Angle Relationships

Applications and design

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. A hinged arm opens to 126° from a straight position. Find the remaining angle to 180°.

2. A camera turns 85°, then 140°, in the same direction. How much more completes one full turn?

3. A right-angle shelf bracket is split into a 32° section and a second section. Find the second.

4. Design two supplementary angles in ratio $2:7$. State both measures.

5. Two crossing beams form one 57° angle. Find the opposite angle and the two neighboring angles.

6. A circular garden is divided into sectors $75^\circ, 85^\circ, 110^\circ$ and one remaining sector. Find the last sector.

7. A machine permits an angle only if its supplement is at least 115°. Does a 68° setting qualify?

8. A fan covers 160° in three adjacent sweeps. Two sweeps are 48° and 55°. Find the third.

9. Design four equal sectors and one 40° sector to fill a circular display. Find each equal sector.

10. A sign requires two complementary cuts differing by 14°. Find both cutting angles.

Answer Key

1. 54°
2. 135°
3. 58°
4. $40^\circ, 140^\circ$
5. 57° opposite; 123° each neighbor.
6. 90°
7. No; its supplement is 112°.
8. 57°
9. 80°
10. $38^\circ, 52^\circ$

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The straight position totals 180°, so $126 + r = 180$.
2. The remaining opening is $r = 180 - 126 = 54$ degrees.
3. The check $126 + 54 = 180$ verifies the straight position. This is a supplement, not a complement of the opening.

Problem 2

1. The camera has turned $85 + 140 = 225$ degrees.
2. One full turn is 360°, leaving $360 - 225 = 135$ degrees.
3. The completed turn checks as $85 + 140 + 135 = 360$; no reversal of direction is included in the problem.

Problem 3

1. The bracket's whole angle is 90°, giving $32 + b = 90$.
2. Subtract 32: $b = 90 - 32 = 58$ degrees.
3. The two sections sum to $32 + 58 = 90$, matching the right-angle requirement for the shelf bracket.

Problem 4

1. The ratio parts total $2 + 7 = 9$. Each part is $180/9 = 20$ degrees.
2. The two angles are $2(20) = 40^\circ$ and $7(20) = 140^\circ$.
3. The checks $40 + 140 = 180$ and $40 : 140 = 2 : 7$ verify that the design meets both requirements.

Problem 5

1. The opposite angle is vertical, so it also measures 57°.
2. Each neighbor forms a linear pair: $180 - 57 = 123$ degrees.
3. The four measures total $57 + 123 + 57 + 123 = 360$, checking the complete arrangement at the crossing.

Problem 6

1. The assigned sectors total $75 + 85 + 110 = 270$ degrees.
2. The remaining sector is $360 - 270 = 90$ degrees.
3. The check $75 + 85 + 110 + 90 = 360$ shows the sectors fill the garden once without overlapping angular portions.

Problem 7

1. The supplement of the setting is $180 - 68 = 112$ degrees.
2. The requirement is $112 \geq 115$, which is false; it misses by $115 - 112 = 3$ degrees.
3. The 68° setting therefore does not qualify. The comparison must use the supplement, not the original setting.

Problem 8

1. The first two sweeps cover $48 + 55 = 103$ degrees.
2. The remaining sweep is $160 - 103 = 57$ degrees.
3. The full coverage checks as $48 + 55 + 57 = 160$. The stated total is not a straight angle or a full turn.

Problem 9

1. The four equal sectors share $360 - 40 = 320$ degrees.
2. Each equal sector is $320/4 = 80$ degrees.
3. The check $4(80) + 40 = 360$ verifies the complete circular design, including the separate 40° sector.

Problem 10

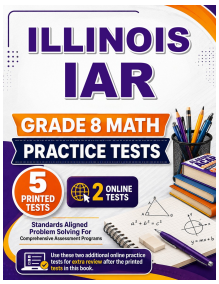
1. Let the smaller cut be x and the larger $x + 14$. Then $x + (x + 14) = 90$.
2. Solve $2x = 76$: $x = 38$, giving the other cut $38 + 14 = 52$ degrees.
3. The checks $38 + 52 = 90$ and $52 - 38 = 14$ show the cuts meet both workshop specifications.

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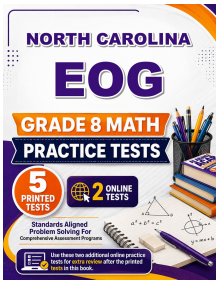
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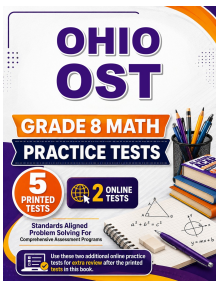
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