = 27$ .



Working backward:  $27 + 8 = 35$  and  $35 \div 5 = 7$ .

### Problem 4: Divide, then subtract

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Add 2 to both sides:  $\frac{x}{5} = 8$ .

Multiply both sides by 5:  $x = 40$ .

Check:  $\frac{40}{5} - 2 = 8 - 2 = 6$ .

### Problem 5: A division step

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Subtract 3 from both sides:  $\frac{x}{4} = 7$ .

Multiply both sides by 4:  $x = 28$ .

Check:  $\frac{28}{4} + 3 = 7 + 3 = 10$ .

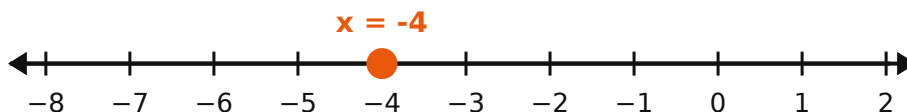
### Problem 6: Below zero

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Subtract 14 from both sides:  $3x = -12$ .

Divide both sides by 3:  $x = -4$ .

Check:  $3(-4) + 14 = -12 + 14 = 2$ .



The solution  $x = -4$ .

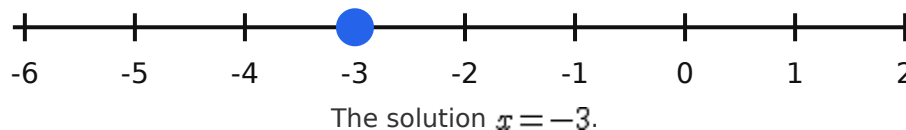
### Problem 7: A negative solution

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Subtract 7 from both sides:  $2x = -6$ .

Divide both sides by 2:  $x = -3$ .

Check:  $2(-3) + 7 = -6 + 7 = 1$ .



### Problem 8: Two negatives

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Add 7 to both sides:  $-5x = 25$ .

Divide both sides by  $-5$ :  $x = -5$ .

Check:  $-5(-5) - 7 = 25 - 7 = 18$ .

### Problem 9: A negative coefficient

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Subtract 5 from both sides:  $-3x = -15$ .

Divide both sides by  $-3$ :  $x = 5$ .

Check:  $-3(5) + 5 = -15 + 5 = -10$ .

### Problem 10: Decimal coefficient

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Subtract 2.4 from both sides:  $0.6x = 5.4$ .

Divide both sides by 0.6:  $x = 9$ .

Check:  $0.6(9) + 2.4 = 5.4 + 2.4 = 7.8$ .

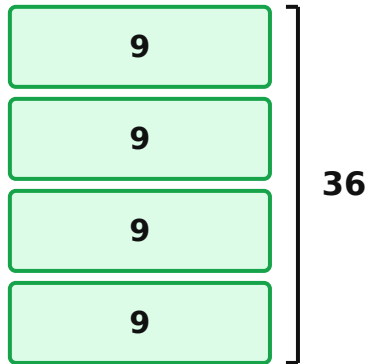
### Problem 11: Parentheses

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Dividing first:  $x + 3 = 9$ , so  $x = 6$ .

Distributing first:  $4x + 12 = 36$ , then  $4x = 24$ , so  $x = 6$ .

Both methods give the same answer. Check:  $4(6 + 3) = 4(9) = 36$ .



Each group is  $36 \div 4 = 9$ , so  $x + 3 = 9$ .

### Problem 12: Decimal in parentheses

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Divide both sides by 5:  $x - 2.5 = 4$ .

Add 2.5 to both sides:  $x = 6.5$ .

Check:  $5(6.5 - 2.5) = 5(4) = 20$ .

### Problem 13: Fraction coefficient

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Add 2 to both sides:  $\frac{3}{4}x = 9$ .

Multiply both sides by the reciprocal  $\frac{4}{3}$ :  $x = 9 \times \frac{4}{3} = 12$ . So  $x = 12$ .

Check:  $\frac{3}{4}(12) - 2 = 9 - 2 = 7$ .

### Problem 14: Estimate, then solve

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Estimate: with  $x = 4$ ,  $2.5(4) + 1.5 = 11.5$ , which is a little more than 11. So  $x$  is a little **less than 4**.

Exact solution: subtract 1.5 to get  $2.5x = 9.5$ , then divide by 2.5:  $x = 3.8$ .

Check:  $2.5(3.8) + 1.5 = 9.5 + 1.5 = 11$ . The answer 3.8 is a little less than 4, as predicted.

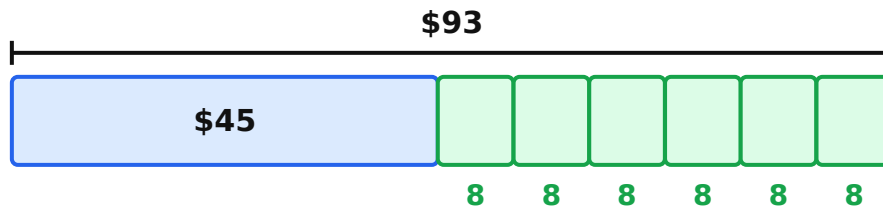
### Problem 15: Saving for a bike

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Equation:  $45 + 8w = 93$ .

Subtract 45:  $8w = 48$ . Divide by 8:  $w = 6$  **weeks**.

Check:  $45 + 8(6) = 45 + 48 = 93$ .



Six weeks of \$8 add \$48 to \$45.

### Problem 16: Rectangle perimeter

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Divide both sides by 2:  $x+6=20$ .

Subtract 6 from both sides:  $x=14$ .

Arithmetic: half the perimeter is  $40 \div 2 = 20$ , and  $20 - 6 = 14$ . The steps match the algebra.

Check:  $2(14+6) = 2(20) = 40$ . The length is 14 in.

### Problem 17: Movie night

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Each friend spends  $t+2$ , so  $3(t+2)=27$ .

Divide by 3:  $t+2=9$ . Subtract 2:  $t=7$ . A ticket costs \$7.

Check:  $3(7+2) = 3(9) = 27$ .



Each friend pays \$9: a \$7 ticket and \$2 popcorn.

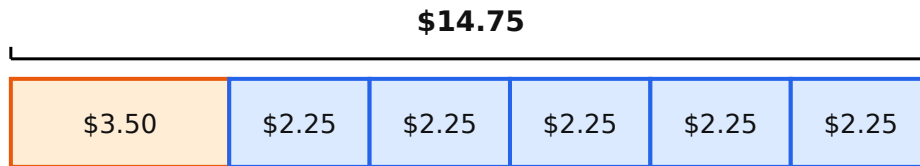
### Problem 18: Taxi ride

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Equation:  $3.50 + 2.25m = 14.75$ .

Subtract 3.50:  $2.25m = 11.25$ . Divide by 2.25:  $m = 5$  **miles**.

Check:  $3.50 + 2.25(5) = 3.50 + 11.25 = 14.75$ .



Five miles at \$2.25 each cost \$11.25.

### Problem 19: Warming up

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Equation:  $-3 + 2.5h = 12$ .

Add 3 to both sides:  $2.5h = 15$ . Divide by 2.5:  $h = 6$  **hours**.

Check:  $-3 + 2.5(6) = -3 + 15 = 12$ .

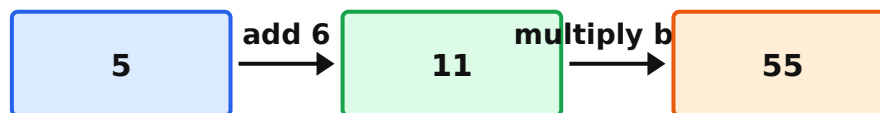
### Problem 20: Diego's number

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(a) Work backward:  $55 \div 5 = 11$ , then  $11 - 6 = 5$ .

(b)  $5(x+6) = 55$ . Divide by 5:  $x+6 = 11$ . Subtract 6:  $x = 5$ .

(c) Both solutions use the same steps in the same order: divide by 5, then subtract 6. The algebra writes each step as an equation. Check:  $(5+6) \cdot 5 = 55$ .



Diego's number:  $5 \rightarrow 11 \rightarrow 55$ .