Angle Relationships: Supplementary, Complementary, and Vertical Angles

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

Complementary angles sum to $90°$; supplementary angles sum to $180°$; vertical (opposite) angles are equal. Determine whether the angles add to a right angle, add to a straight angle, or lie opposite each other. Diagrams are not to scale.

Worked example

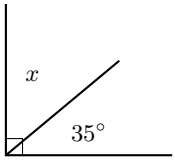
Find the supplement of $28°$.

1. Supplementary means $x + 28 = 180$.
2. $x = 180 - 28 = 152°$.
3. Check $152 + 28 = 180°$.
Answer: $152°$.

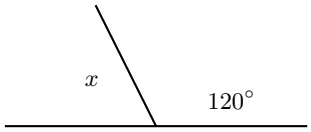
Practice Problems

Show your thinking.

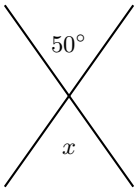
1. The marked angles are complementary. A student reports $x = 65°$. Correct the claim and check the correct angle against the given one.



2. The marked angles are supplementary. A student reports $x = 70°$. Correct the claim and check the correct angle against the given one.



3. The marked angles are vertical. A student reports $x = 60°$. Correct the claim and check the correct angle against the given one.



4. Two complementary angles are x and $x + 30$ degrees. A student sets their sum to 180. Correct the equation and solve.

5. A student solves supplementary angles $(3x + 5)°$ and $79°$ using $90°$. Repair the total and find x.

6. A student adds vertical angles $(2x + 10)°$ and $44°$ to get 180. Correct the relationship and find x.

7. A student divides $180°$ in ratio $2 : 3$ for complementary angles. Correct the total and find both angles.

8. A student treats $(3x + 10)°$ and $(5x + 10)°$ as equal because they are supplementary. Write the correct equation and solve.

Answer Key

1. $x = 55°$.
2. $x = 60°$.
3. $x = 50°$.
4. $30°$ and $60°$.
5. Use $180°$; $x = 32$.
6. The angles are equal; $x = 17$.
7. Use total $90°$; $36°$ and $54°$.
8. $3x + 10 + 5x + 10 = 180$; $x = 20$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Complementary angles sum to $90°$: $x + 35 = 90$.
2. $x = 90 - 35 = 55°$.
3. Check $55 + 35 = 90°$.

Problem 2

1. Supplementary angles sum to $180°$: $x + 120 = 180$.
2. $x = 180 - 120 = 60°$.
3. Check $60 + 120 = 180°$.

Problem 3

1. Opposite angles at the intersection are vertical, so $x = 50°$.
2. Each adjacent angle is $180 - 50 = 130°$.
3. Check around the point: $2(50) + 2(130) = 360°$.

Problem 4

1. $x + (x + 30) = 90$.
2. $2x = 90 - 30 = 60$, so $x = 30°$.
3. Other angle $30 + 30 = 60°$; check $30 + 60 = 90°$.

Problem 5

1. $3x + 5 + 79 = 180$.
2. $3x = 180 - 5 - 79 = 96$, so $x = 32$.
3. Angle $3(32) + 5 = 101°$; check $101 + 79 = 180°$.

Problem 6

1. Vertical angles are equal: $2x + 10 = 44$.
2. $x = (44 - 10)/2 = 17$.
3. Check that $2(17) + 10 = 44°$, equal to the opposite angle.

Problem 7

1. Write angles $2x, 3x$; complementary gives $2x + 3x = 90$.
2. $5x = 90$ gives $x = 18$, so angles $2(18) = 36$ and $3(18) = 54$ degrees.
3. Check $36 + 54 = 90°$ and divide both terms of $36 : 54$ by 18 to recover $2 : 3$.

Problem 8

1. Supplementary angles sum to $180°$: $3x + 10 + 5x + 10 = 180$.
2. $8x = 160$, so $x = 20$.
3. Substitute: $3(20) + 10 = 70$ and $5(20) + 10 = 110$ degrees. Check $70 + 110 = 180°$.

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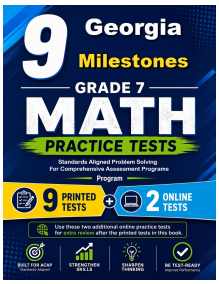

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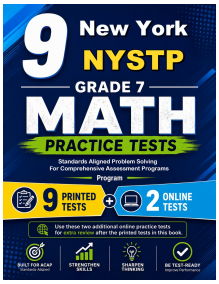

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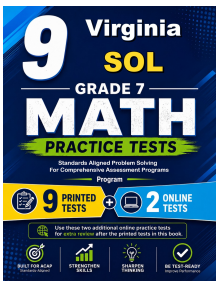

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