

Geometry - Points, Lines, Segments and Angles - Answer Key

Common Core G-CO.A.1 · maths-pdf.fr/en/

Use this answer key to check the 20 problems on segments and angles. Every solution shows the formula or theorem used, each step of the work, and the final answer in bold. If an answer differs from yours, compare the steps line by line to find where the work changed.

Geometry · Common Core State Standards: **G-CO.A.1**

Exercise 1 - Length on a number line

Length is the absolute value of the difference of the coordinates.

$$AB = |9 - (-3)| = |12| = 12$$

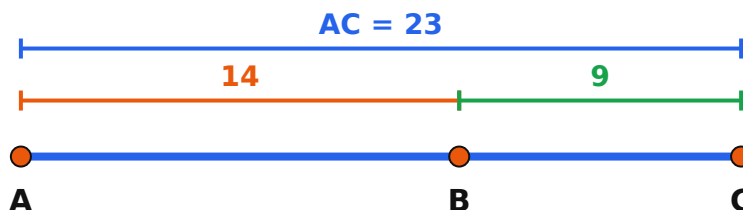
$$\mathbf{AB = 12}$$

Exercise 2 - Midpoint on a number line

$$\frac{4+18}{2} = \frac{22}{2} = 11$$

$$\mathbf{11}$$

Exercise 3 - Segment addition



$$AB + BC = AC.$$

B is between A and C, so use the Segment Addition Postulate.

$$AC = AB + BC = 14 + 9 = 23$$

$$\mathbf{AC = 23}$$

Exercise 4 - Segment with a variable

$$(3x-2)+(x+8)=34$$

$$4x+6=34$$

$$4x=28$$

$$x=7$$

$$AB=3(7)-2=19 \text{ and } BC=7+8=15. \text{ Check: } 19 + 15 = 34.$$

$$\mathbf{x = 7, AB = 19, BC = 15}$$

Exercise 5 - Midpoint with a variable

A midpoint makes the two parts equal.

$$2x+3=5x-9$$

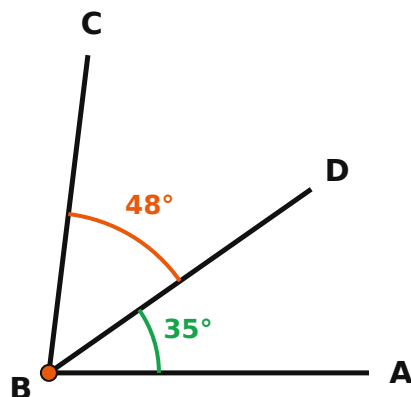
$$12=3x$$

$$x=4$$

$$AM=2(4)+3=11, \text{ so } AB=2\cdot 11=22.$$

$$\mathbf{x = 4, AB = 22}$$

Exercise 6 - Angle addition



$$35^\circ + 48^\circ = 83^\circ.$$

Ray BD is inside the angle, so use the Angle Addition Postulate.

$$m\angle ABC = 35^\circ + 48^\circ = 83^\circ$$

$$\mathbf{83^\circ}$$

Exercise 7 - Angle bisector

A bisector splits the angle into two equal parts.

$$m\angle ABD = 76^\circ \div 2 = 38^\circ$$

$$\mathbf{38^\circ}$$

Exercise 8 - Bisector with a variable

The two angles are equal.

$$4x+6=7x-24$$

$$30=3x$$

$$x=10$$

$$4(10)+6=46, \text{ so each half is } 46^\circ.$$

$$m\angle ABC = 2 \cdot 46^\circ = 92^\circ$$

$$\mathbf{x = 10, m\angle ABC = 92^\circ}$$

Exercise 9 - Complement and supplement

$$90^\circ - 37^\circ = 53^\circ \text{ (complement)}$$

$$180^\circ - 37^\circ = 143^\circ \text{ (supplement)}$$

$$\mathbf{\text{Complement } 53^\circ, \text{ supplement } 143^\circ}$$

Exercise 10 - Linear pair

A linear pair is supplementary.

$$(3x+10)+(5x-6)=180$$

$$8x+4=180$$

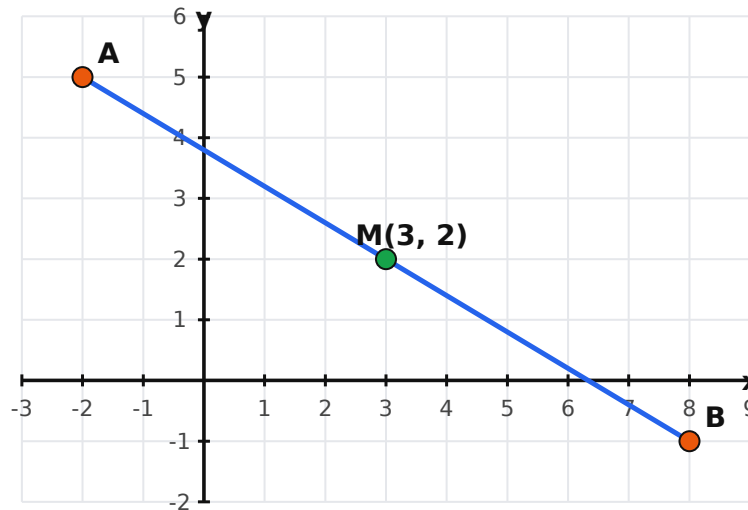
$$8x=176$$

$$x=22$$

$$3(22)+10=76 \text{ and } 5(22)-6=104. \text{ Check: } 76 + 104 = 180.$$

$$x = 22; 76^\circ \text{ and } 104^\circ$$

Exercise 11 - Midpoint in the plane



The midpoint is M(3, 2).

$$\left(\frac{-2+8}{2}, \frac{5+(-1)}{2} \right) = \left(\frac{6}{2}, \frac{4}{2} \right) = (3, 2)$$

M(3, 2)

Exercise 12 - Find an endpoint

$$\frac{-3+x}{2} = 1 \text{ gives } x = 5.$$

$$\frac{4+y}{2} = -2 \text{ gives } y = -8.$$

B(5, -8)

Exercise 13 - Distance in the plane

$$\sqrt{(7-1)^2 + (10-2)^2} = \sqrt{36+64} = \sqrt{100} = 10$$

10 units

Exercise 14 - Perpendicular lines

Perpendicular lines form right angles.

$$2x + 10 = 90$$

$$2x = 80$$

$$x = 40$$

$$\mathbf{x = 40}$$

Exercise 15 - Points on a circle

$$OP = \sqrt{6^2 + 8^2} = \sqrt{100} = 10$$

$$OQ = \sqrt{(-10)^2 + 0^2} = 10$$

Q is also 10 units from the center, so it lies on the circle.

Radius 10; yes, Q is on the circle

Exercise 16 - Trail rest stop

$$\frac{3.2 + 11.6}{2} = \frac{14.8}{2} = 7.4$$

$11.6 - 3.2 = 8.4$, and half of 8.4 is 4.2.

Mile 7.4, which is 4.2 miles from each end

Exercise 17 - Fence line

$$BC = x \text{ and } AB = 2x.$$

$$2x + x = 45$$

$$3x = 45$$

$$x = 15$$

$$\mathbf{BC = 15 \text{ ft and } AB = 30 \text{ ft}}$$

Exercise 18 - Garden path

The bisector makes each half $120^\circ \div 2 = 60^\circ$.

$$5x + 10 = 60$$

$$5x = 50$$

$$x = 10$$

$$\mathbf{x = 10}$$

Exercise 19 - Angle between clock hands

At 4:00 the hands are 4 hours apart, and each hour is $360^\circ \div 12 = 30^\circ$, so $4 \cdot 30^\circ = 120^\circ$.

At 2:30 the minute hand is on the 6, which is 180° from the 12. The hour hand moved halfway from 2 to 3: $2.5 \cdot 30^\circ = 75^\circ$.

$$180^\circ - 75^\circ = 105^\circ$$

2:30 gives 105° ; 4:00 gives 120°

Exercise 20 - Meeting halfway

$$\left(\frac{2+10}{2}, \frac{1+7}{2}\right) = (6, 4)$$

Total distance: $\sqrt{8^2 + 6^2} = \sqrt{100} = 10$ miles.

Each person travels half of 10 miles.

Meeting point (6, 4); Liam travels 5 miles