GRADE 7 ACCELERATED · UNIT 6 · LESSON 6

# Real-World Coordinate-Plane Problems; Perimeter

**MA.8.GR.1.2**

I can find the perimeter of a figure on the coordinate plane, and a straight-line distance on a map.

# Warm-Up

1. How far apart are $(-2, -3)$ and $(4, 5)$?
2. Legs of 2 m and 7 m. The hypotenuse, to the nearest tenth?
3. A map's scale is 1 in : 30 mi. Towns 2.5 in apart are how far?
4. The rectangle $(-3, 2)$, $(4, 2)$, $(4, -1)$, $(-3, -1)$: its perimeter?

# Warm-Up

1. How far apart are $(-2, -3)$ and $(4, 5)$? **10 units**
2. Legs of 2 m and 7 m. The hypotenuse, to the nearest tenth?

   **$\sqrt{53} \approx 7.3$ m**
3. A map's scale is 1 in : 30 mi. Towns 2.5 in apart are how far?

   **75 mi**
4. The rectangle $(-3, 2)$, $(4, 2)$, $(4, -1)$, $(-3, -1)$: its perimeter?

   **20 units**

# Vocabulary

**perimeter**

the distance around a figure: the sum of all its sides

**height of a triangle**

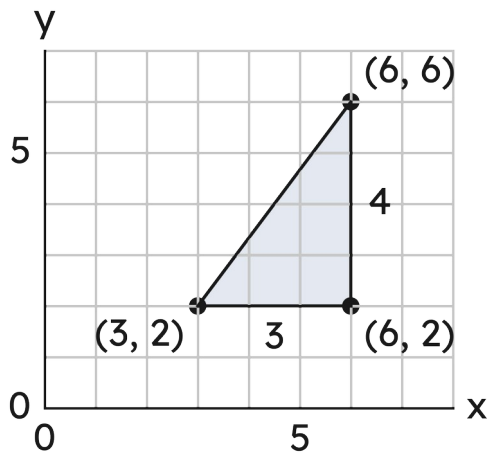
the segment from a corner straight to the opposite side, meeting it at a right angle

**straight-line distance**

the length of the one segment between two points — on a map, straight across, not along the streets

# Notes

## I. Perimeter: every side — a slanted one by its triangle

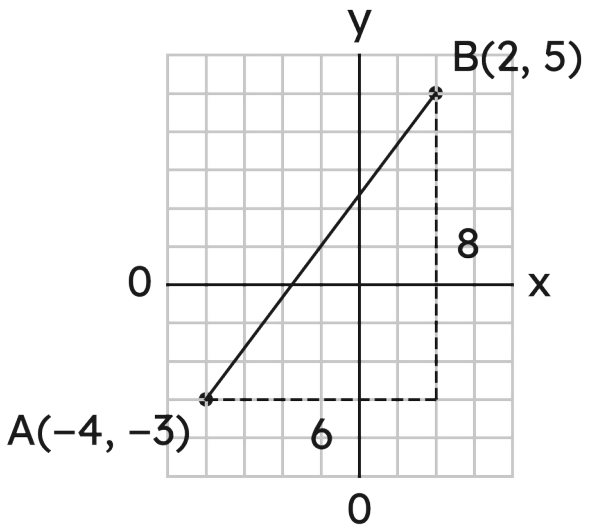



slanted side: $c^2 = 3^2 + 4^2 = 25, \quad c = 5$

$$P = 3 + 4 + 5 = 12$$

# Notes

## II. Along the streets, or straight

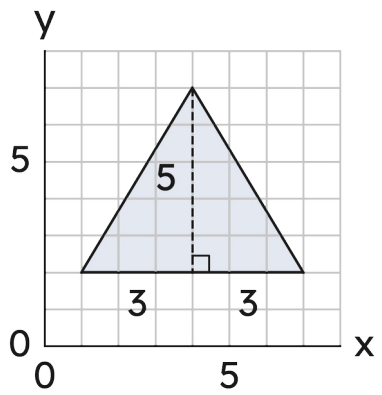



streets: $6 + 8 = 14$ blocks

straight: $c^2 = 36 + 64 = 100$, $c = 10$ blocks

# Notes

## III. No right angle: split it — and round once, at the end



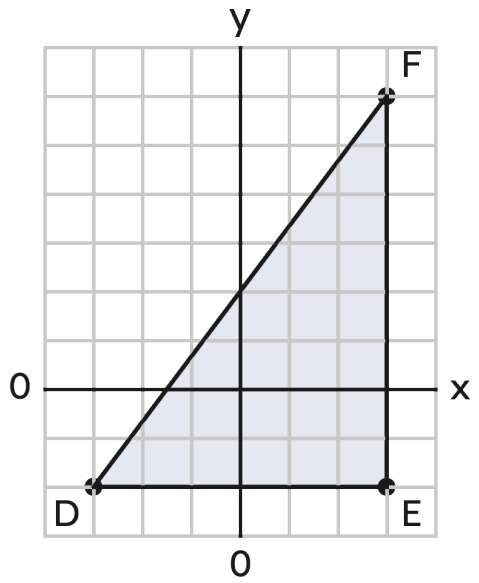

each slanted side: $c^2 = 3^2 + 5^2 = 34$, $c = \sqrt{34} \approx 5.831$

$$P \approx 6 + 5.831 + 5.831 = 17.662 \approx 17.7$$

**Round once, at the end: 6 + 5.8 + 5.8 = 17.6 is short.**

# Example 1

Triangle DEF has corners $D(-3, -2)$, $E(3, -2)$ and $F(3, 6)$.




**Find its perimeter.**

# Example 1

$3 - (-3) = 6, \quad 6 - (-2) = 8$

$c^2 = 36 + 64 = 100, \quad c = 10$

$P = 6 + 8 + 10 = 24$

**Answer: 24 units**

# Your Turn

Find the perimeter of the triangle with corners

$(-5, -7)$, $(4, -7)$ and $(4, 5)$.

# Your Turn

Find the perimeter of the triangle with corners

$(-5, -7)$, $(4, -7)$ and $(4, 5)$.

across $4 - (-5) = 9$, up $5 - (-7) = 12$

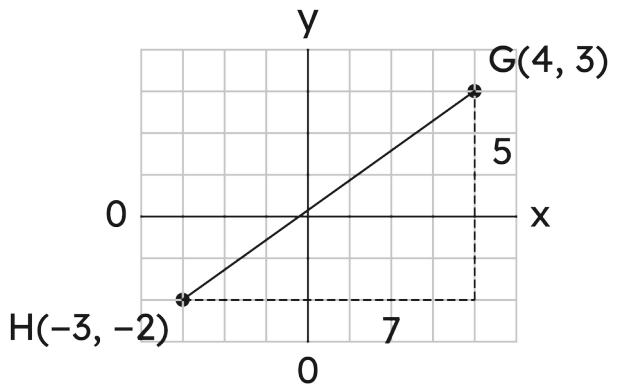
$c^2 = 81 + 144 = 225$, $c = 15$

$P = 9 + 12 + 15 = 36$

**Answer: 36 units**

# Example 2

On a town map in blocks, Ana's home H is at $(-3, -2)$ and the gym G at $(4, 3)$.




**How far along the streets? In a straight line, to the nearest tenth?**

# Example 2

$4 - (-3) = 7, \quad 3 - (-2) = 5$

$7 + 5 = 12$

$c^2 = 49 + 25 = 74, \quad c = \sqrt{74} \approx 8.6$

**Answer: 12 blocks along the streets; about 8.6 blocks straight**

# Your Turn

On a town map in blocks, Ben's home is at $(-5, 4)$ and the park at $(-2, -4)$. How far is it along the streets?

In a straight line, to the nearest tenth?

# Your Turn

On a town map in blocks, Ben's home is at $(-5, 4)$

and the park at $(-2, -4)$. How far is it along the streets?

In a straight line, to the nearest tenth?

across $3$, down $8$: streets $3 + 8 = 11$

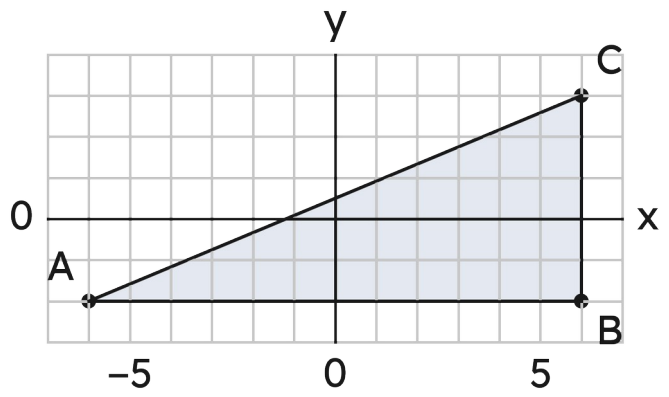
straight: $c^2 = 9 + 64 = 73$, $c = \sqrt{73} \approx 8.5$

**Answer: 11 blocks along the streets; about 8.5 blocks straight**

# Whiteboards · Question 1 of 9

Triangle ABC has corners $A(-6, -2)$, $B(6, -2)$ and $C(6, 3)$.

**Find its perimeter.**

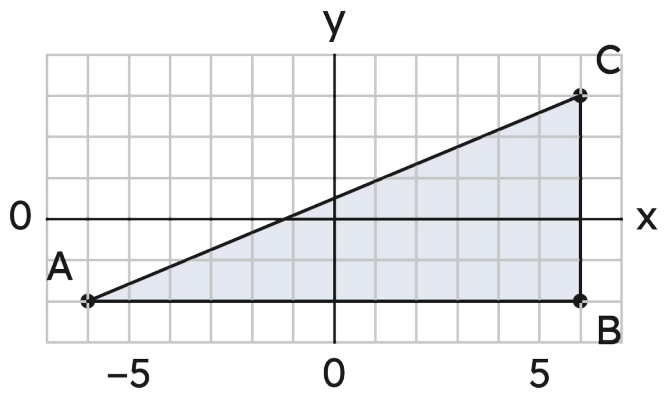



**Answer it.**

# Whiteboards · Question 1 of 9

Triangle ABC has corners $A(-6, -2)$, $B(6, -2)$ and $C(6, 3)$.

**Find its perimeter.**




$6 - (-6) = 12$, $3 - (-2) = 5$

$c^2 = 144 + 25 = 169$, $c = 13$

$P = 12 + 5 + 13 = 30$

**Answer: 30 units**

# Whiteboards · Question 2 of 9

A triangle has corners $(-3, -4)$, $(1, -4)$ and $(1, 5)$.

**Find its perimeter, to the nearest tenth.**

**Answer it.**

# Whiteboards · Question 2 of 9

A triangle has corners $(-3, -4)$, $(1, -4)$ and $(1, 5)$.

**Find its perimeter, to the nearest tenth.**

$$1 - (-3) = 4, \quad 5 - (-4) = 9$$

$$c^2 = 16 + 81 = 97, \quad c = \sqrt{97}$$

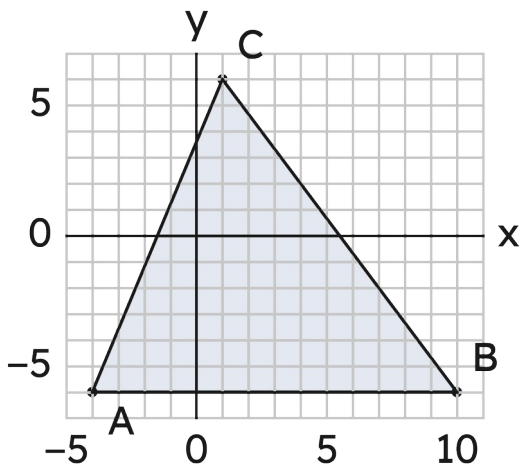
$$P = 4 + 9 + \sqrt{97} \approx 22.8$$

**Answer: 22.8 units**

# Whiteboards · Question 3 of 9

Triangle $A(-4, -6)$, $B(10, -6)$, $C(1, 6)$ has no right angle.

**Find its perimeter.**

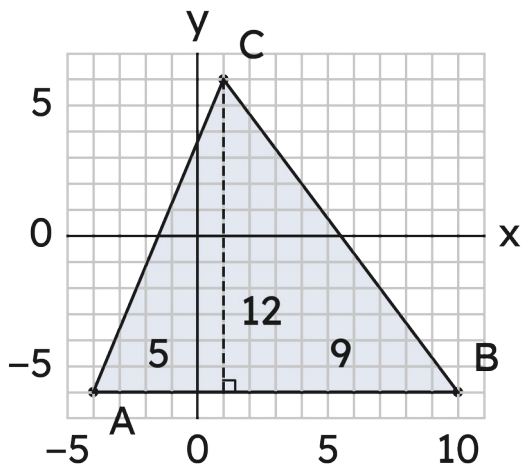



**Answer it.**

# Whiteboards · Question 3 of 9

Triangle $A(-4, -6)$, $B(10, -6)$, $C(1, 6)$ has no right angle.

**Find its perimeter.**




the height from C to $(1, -6)$: $6 - (-6) = 12$

AC: $c^2 = 5^2 + 12^2 = 169$, $c = 13$

BC: $c^2 = 9^2 + 12^2 = 225$, $c = 15$

$P = 14 + 13 + 15 = 42$

**Answer: 42 units**

# Whiteboards · Question 4 of 9

**What is the perimeter of the triangle with corners $(-2, 3)$, $(2, 3)$ and $(2, -4)$, to the nearest tenth?**

**A.** 11

**B.** 22

**C.** 76

**D.** 19.1

**Answer it.**

# Whiteboards · Question 4 of 9

**What is the perimeter of the triangle with corners $(-2, 3)$, $(2, 3)$ and $(2, -4)$, to the nearest tenth?**

4 and 7 on grid lines

$c^2 = 16 + 49 = 65, \quad c = \sqrt{65}$

$P = 4 + 7 + \sqrt{65} \approx 19.1$

**Answer: D — 19.1 units**

# Whiteboards · Question 5 of 9

On a map in blocks, the library is at $(-7, -1)$

and the pool at $(5, 4)$.

**How much shorter is the straight line than the streets?**

**Answer it.**

# Whiteboards · Question 5 of 9

On a map in blocks, the library is at $(-7, -1)$

and the pool at $(5, 4)$.

**How much shorter is the straight line than the streets?**

streets: $12 + 5 = 17$

straight: $c^2 = 144 + 25 = 169$, $c = 13$

$17 - 13 = 4$

**Answer: 4 blocks shorter**

# Whiteboards · Question 6 of 9

**How long is a diagonal of the rectangle with corners $(-3, -4)$, $(6, -4)$, $(6, 8)$ and $(-3, 8)$?**

**A.** 15

**B.** 21

**C.** 42

**D.** 10

**Answer it.**

# Whiteboards · Question 6 of 9

**How long is a diagonal of the rectangle with corners $(-3, -4)$, $(6, -4)$, $(6, 8)$ and $(-3, 8)$?**

sides $6 - (-3) = 9$ and $8 - (-4) = 12$

$c^2 = 81 + 144 = 225$, $c = 15$

**Answer: A — 15 units**

# Whiteboards · Question 7 of 9

On a park map in meters, the fountain is at $(-5, 2)$ and the gate at $(4, -3)$.

**How far is it straight across, to the nearest tenth?**

**Answer it.**

# Whiteboards · Question 7 of 9

On a park map in meters, the fountain is at $(-5, 2)$ and the gate at $(4, -3)$.

**How far is it straight across, to the nearest tenth?**

across $4 - (-5) = 9$, down $2 - (-3) = 5$

$c^2 = 81 + 25 = 106$, $c = \sqrt{106} \approx 10.3$

**Answer: $\sqrt{106} \approx 10.3$ m**

# Whiteboards · Question 8 of 9

On a trail map in miles, the camp is at $(-3, -6)$,

the lake at $(2, 6)$ and the trailhead at $(-1, 0)$.

**How far is the camp from the lake, in a straight line?**

**Answer it.**

# Whiteboards · Question 8 of 9

On a trail map in miles, the camp is at $(-3, -6)$,

the lake at $(2, 6)$ and the trailhead at $(-1, 0)$.

**How far is the camp from the lake, in a straight line?**

across $2 - (-3) = 5$, up $6 - (-6) = 12$

$c^2 = 25 + 144 = 169$, $c = 13$

**Answer: 13 mi**

# Whiteboards · Question 9 of 9

Mia says the segment from $(0, 0)$ to $(3, 1)$ is 3 units long,

because it crosses 3 grid squares.

**Is she right? Explain, and find its length to the nearest tenth.**

**Write your answer in sentences.**

# Whiteboards · Question 9 of 9

Mia says the segment from $(0, 0)$ to $(3, 1)$ is 3 units long,

because it crosses 3 grid squares.

**Is she right? Explain, and find its length to the nearest tenth.**

across 3, up 1

$c^2 = 9 + 1 = 10, \quad c = \sqrt{10} \approx 3.2$

**Answer: No: it is the hypotenuse of a triangle with legs 3 and 1, √10 ≈ 3.2 units.**

# Independent Set

1. Find the perimeter of the triangle $(-8, -3)$, $(2, -3)$, $(-3, 9)$. It has no right angle.
2. Find the perimeter of the triangle $(-4, 1)$, $(2, 1)$, $(2, -4)$, to the nearest tenth.
3. Find the perimeter of the parallelogram $(-4, -5)$, $(2, -5)$, $(7, 7)$, $(1, 7)$.
4. On a map in blocks, Kai's home is at $(-6, -5)$ and his school at $(3, 7)$. How much shorter is the straight line than the streets?
5. On a map in miles, a dock is at $(-4, 3)$ and an island at $(3, -5)$. How far apart are they, to the nearest tenth?
6. A rectangle has corners $(-3, -2)$, $(2, -2)$, $(2, 10)$ and $(-3, 10)$. How long is a diagonal?

# IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 67. Due by the Unit 6 test.

**Today's skills — all required**

Pythagorean theorem: find the perimeter — VGE