Multi-Step Equations

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

To solve, first simplify each side: clear parentheses with the distributive property and combine like terms. Then undo the operations in reverse order – add or subtract to move constants, and multiply or divide to free the variable. If the variable appears on both sides, move all variable terms to one side first.

▷ **Example:** Solve $4(x-2)+6=18$. **Work:** Distribute: $4x-8+6=18$. Combine like terms: $4x-2=18$. Add 2: $4x=20$. Divide by 4: $x=5$. ★ **Answer:** $x=5$

Do the same to both sides to stay balanced.

Practice Problems

Solve each equation for the variable.

1. $2x+3=11$ _____

2. $3x-5=16$ _____

3. $5x+2=22$ _____

4. $4x-7=9$ _____

5. $2x+3x=20$ _____

6. $7x-2x=15$ _____

7. $2(x+4)=18$ _____

8. $3(x-1)=12$ _____

9. $2x+5=x+9$ _____

10. $5x-3=2x+9$ _____

11. $4(x+2)=2x+14$ _____

12. $3x+7=2(x+5)$ _____

13. $2(2x-1)+3=13$ _____

14. $6x-2(x-1)=14$ _____

Word Problems

15. The sum of a number and 7, then doubled, is 26. Find the number. _____

16. A taxi charges $\$3$ plus $\$2$ per mile. A ride costs $\$17$. How many miles was it? _____

17. A rectangle's perimeter is 30. Its length is 3 more than its width. Find the width. _____

18. Five less than three times a number is 16. Find the number. _____

Answer Keys

1. $x = 4$	**7.** $x = 5$	**13.** $x = 3$
2. $x = 7$	**8.** $x = 5$	**14.** $x = 3$
3. $x = 4$	**9.** $x = 4$	**15.** 6
4. $x = 4$	**10.** $x = 4$	**16.** 7 miles
5. $x = 4$	**11.** $x = 3$	**17.** 6
6. $x = 3$	**12.** $x = 3$	**18.** 7

Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 3 from both sides: $2x = 8$. Then divide by 2: $x = 4$. So the final answer is $x = 4$.

2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Add 5 to both sides: $3x = 21$. Divide by 3: $x = 7$. So the final answer is $x = 7$.

3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 2: $5x = 20$. Divide by 5: $x = 4$. So the final answer is $x = 4$.

4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Add 7: $4x = 16$. Divide by 4: $x = 4$. So the final answer is $x = 4$.

5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Combine like terms first: $5x = 20$. Divide by 5: $x = 4$. So the final answer is $x = 4$.

6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Combine: $5x = 15$. Divide by 5: $x = 3$. So the final answer is $x = 3$.

7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute: $2x + 8 = 18$. Subtract 8: $2x = 10$. Divide by 2: $x = 5$. So the final answer is $x = 5$.

8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute: $3x - 3 = 12$. Add 3: $3x = 15$. Divide by 3: $x = 5$. So the final answer is $x = 5$.

9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract x from both sides: $x + 5 = 9$. Subtract 5: $x = 4$. So the final answer is $x = 4$.

10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract $2x$: $3x - 3 = 9$. Add 3: $3x = 12$. Divide by 3: $x = 4$. So the final answer is $x = 4$.

11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute: $4x + 8 = 2x + 14$. Subtract $2x$: $2x + 8 = 14$. Subtract 8: $2x = 6$, so $x = 3$. So the final answer is $x = 3$.

12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the right side: $3x + 7 = 2x + 10$. Subtract $2x$: $x + 7 = 10$, so $x = 3$. So the final answer is $x = 3$.

13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute: $4x - 2 + 3 = 13$, so $4x + 1 = 13$. Subtract 1: $4x = 12$, $x = 3$. So the final answer is $x = 3$.

14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Distribute the -2: $6x - 2x + 2 = 14$, so $4x + 2 = 14$. Subtract 2: $4x = 12$, $x = 3$. So the final answer is $x = 3$.

15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is "Doubled" means $2(x + 7) = 26$. Divide by 2: $x + 7 = 13$. Subtract 7: $x = 6$. So the final answer is 6.

16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Cost is $3 + 2m = 17$. Subtract 3: $2m = 14$. Divide by 2: $m = 7$ miles. So the final answer is 7 miles.

17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Perimeter: $2(w + (w + 3)) = 30$, so $4w + 6 = 30$. Then $4w = 24$ and $w = 6$. So the final answer is 6.

18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is "Five less than three times a number" is $3x - 5 = 16$. Add 5: $3x = 21$, so $x = 7$. So the final answer is 7.

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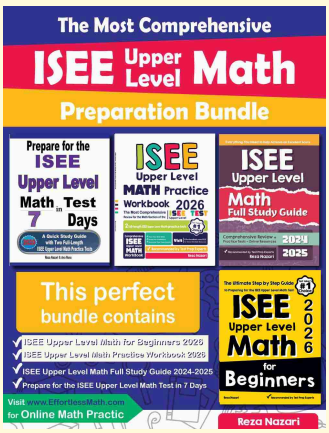

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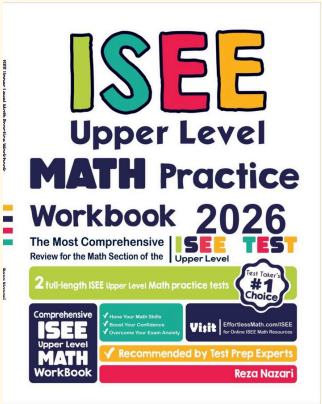

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