Angle Relationships

Models and mappings

Name _____ **Date** _____ **Score** _____ / 10

QUICK REVIEW

Complementary angles sum to 90°; supplementary angles sum to 180°. Vertical angles, formed by two intersecting lines, are equal. A linear pair is adjacent and supplementary. Angles around one point sum to 360°. Adjacent angles need not be equal or supplementary unless an extra condition is given. Translate the stated relationship into an equation, then check the resulting angle measures.

Worked example

Two complementary angles are $(2x+5)^\circ$ and $(x+10)^\circ$. Find both.

1. Complementary means $(2x+5)+(x+10)=90$, so $3x+15=90$.
2. Solve $3x=75$ to obtain $x=25$. The angles are $2(25)+5=55^\circ$ and $25+10=35^\circ$.
3. The check $55+35=90$ confirms the complement relationship; neither angle is the variable value 25.
Answer: $55^\circ, 35^\circ$

Practice Problems

Show your thinking.

1. Find the complement of 34°.

2. Find the supplement of 127°.

3. Two lines intersect. An angle is 68°. Find its vertical angle and one adjacent angle.

4. Vertical angles are $(4x-7)^\circ$ and 65°. Find x.

5. A linear pair measures $(2x+10)^\circ$ and $(3x+20)^\circ$. Find x.

6. Three nonoverlapping angles fill a right angle: $25^\circ, 38^\circ, x^\circ$. Find x.

7. Angles of $95^\circ, 120^\circ, 80^\circ, x^\circ$ fill one turn. Find x.

8. An angle measures 41°. Find the difference between its supplement and complement.

9. Adjacent angles fill a 140° angle. One part is 57°. Find the other part.

10. An angle is twice its complement. Find both angles.

Answer Key

1. 56°
2. 53°
3. $68^\circ, 112^\circ$
4. $x = 18$
5. $x = 30$
6. $x = 27$
7. $x = 65$
8. 90°
9. 83°
10. $60^\circ, 30^\circ$

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Complementary angles total 90°, giving $34 + c = 90$.
2. Subtract: $c = 90 - 34 = 56$ degrees.
3. The check $34 + 56 = 90$ verifies the result. The complement is acute because the given angle is positive and acute.

Problem 2

1. Supplementary angles total 180°, giving $127 + s = 180$.
2. The missing measure is $s = 180 - 127 = 53$ degrees.
3. The check $127 + 53 = 180$ verifies a supplementary pair. A supplement is not found by subtracting from 90.

Problem 3

1. The vertical angle equals the given angle, so its measure is 68°.
2. An adjacent angle forms a linear pair: $180 - 68 = 112$ degrees.
3. The four angles are $68, 112, 68, 112$ degrees, totaling 360° around the intersection.

Problem 4

1. Vertical angles are equal, so $4x - 7 = 65$.
2. Add 7 and divide by 4: $4x = 72$, hence $x = 18$.
3. The substitution $4(18) - 7 = 65$ degrees matches the opposite angle and confirms the value.

Problem 5

1. The pair lies on a straight line, so $(2x + 10) + (3x + 20) = 180$.
2. Collect terms: $5x + 30 = 180$, hence $5x = 150$ and $x = 30$.
3. The angles are 70° and 110°; $70 + 110 = 180$ checks the linear pair.

Problem 6

1. The two known pieces total $25 + 38 = 63$ degrees.
2. The missing piece is $90 - 63 = 27$ degrees, because the whole angle is right.
3. The check $25 + 38 + 27 = 90$ confirms the partition; using 180 would describe a straight angle instead.

Problem 7

1. The known angles total $95 + 120 + 80 = 295$ degrees.
2. A full turn is 360°, so $x = 360 - 295 = 65$ degrees.
3. The sum $95 + 120 + 80 + 65 = 360$ verifies that the four angles fill the point without a gap.

Problem 8

1. The supplement is $180 - 41 = 139$ degrees.
2. The complement is $90 - 41 = 49$ degrees. Their difference is $139 - 49 = 90$ degrees.
3. The supplement exceeds the complement by 90°; both subtraction calculations used the same original angle 41°.

Problem 9

1. The given whole is 140°, so the partition equation is $57 + x = 140$.
2. Subtract 57: $x = 140 - 57 = 83$ degrees.
3. The check $57 + 83 = 140$ uses the stated whole. Adjacency alone does not make the pair supplementary.

Problem 10

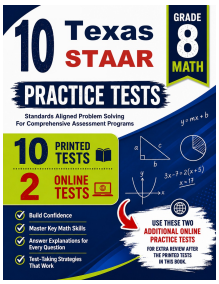
1. Write the smaller complementary angle as x and the larger as $2x$: $x + 2x = 90$.
2. Thus $3x = 90$, so $x = 30$ degrees and $2x = 60$ degrees.
3. The sum $30 + 60 = 90$ and ratio $60/30 = 2$ verify both conditions simultaneously.

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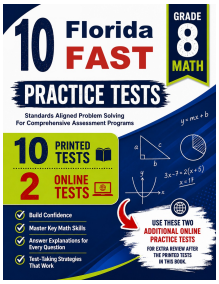
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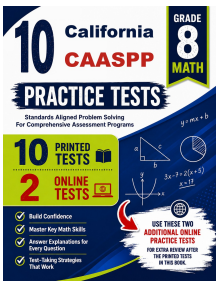
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