

Geometry · Points, Lines, Planes, Segments and Angles · Worksheet Answer Key

Common Core G-CO.A.1 · mathovore.fr

Each solution shows the postulate or definition used, the equation, the algebra and a check. Compare every step with your own work, not only the final answer, and redraw any figure that did not match.

GeometryCommon Core: G-CO.A.1

Problem 1: Naming points and rays

- a. P, Q and R lie on one line: **P, Q, R**.
- b. S is off the line, so S with any two of the others works: **P, Q, S**.
- c. Endpoint first: **ray QR**.

Problem 2: Defining a segment

A **line segment** is the part of a line that consists of two endpoints and all the points of the line between them.

Problem 3: Segment addition: find the whole

Segment Addition Postulate: $AC = AB + BC = 7 + 12 = 19$. **AC = 19 in.**

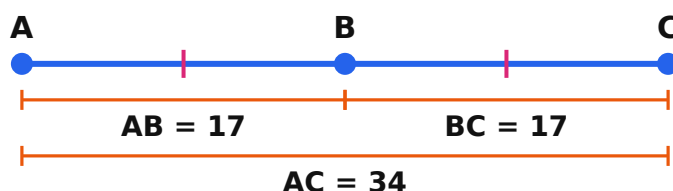
Problem 4: Segment addition: find a part

Subtract: $BC = AC - AB = 31 - 18 = 13$. **BC = 13 cm**. Check: $18 + 13 = 31$.

Problem 5: Segment addition with algebra

$(3x+2)+(2x+7)=34$, so $5x+9=34$ and $5x=25$. **x = 5**.

$AB = 3(5)+2=17$ and $BC = 2(5)+7=17$. **AB = 17 and BC = 17**. Check: $17+17=34$. B is the midpoint of $\overline{AC}$.



With $x = 5$, AB and BC are equal.

Problem 6: Midpoint with algebra

A midpoint makes the halves equal: $4x-3=2x+9$. Then $2x=12$ and $x = 6$.

$PM = 4(6)-3=21$ and $MQ = 2(6)+9=21$. $PQ = 21+21=42$. **PQ = 42.**

Problem 7: Midpoint on a number line

$AB = |10 - (-4)| = 14$. The midpoint is halfway: $\frac{-4+10}{2} = \frac{6}{2} = 3$. **AB = 14; midpoint at 3.** Check: $3 - (-4) = 7$ and $10 - 3 = 7$.

Problem 8: Angle addition: find the whole

$m\angle ABC = m\angle ABD + m\angle DBC = 38^\circ + 47^\circ = 85^\circ$. **85° .**

Problem 9: Angle addition: find a part

$m\angle BOC = 112^\circ - 65^\circ = 47^\circ$. **47° .** Check: $65 + 47 = 112$.

Problem 10: Angle addition with algebra

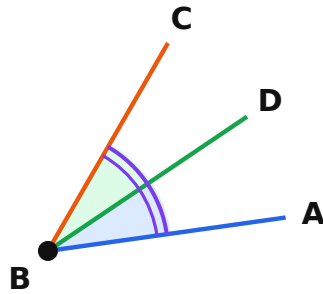
$(4x+8) + (2x+4) = 96$, so $6x+12=96$ and $6x=84$. **$x = 14$.**

$m\angle PQS = 4(14)+8=64^\circ$ and $m\angle SQR = 2(14)+4=32^\circ$. Check: $64+32=96$. **64° and 32° .**

Problem 11: Angle bisector

A bisector makes two equal angles: $3x+5=5x-9$. Then $14=2x$ and $x = 7$.

$m\angle ABD = 3(7)+5=26^\circ$ and $m\angle DBC = 5(7)-9=26^\circ$. $m\angle ABC = 26+26=52^\circ$. **52° .**



Both parts measure 26° .

Problem 12: Complement of an angle

$$90 - 63 = 27. \mathbf{27^\circ}.$$

Problem 13: Supplement of an angle

$$180 - 127 = 53. \mathbf{53^\circ}.$$

Problem 14: Complementary angles with algebra

$$(2x+3)+(3x+7)=90, \text{ so } 5x+10=90 \text{ and } 5x=80. \mathbf{x = 16}.$$

The angles are $2(16)+3=35^\circ$ and $3(16)+7=55^\circ$. Check: $35+55=90$. **35° and 55° .**

Problem 15: Supplementary angles with algebra

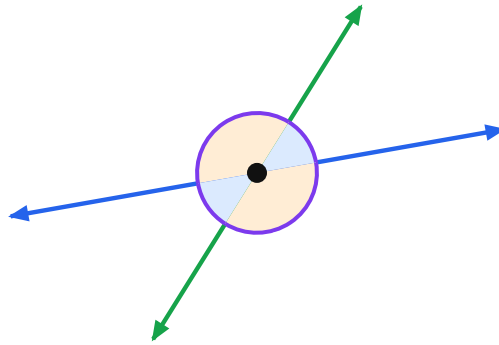
$$(4x-10)+(6x+20)=180, \text{ so } 10x+10=180 \text{ and } 10x=170. \mathbf{x = 17}.$$

The angles are $4(17)-10=58^\circ$ and $6(17)+20=122^\circ$. Check: $58+122=180$. **58° and 122° .**

Problem 16: Angles at an intersection

Angle a forms a linear pair with the 48° angle: $a=180-48=132^\circ$.

Angle b is vertical to the 48° angle, so $b=48^\circ$. Angle c is vertical to a, so $c=132^\circ$. **$a = 132^\circ$, $b = 48^\circ$, $c = 132^\circ$.**

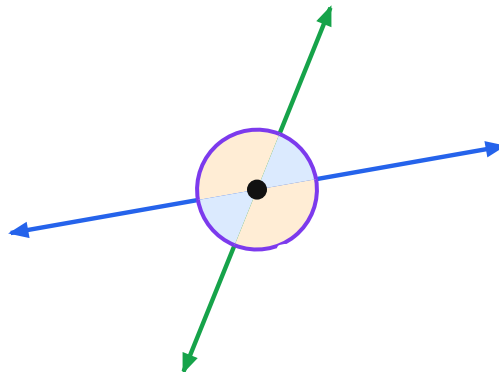


Opposite angles are equal.

Problem 17: Vertical angles with algebra

Vertical angles are congruent: $7x - 12 = 4x + 18$. Then $3x = 30$ and $x = 10$.

$m\angle 1 = 7(10) - 12 = 58^\circ$ and $m\angle 3 = 4(10) + 18 = 58^\circ$. Angle 2 forms a linear pair with angle 1:
 $m\angle 2 = 180 - 58 = 122^\circ$. **58° and 122° .**



Angles 1 and 3 measure 58° ; angles 2 and 4 measure 122° .

Problem 18: Perpendicular lines

Perpendicular lines form right angles, so $3x + 6 = 90$. Then $3x = 84$ and $x = 28$. Check:
 $3(28) + 6 = 90$.

Problem 19: Points and a circle

A circle is the set of all points in the plane at the same distance from the center. Only D is 6 cm from C. E is closer than 6 cm (inside) and F is farther (outside). **Only point D** is on the circle.

Problem 20: Road trip on a straight highway

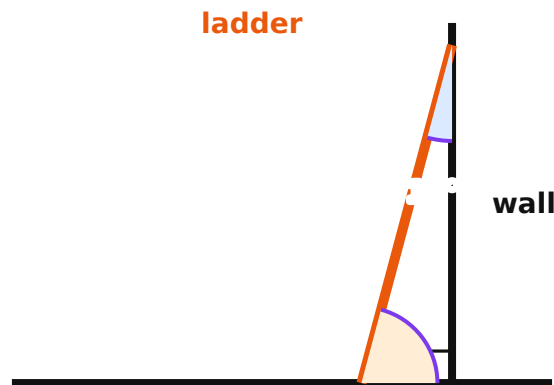
Distance: $74 - 18 = 56$ miles. Half of that is $56 \div 2 = 28$ miles.

Rest stop: $18 + 28 = 46$. **56 miles apart; mile marker 46.** Check: $74 - 46 = 28$.

Problem 21: Ladder against a wall

The wall and the ground are perpendicular, so the ladder splits a right angle into two complementary angles.

$90 - 75 = 15$. **15° .**



The two angles add to 90° .

Problem 22: Laptop lid

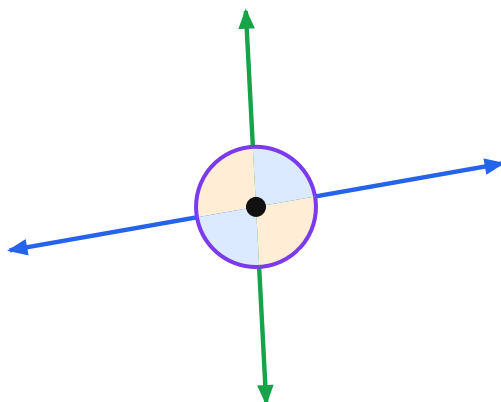
The new angle plus the 40° rotation makes the original angle (Angle Addition Postulate):
 $115 - 40 = 75$. **75° .**

Problem 23: Four angles at an intersection

A linear pair is supplementary: $(2x + 15) + (3x - 5) = 180$, so $5x + 10 = 180$ and $5x = 170$. **$x = 34$.**

$m\angle 1 = 2(34) + 15 = 83^\circ$ and $m\angle 2 = 3(34) - 5 = 97^\circ$. Angle 3 is vertical to angle 1 and angle 4 is vertical to angle 2.

83° , 97° , 83° , 97° . Check: $83 + 97 = 180$.



The four angles around the point add to 360° .