Lesson 6.3 Centroid

Monday, March 3, 2025 10:07 PM

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Lesson 6.3
Medians of a

Lesson 6.3 Medians of Triangles

Content Objective

Students solve problems using medians and altitudes in triangles.

Florida's B.E.S.T. Standards for Mathematics

MA.912.GR.1.3 Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles.

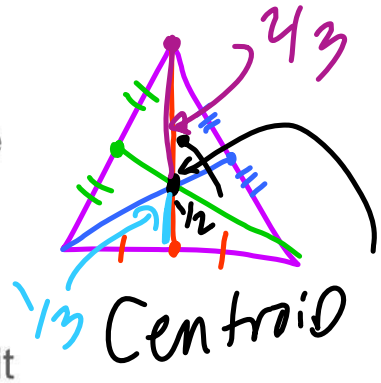
MA.912.GR.3.3 Use coordinate geometry to solve mathematical and real-world geometric problems involving

lines, circles, triangles and quadrilaterals.

Medians of Triangles

In a triangle, a **median** is a line segment with endpoints that are a vertex of the triangle and the midpoint of the side opposite the vertex.

Every triangle has three medians that are concurrent. The point of concurrency of the medians of a triangle is called the **centroid**, and it is always inside the triangle.



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Learn

Medians of Triangles

Theorem 6.7: Centroid Theorem

The medians of a triangle intersect at a point called the centroid that is two-thirds of the distance from each vertex to the midpoint of the opposite side.

All polygons have a balancing point or *center of gravity*. This is the point at which the weight of a region is evenly dispersed and all sides of the region are balanced. The centroid is the center of gravity for a triangular region.

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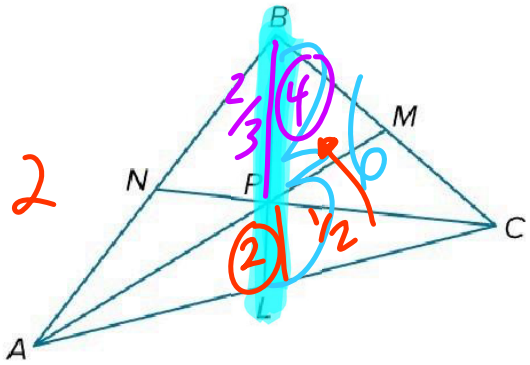
Example 1

Use the Centroid Theorem

In △*ABC*, *P* is the centroid and *BL* = 6. Find *BP* and *PL*.

$\frac{2}{3} \cdot \frac{6}{1} = \frac{12}{3} = 4$ $\frac{1}{3} \cdot \frac{6}{1} = \frac{6}{3} = 2$



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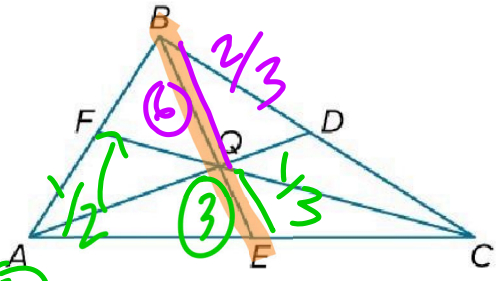
Example 1
Use the Centroid Theorem

Check

In △*ABC*, *Q* is the centroid and *BE* = 9. Find *BQ* and *QE*.

$\frac{2}{3} \cdot \frac{9}{1} = \frac{18}{3} = 6$ $\frac{1}{3} \cdot \frac{9}{1} = \frac{9}{3} = 3$



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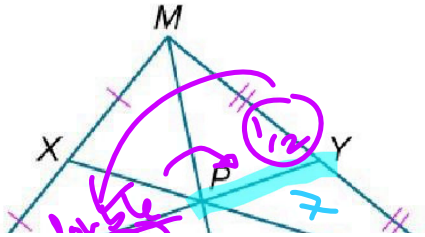
Example 2
Apply the Centroid Theorem

In △*LMN*, *PY* = 7. Find *LP*. 14

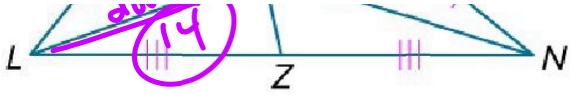
$2 \quad 21 - 42 - 14$



$Ly = 21$

$\frac{1}{3} \cdot \frac{1}{1} = \frac{3}{3} = 1$

$PY = \frac{1}{3}(21) = \frac{21}{3} = 7$



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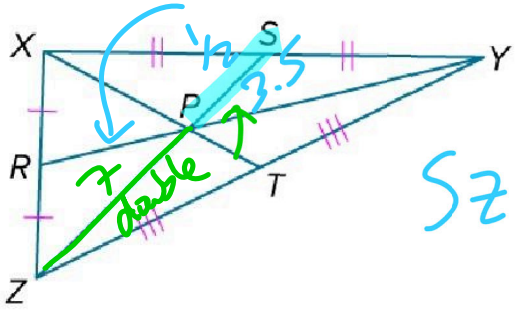
Example 2
Apply the Centroid Theorem

Check

In △*XYZ*, *SP* = 3.5. Find *PZ*.



$SZ = 10.5$

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Medians of Triangles

Think About It!

How could you find the coordinates of the centroid of △*PQR*?

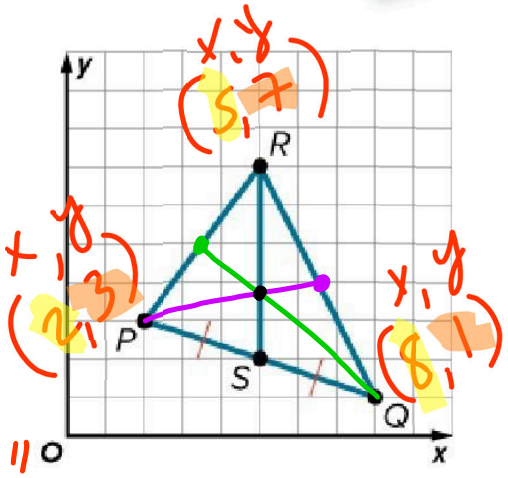
$\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}$

$\frac{2+5}{2}, \frac{3+7}{2}$

$(3.5, 5)$

$\frac{5+8}{2}, \frac{7+1}{2}$

$(6.5, 4)$



$\frac{2+5+8}{3} = \frac{15}{3}$

$\frac{3+7+1}{3} = \frac{11}{3}$

(3, 3.7)

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GRAPHING CENTROIDS
Find the coordinates of the centroid P of △ABC.
A(0, 4), B(3, 10), C(6, -2)

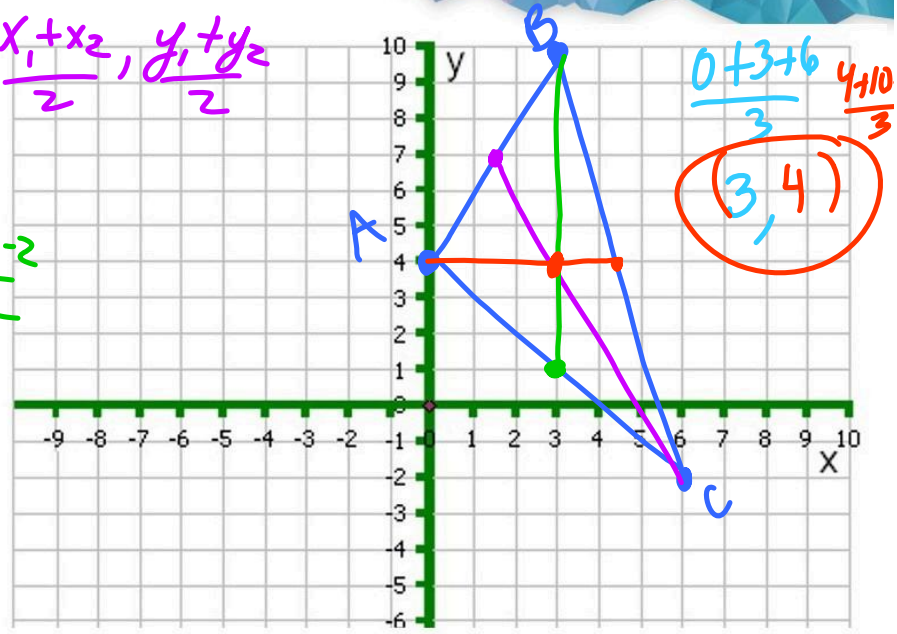
$\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}$

$\frac{0+3}{2}, \frac{4+10}{2}$ $\quad$ $\frac{0+6}{2}, \frac{4-2}{2}$

(1.5, 7) $\quad$ (3, 1)

$\frac{3+6}{2}, \frac{10-2}{2}$

(4.5, 4)



$\frac{0+3+6}{3}$ $\quad$ $\frac{4+10}{3}$

(3, 4)

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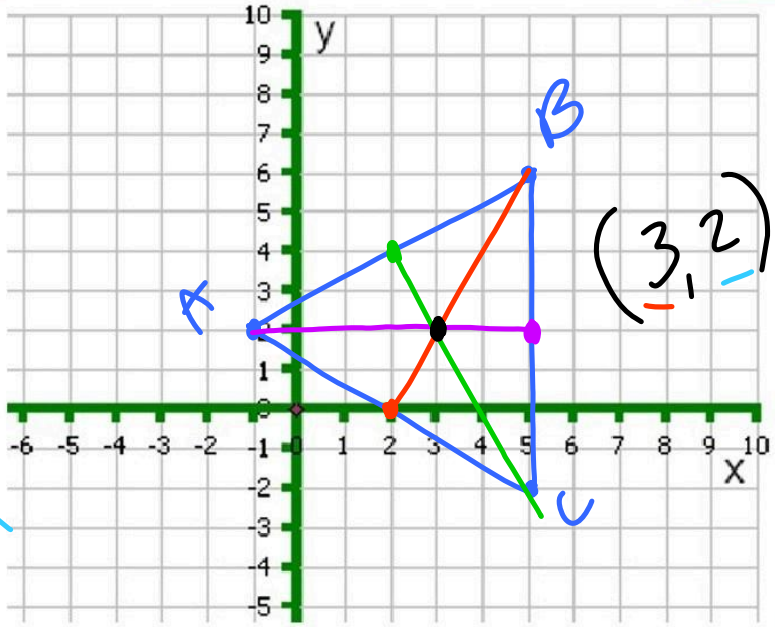
GRAPHING CENTROIDS Find the coordinates of the centroid P of △ABC.
A(-1, 2), B(5, 6), C(5, -2)

$\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}$

$\frac{-1+5+5}{3} = \frac{9}{3} = 3$

$\frac{2+6-2}{3} = \frac{6}{3} = 2$



(3, 2)

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