

Geometry · Coordinate Geometry Proofs · Test Answer Key

Common Core G-GPE.B.4, G-GPE.B.5, G-GPE.B.6, G-GPE.B.7 · mathovore.fr

Use this answer key to score the coordinate geometry test out of 20 points. Each solution is fully worked, and the scoring note after it shows how the points are awarded, including partial credit for correct methods with small arithmetic slips.

Geometry Common Core: G-GPE.B.4 · G-GPE.B.5 · G-GPE.B.6 · G-GPE.B.7

Question 1: Distance and midpoint (2 points)

a. $AB = \sqrt{(2 - (-4))^2 + (-5 - 3)^2} = \sqrt{36 + 64} = 10$. $AB = 10$

b. $M = \left(\frac{-4 + 2}{2}, \frac{3 + (-5)}{2} \right)$. $M = (-1, -1)$

Scoring: 1 point for the correct distance (substitution and result), 1 point for the correct midpoint.

Question 2: Parallel or perpendicular (2 points)

Slope of line 1: $\frac{4 - (-2)}{4 - 1} = 2$. Slope of line 2: $\frac{3 - 5}{3 - (-1)} = -\frac{1}{2}$. Slope of line 3: $\frac{4 - 0}{2 - 0} = 2$.

Lines 1 and 3 are parallel (equal slopes). **Lines 1 and 2 are perpendicular** and **lines 2 and 3 are perpendicular** ($2 \cdot \left(-\frac{1}{2}\right) = -1$).

Scoring: 1 point for the three correct slopes; 1 point for naming the parallel pair and both perpendicular pairs with the product-of-slopes reason.

Question 3: Perpendicular line (2 points)

The perpendicular slope is the opposite reciprocal of $-\frac{3}{4}$: $\frac{4}{3}$. Then $y - 5 = \frac{4}{3}(x - 3)$, so $y = \frac{4}{3}x - 4 + 5$.

$y = \frac{4}{3}x + 1$ Check: $\frac{4}{3}(3) + 1 = 5$.

Scoring: 1 point for the slope $\frac{4}{3}$; 1 point for the correct equation.

Question 4: Partition a segment (2 points)

The run is $5 - (-7) = 12$ and the rise is $-2 - 4 = -6$.

a. Fraction $\frac{1}{3}$: $(-7 + 4, 4 - 2)$. $(-3, 2)$

b. Fraction $\frac{3}{4}$: $(-7+9, 4-4.5) \cdot (2, -0.5)$

Scoring: 1 point for each correct point (a correct fraction with an arithmetic slip earns no point).

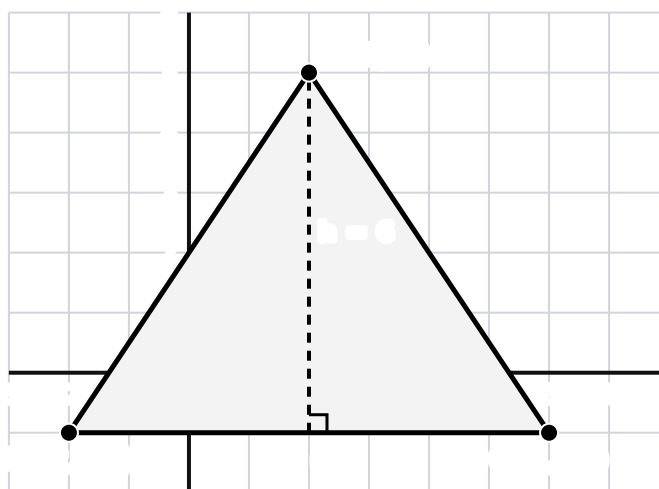
Question 5: Triangle perimeter and area (3 points)

$$PQ = 8 \text{ (horizontal)}. QR = \sqrt{(2-6)^2 + (5-(-1))^2} = \sqrt{52} = 2\sqrt{13}.$$

$$PR = \sqrt{(2-(-2))^2 + (5-(-1))^2} = \sqrt{52} = 2\sqrt{13}.$$

a. Perimeter $= 8 + 4\sqrt{13} \approx 8 + 14.42$. $8 + 4\sqrt{13} \approx 22.42$ **units**

b. Base $PQ = 8$, height $5 - (-1) = 6$. **Area** $= \frac{1}{2}(8)(6) = 24$ **square units**



Base $PQ = 8$ and height 6.

Scoring: Part (a): 1 point for the three side lengths, 1 point for the exact and rounded perimeter. Part (b): 1 point for the correct area.

Question 6: Missing endpoint (2 points)

a. $\frac{-5+x}{2} = 1$ gives $x = 7$; $\frac{4+y}{2} = -2$ gives $y = -8$. $B = (7, -8)$

b. $AB = \sqrt{(7-(-5))^2 + (-8-4)^2} = \sqrt{144+144} = \sqrt{288}$. $AB = 12\sqrt{2}$

Scoring: 1 point for each part.

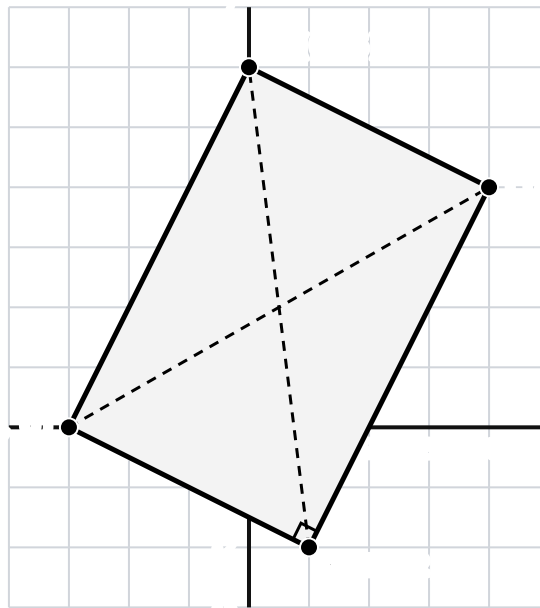
Question 7: Prove a rectangle (3 points)

Statements	Reasons
$\text{slope } JK = \frac{-2-0}{1-(-3)} = -\frac{1}{2};$ $\text{slope } ML = \frac{4-6}{4-0} = -\frac{1}{2}$	Slope formula

Statements	Reasons
slope $KL = \frac{4-(-2)}{4-1} = 2$; slope $JM = \frac{6-0}{0-(-3)} = 2$	Slope formula
JKLM is a parallelogram	Both pairs of opposite sides have equal slopes, so they are parallel
$-\frac{1}{2} \cdot 2 = -1$, so $\overline{JK} \perp \overline{KL}$	Slopes with product -1 are perpendicular
JKLM is a rectangle	A parallelogram with a right angle

$$JK = \sqrt{4^2 + (-2)^2} = \sqrt{20} = 2\sqrt{5} \text{ and } KL = \sqrt{3^2 + 6^2} = \sqrt{45} = 3\sqrt{5}. \text{ Area} = 2\sqrt{5} \cdot 3\sqrt{5} = 30.$$

JKLM is a rectangle with area 30 square units.



JKLM is a parallelogram with a right angle at K.

Scoring: 1 point for showing both pairs of opposite sides parallel; 1 point for showing a right angle; 1 point for the correct area.

Question 8: Campus map (2 points)

- $GC = \sqrt{8^2 + 6^2} = 10$ units, and $10 \times 50 = 500$. **500 feet**
- $(1 + \frac{3}{4}(8), 2 + \frac{3}{4}(6)) = (7, 6.5)$. $(7, 6.5)$

Scoring: 1 point for each part.

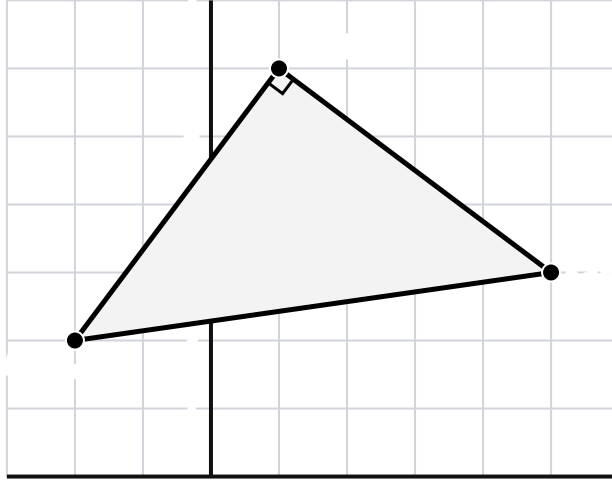
Question 9: Classify a triangle (2 points)

$$AB = \sqrt{3^2 + 4^2} = 5, BC = \sqrt{4^2 + (-3)^2} = 5, AC = \sqrt{7^2 + 1^2} = \sqrt{50}. \text{ Two sides are equal and the third}$$

is different.

Slope of $\overline{AB}$ is $\frac{4}{3}$ and slope of $\overline{BC}$ is $-\frac{3}{4}$; the product is -1 . (Also $5^2+5^2=50=(\sqrt{50})^2$.)

The triangle is isosceles and right, with the right angle at B .



$AB = BC = 5$ and the angle at B is a right angle.

Scoring: 1 point for the three lengths and the classification; 1 point for a valid right-angle justification.

Total
20 points