

# Complementary and Supplementary Angles

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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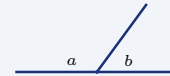
## Quick Review and Helpful Hints

Two angles are *complementary* if they add up to  $90^\circ$ , and *supplementary* if they add up to  $180^\circ$ . To find a missing angle, subtract the known angle from  $90^\circ$  (complementary) or from  $180^\circ$  (supplementary).

▷ **Example:** Find the angle complementary to  $35^\circ$ .

**Work:** Complementary angles total  $90^\circ$ , so subtract the known angle:  $90 - 35$ .

★ **Answer:**  $55^\circ$



On a straight line,  $a + b = 180^\circ$  (supplementary).

## ◆ Practice Problems

Find each requested angle.

1. Complement of  $40^\circ$

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2. Complement of  $65^\circ$

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3. Supplement of  $110^\circ$

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4. Supplement of  $45^\circ$

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5. Complement of  $18^\circ$

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6. Supplement of  $90^\circ$

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7. Complement of  $30^\circ$

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8. Supplement of  $130^\circ$

\_\_\_\_\_

9. Complement of  $75^\circ$

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10. Supplement of  $25^\circ$

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11. Complement of  $12^\circ$

\_\_\_\_\_

12. Supplement of  $160^\circ$

\_\_\_\_\_

13. Complement of  $55^\circ$

\_\_\_\_\_

14. Supplement of  $72^\circ$

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## ◆ Word Problems

15. Two angles are complementary. One measures  $28^\circ$ . What is the other?

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16. Two angles are supplementary. One measures  $95^\circ$ . What is the other?

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17. A ramp makes a  $22^\circ$  angle with the ground. What complementary angle does it make with a vertical wall?

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18. Two angles form a straight line. One measures  $137^\circ$ . Find the other.

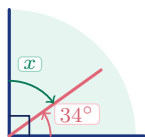
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◆ Illustrated Practice

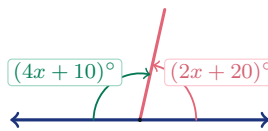
Use each picture. Decide whether the angles add to  $90^\circ$  or  $180^\circ$ , then find the missing value.

19. The two angles make a right angle. Find  $x$ .



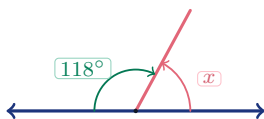
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24. The two marked angles make a straight angle. Find  $x$ .



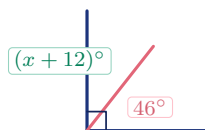
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20. The two angles form a straight line. Find  $x$ .



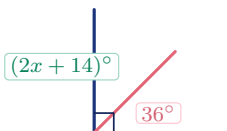
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25. The right angle is split into  $46^\circ$  and  $(x + 12)^\circ$ . Find  $x$ .



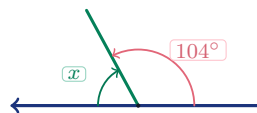
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21. The corner is split into two complementary angles. Find  $x$ .



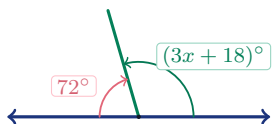
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26. The angles are supplementary. One angle is  $104^\circ$ . Find  $x$ .



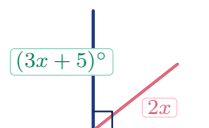
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22. The two adjacent angles are supplementary. Find  $x$ .



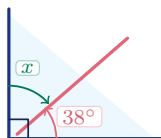
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27. The two expressions are complementary. Find  $x$ .



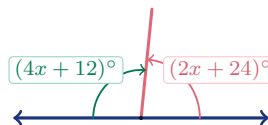
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23. A ladder, wall, and floor make a right angle. The ladder makes  $38^\circ$  with the floor. Find  $x$ .



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28. The two expressions are supplementary. Find  $x$ .



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## Answer Keys

- |                 |                 |                |
|-----------------|-----------------|----------------|
| 1. $50^\circ$   | 11. $78^\circ$  | 21. $x = 20$   |
| 2. $25^\circ$   | 12. $20^\circ$  | 22. $x = 30$   |
| 3. $70^\circ$   | 13. $35^\circ$  | 23. $52^\circ$ |
| 4. $135^\circ$  | 14. $108^\circ$ | 24. $x = 25$   |
| 5. $72^\circ$   | 15. $62^\circ$  | 25. $x = 32$   |
| 6. $90^\circ$   | 16. $85^\circ$  | 26. $76^\circ$ |
| 7. $60^\circ$   | 17. $68^\circ$  | 27. $x = 17$   |
| 8. $50^\circ$   | 18. $43^\circ$  | 28. $x = 24$   |
| 9. $15^\circ$   | 19. $56^\circ$  |                |
| 10. $155^\circ$ | 20. $62^\circ$  |                |

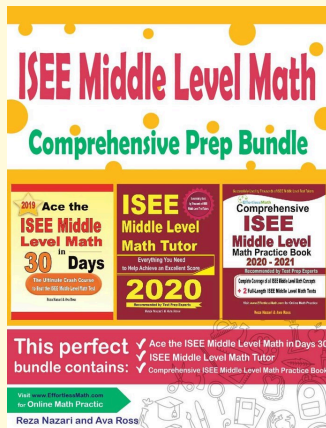
### Step-by-Step Explanations

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 Complementary angles add up to  $90^\circ$ , so subtract the known angle:  $90 - 40 = 50^\circ$ . So the final answer is  $50^\circ$ .
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 Subtract from  $90^\circ$ :  $90 - 65 = 25^\circ$ . So the final answer is  $25^\circ$ .
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 Supplementary angles add up to  $180^\circ$ , so subtract:  $180 - 110 = 70^\circ$ . So the final answer is  $70^\circ$ .
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 Subtract from  $180^\circ$ :  $180 - 45 = 135^\circ$ . So the final answer is  $135^\circ$ .
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 From  $90^\circ$ :  $90 - 18 = 72^\circ$ . So the final answer is  $72^\circ$ .
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 From  $180^\circ$ :  $180 - 90 = 90^\circ$ . So the final answer is  $90^\circ$ .
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 From  $90^\circ$ :  $90 - 30 = 60^\circ$ . So the final answer is  $60^\circ$ .
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 From  $180^\circ$ :  $180 - 130 = 50^\circ$ . So the final answer is  $50^\circ$ .
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 From  $90^\circ$ :  $90 - 75 = 15^\circ$ . So the final answer is  $15^\circ$ .
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 From  $180^\circ$ :  $180 - 25 = 155^\circ$ . So the final answer is  $155^\circ$ .
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 From  $90^\circ$ :  $90 - 12 = 78^\circ$ . So the final answer is  $78^\circ$ .
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 From  $180^\circ$ :  $180 - 160 = 20^\circ$ . So the final answer is  $20^\circ$ .
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 From  $90^\circ$ :  $90 - 55 = 35^\circ$ . So the final answer is  $35^\circ$ .
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 From  $180^\circ$ :  $180 - 72 = 108^\circ$ . So the final answer is  $108^\circ$ .
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 Complementary angles total  $90^\circ$ , so the other is  $90 - 28 = 62^\circ$ . So the final answer is  $62^\circ$ .
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 Supplementary angles total  $180^\circ$ , so the other is  $180 - 95 = 85^\circ$ . So the final answer is  $85^\circ$ .
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 The ground and the vertical wall meet at  $90^\circ$ , so the wall angle is the complement:  $90 - 22 = 68^\circ$ . So the final answer is  $68^\circ$ .
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 A straight line is  $180^\circ$ , so the other angle is  $180 - 137 = 43^\circ$ . So the final answer is  $43^\circ$ .
19. In the picture, the square corner tells us the whole angle is  $90^\circ$ . The known part is  $34^\circ$ , so the missing part is  $90 - 34 = 56^\circ$ . So the final answer is  $56^\circ$ .
20. The two angles sit on a straight line, which means they are supplementary and must total  $180^\circ$ . Subtract the known angle:  $180 - 118 = 62^\circ$ . So the final answer is  $62^\circ$ .
21. The right-angle mark means the two pieces add to  $90^\circ$ . Write  $(2x + 14) + 36 = 90$ , combine to get  $2x + 50 = 90$ , then subtract 50 and divide by 2, so  $x = 20$ .
22. Because the angles form a straight line, their sum is  $180^\circ$ . Set up  $(3x + 18) + 72 = 180$ , so  $3x + 90 = 180$ ; subtract 90 to get  $3x = 90$ , and divide by 3 to get  $x = 30$ .
23. The wall and floor form a  $90^\circ$  corner, so the ladder splits that right angle into two complementary angles. The floor angle is  $38^\circ$ , so the wall angle is  $90 - 38 = 52^\circ$ .
24. The two marked angles are on a straight line, so they must add to  $180^\circ$ . Write  $(4x + 10) + (2x + 20) = 180$ , combine to get  $6x + 30 = 180$ , then  $6x = 150$ , so  $x = 25$ .
25. The picture shows a right angle, so the two pieces add to  $90^\circ$ . Write  $46 + (x + 12) = 90$ , combine to get  $x + 58 = 90$ , then subtract 58 to get  $x = 32$ .
26. Supplementary angles make a straight line and total  $180^\circ$ . Since one angle is  $104^\circ$ , the other is  $180 - 104 = 76^\circ$ .
27. The square corner tells us the two expressions are complementary. Set up  $2x + (3x + 5) = 90$ , combine like terms to get  $5x + 5 = 90$ , then subtract 5 and divide by 5, so  $x = 17$ .
28. The two expressions form a straight angle, so their sum is  $180^\circ$ . Write  $(4x + 12) + (2x + 24) = 180$ , combine to get  $6x + 36 = 180$ , then  $6x = 144$ , so  $x = 24$ .



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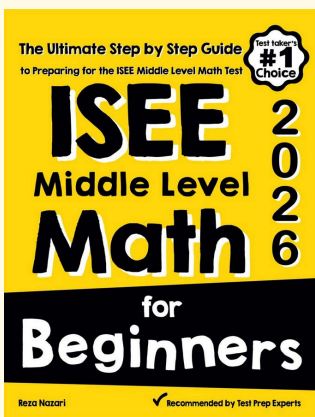
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