

Grade 7 · Angle Relationships · Worksheet

Answer Key

Common Core 7.G.B.5 · mathovore.fr

This answer key gives a complete worked solution for each of the 20 angle relationship problems. Every solution names the angle relationship, shows the equation, and checks the result by adding the angle measures. Use it after finishing the worksheet to find and understand any mistakes.

Grade 7 Common Core: 7.G.B.5

Problem 1: Complementary angles

Complementary angles add up to 90° , so subtract from 90° .

- a. $90 - 22 = 68$: 68°
- b. $90 - 65 = 25$: 25°
- c. $90 - 81 = 9$: 9°

Problem 2: Supplementary angles

Supplementary angles add up to 180° , so subtract from 180° .

- a. $180 - 130 = 50$: 50°
- b. $180 - 77 = 103$: 103°
- c. $180 - 164 = 16$: 16°

Problem 3: Find the missing angle

- a. $90 - 53 = 37$: 37°
- b. $180 - 146 = 34$: 34°
- c. The angle x satisfies $x + x = 180$, so $2x = 180$ and $x = 90$: 90° . Check: $90 + 90 = 180$.

Problem 4: Complementary or supplementary

Add each pair. A sum of 90° means complementary. A sum of 180° means supplementary.

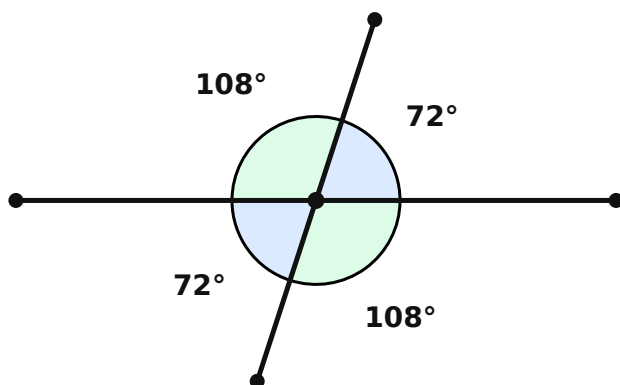
- a. $40 + 50 = 90$: **complementary**
- b. $110 + 70 = 180$: **supplementary**
- c. $120 + 50 = 170$: **neither**

d. $25+155=180$: **supplementary**

Problem 5: Vertical angles

Angle b is vertical to the 72° angle, so $b=72$. Angle a is supplementary to 72° : $a=180-72=108$. Angle c is vertical to a , so $c=108$.

$$a=108^\circ, b=72^\circ, c=108^\circ$$



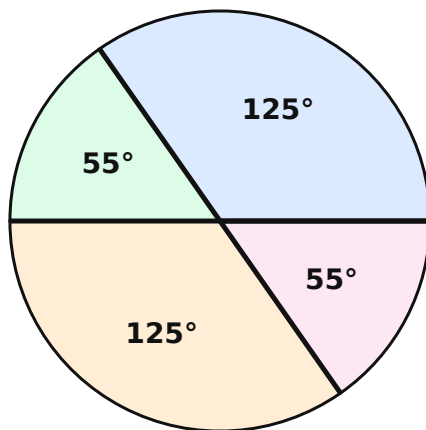
Solved: opposite angles are equal.

Problem 6: Crossing lines

Angle a is next to the 125° angle on a straight line, so $a=180-125=55$.

Angle b is vertical to the 125° angle, so $b=125$.

Angle c is vertical to a , so $c=55$. Check: $125+55+125+55=360$.



Vertical angles are equal; neighbors add to 180° .

$$a=55^\circ, b=125^\circ, c=55^\circ$$

Problem 7: Angles on a line

The angles are supplementary, so $115 + x = 180$.

$$x = 180 - 115 = 65. \text{ Check: } 115 + 65 = 180.$$

$$x = 65^\circ$$

Problem 8: Angles along a line

Angles on a straight line add up to 180° : $52 + 81 + x = 180$.

$$133 + x = 180, \text{ so } x = 180 - 133 = 47.$$

$$\text{Check: } 52 + 81 + 47 = 180.$$

$$x = 47^\circ$$

Problem 9: Angles in a right angle

The angles are complementary, so $29 + x = 90$.

$$x = 90 - 29 = 61. \text{ Check: } 29 + 61 = 90.$$

$$x = 61^\circ$$

Problem 10: Splitting a right angle

The three angles make a right angle, so they add up to 90° : $18 + x + 49 = 90$.

$$67 + x = 90, \text{ so } x = 90 - 67 = 23.$$

$$\text{Check: } 18 + 23 + 49 = 90.$$

$$x = 23^\circ$$

Problem 11: Complementary equation

$$\text{Equation: } x + (2x + 9) = 90.$$

$$3x + 9 = 90, \text{ so } 3x = 81 \text{ and } x = 27.$$

$$\text{The second angle is } 2(27) + 9 = 63. \text{ Check: } 27 + 63 = 90.$$

$$x = 27; \text{ the angles are } 27^\circ \text{ and } 63^\circ.$$

Problem 12: Supplementary equation

Equation: $x + (x + 36) = 180$.

$2x + 36 = 180$, so $2x = 144$ and $x = 72$.

The second angle is $72 + 36 = 108$. Check: $72 + 108 = 180$.

$x = 72$; the angles are 72° and 108° .

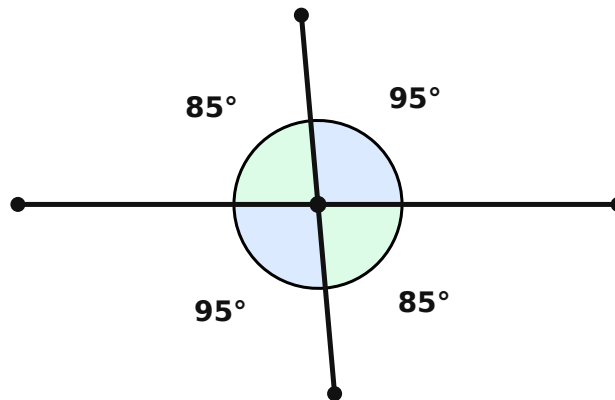
Problem 13: Vertical angles equation

Vertical angles are equal: $4x + 7 = 95$.

$4x = 88$, so $x = 22$. Check: $4(22) + 7 = 95$.

Angle y is supplementary to 95° : $y = 180 - 95 = 85$.

$x = 22$, $y = 85^\circ$



Solved: opposite angles match.

Problem 14: Vertical angles with x

(a) Vertical angles are equal: $3x + 8 = 5x - 14$. Subtract $3x$: $8 = 2x - 14$. Add 14: $22 = 2x$, so $x = 11$.

(b) $3(11) + 8 = 41$ and $5(11) - 14 = 41$.

(c) An angle next to a marked angle is supplementary to it: $180 - 41 = 139$.

(a) $x = 11$. **(b)** 41° each. **(c)** 139° .

Problem 15: Supplementary word problem

Let x be the smaller angle. The larger is $3x + 20$.

$x + (3x + 20) = 180$, so $4x + 20 = 180$ and $4x = 160$, giving $x = 40$.

The larger angle is $3(40) + 20 = 140$. Check: $40 + 140 = 180$.

The angles are 40° and 140° .

Problem 16: Complementary word problem

Let x be the smaller angle. The other angle is $2x - 12$.

$x + (2x - 12) = 90$, so $3x - 12 = 90$ and $3x = 102$, giving $x = 34$.

The other angle is $2(34) - 12 = 56$. Check: $34 + 56 = 90$.

The angles are 34° and 56° .

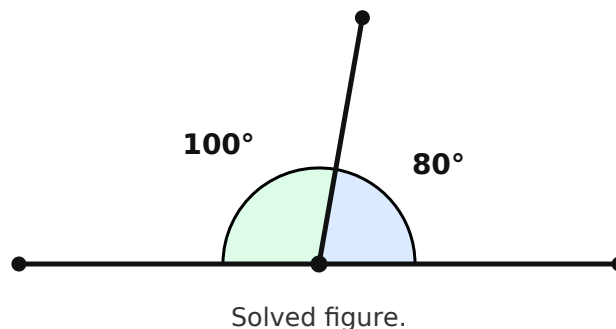
Problem 17: Adjacent angles on a line

Adjacent angles on a line are supplementary: $(2x + 10) + (3x - 5) = 180$.

$5x + 5 = 180$, so $5x = 175$ and $x = 35$.

$2(35) + 10 = 80$ and $3(35) - 5 = 100$. Check: $80 + 100 = 180$.

$x = 35$; the angles are 80° and 100° .



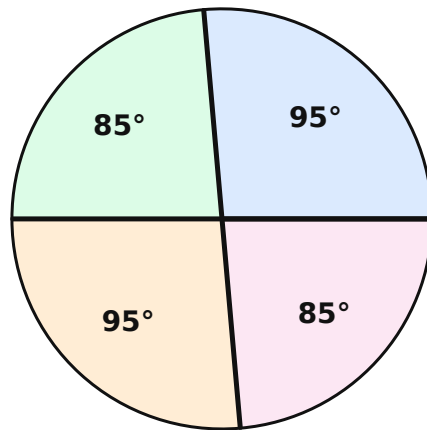
Problem 18: Street corner

Neighboring angles formed by two crossing lines are supplementary: $(3x + 5) + (2x + 25) = 180$.

$5x + 30 = 180$, so $5x = 150$ and $x = 30$.

$3(30) + 5 = 95$ and $2(30) + 25 = 85$. Check: $95 + 85 = 180$.

The other two angles are vertical to these, so they measure 95° and 85° .



All four angles at the corner.

$x = 30$; the angles are 95° , 85° , 95° , 85° .

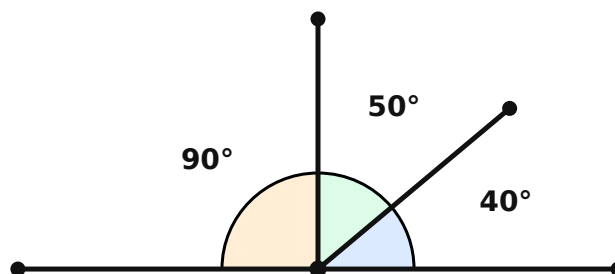
Problem 19: Three angles on a line

The three angles make a straight angle: $x + (x + 10) + (2x + 10) = 180$.

$4x + 20 = 180$, so $4x = 160$ and $x = 40$.

The angles are 40, $40 + 10 = 50$, and $2(40) + 10 = 90$. Check: $40 + 50 + 90 = 180$.

40° , 50° , and 90°



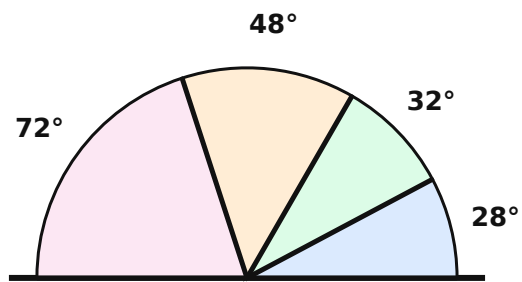
Solved figure.

Problem 20: Four angles on a line

The angles make a straight angle: $x + (x + 4) + (2x - 8) + (2x + 16) = 180$.

Combine like terms: $6x + 12 = 180$, so $6x = 168$ and $x = 28$.

The angles are 28, $28 + 4 = 32$, $2(28) - 8 = 48$, and $2(28) + 16 = 72$. Check: $28 + 32 + 48 + 72 = 180$.



The four angles add up to 180° .

$x = 28$; the angles are 28° , 32° , 48° , and 72° .