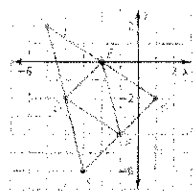
Name Key

Triangle Midsegment Theorem

For #1 – 7, use the graph of $\triangle ABC$ with midsegments $\overline{DE}$, $\overline{EF}$, and $\overline{DF}$



1. Find the coordinates of points D, E, and F

D: (-4, -2)

E: (-2, 2)

F: (-1, -4)

2. Show that $\overline{DE}$ is parallel to $\overline{CB}$

Slope DE: 1
Slope CB: 1 } Same slope → parallel

3. Show that $DE = \frac{1}{2}CB$

$2^2+2^2=(DE)^2$ | $4^2+4^2=(CB)^2$ | $DE = \frac{1}{2}CB$

$8=(DE)^2$ | $32=(CB)^2$ | $2.8=\frac{1}{2}(5.6)$

$DE=\sqrt{8}=2.82$ | $CB=\sqrt{32}=5.65$ | $2.8=2.8$ ✓

4. Show that $\overline{EF}$ is parallel to $\overline{AC}$

Slope EF: -4
Slope AC: -4 } Same slope → parallel

5. Show that $EF = \frac{1}{2}AC$

$1^2+4^2=(EF)^2$ | $2^2+8^2=(AC)^2$ | $EF=\frac{1}{2}AC$

$17=(EF)^2$ | $68=(AC)^2$ | $4.1=\frac{1}{2}(8.2)$

$EF=\sqrt{17}=4.12$ | $AC=\sqrt{68}=8.24$ | $4.1=4.1$ ✓

6. Show that $\overline{DF}$ is parallel to $\overline{AB}$

Slope DF: 3/2
Slope AB: 3/2 } Same slope → parallel

7. Show that $DF = \frac{1}{2}AB$

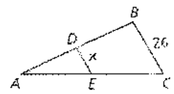
$2^2+3^2=(DF)^2$ | $4^2+6^2=(AB)^2$ | $DF=\frac{1}{2}AB$

$13=(DF)^2$ | $52=(AB)^2$ | $3.6=\frac{1}{2}(7.2)$

$DF=\sqrt{13}=3.6$ | $AB=\sqrt{52}=7.2$ | $3.6=3.6$ ✓

For #8 - 9 $\overline{DE}$ is a midsegment of $\triangle ABC$. Find the value of x.

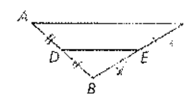
8. x = 13



$x=\frac{1}{2}(26)$

$\boxed{x=13}$

9. x = 8



For #10 - 13, use $\triangle GHJ$, where A, B, and C are midpoints of the sides. Label the drawings with the given information. Show all work.

10. If $AB = 3x + 8$ and $GJ = 2x + 24$, find the measure of AB

AB = 14

$2(3x+8)=2x+24$

$6x+16=2x+24$

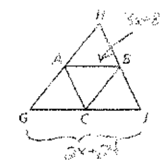
$4x=8$

$\boxed{x=2}$

$AB=3x+8$

$AB=3(2)+8$

$\boxed{AB=14}$



11. If $AC = 3y - 5$ and $HJ = 4y + 2$, find the measure of HB

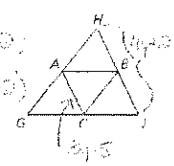
HB = 13

$2(3y-5)=4y+2$ | $HB=\frac{1}{2}(4y+2)$

$6y-10=4y+2$ | $=\frac{1}{2}(4\cdot 6+2)$

$2y=12$ | $=\frac{26}{2}$

$\boxed{y=6}$ | $=13$



12. If $GH = 7z - 1$ and $CB = 4z - 3$, find the measure of GA

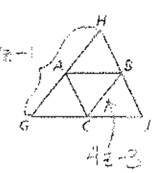
GA = 17

$2(4z-3)=7z-1$ | $GA=\frac{1}{2}(7z-1)$

$8z-6=7z-1$ | $=\frac{1}{2}(7\cdot 5-1)$

$\boxed{z=5}$ | $=\frac{34}{2}$

$=17$



13. A, B, and C are the midpoints of the sides of $\triangle GHJ$. $AB = 3.4$, $BC = 4.2$, and $AC = 3.8$. Find the perimeter of $\triangle GHJ$. Show all work.

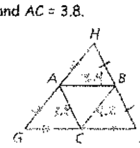
Perimeter = 22.8

$GH=2(4.2)=8.4$

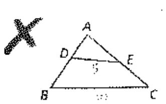
$HJ=2(3.8)=7.6$

$JG=2(3.4)=6.8$

22.8



14. Describe and correct the error



$DE = \frac{1}{2}BC$, so by the Triangle Midsegment Theorem (Thm. 6.8), $\overline{AD} \cong \overline{DB}$ and $\overline{AE} \cong \overline{EC}$.

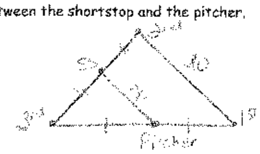
$\overline{DE}$ is not parallel to $\overline{BC}$ so $\overline{DE}$ is not a midsegment → $\overline{DE}$ does not connect the midpoints of $\overline{AC}$ and $\overline{AB}$

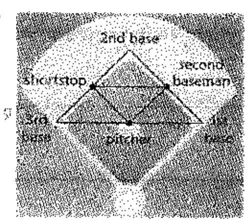
15. The distance between consecutive bases on a baseball field is 90 feet. A second baseman stands halfway between first base and second base, a shortstop stands halfway between second base and third base, and a pitcher stands halfway between first base and third base. Find the distance between the shortstop and the pitcher.

Distance = 45 ft

$x=\frac{1}{2}(90)$

$\boxed{x=45}$



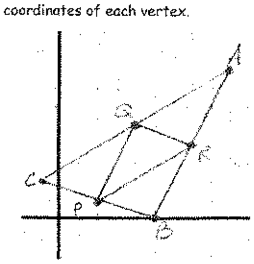


16. The points P(2, 1), Q(4, 5), and R(7, 4) are the midpoints of the sides of a triangle. Graph the three midsegments. Then show how to use your graph and the properties of midsegments to draw the original triangle ABC. Give the coordinates of each vertex.

Vertex A: (9, 8)

Vertex B: (5, 0)

Vertex C: (-1, 2)



17. Find a real-life object that uses midsegments as part of its structure. Print a photograph of the object, or use a ruler to draw the object, and identify the midsegments of one of the triangles in the structure.

Answers will vary

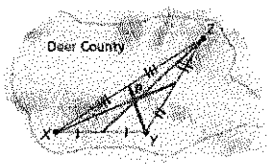
18. The Deer County Parks Committee plans to build a park at point P, equidistant from the three largest cities labeled X, Y, and Z. The map shown was created by the committee.

a. Which point of concurrency did the committee use as the location of the park?

Point of Concurrency Used: Centroid

How do you know?

The segments used to create the point of concurrency are medians.

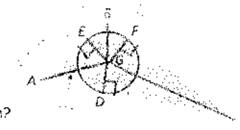


b. Did the committee use the best point of concurrency for the location of the park? If not, which point would be better to use? Explain.

Best point of concurrency to use: Circumcenter

Reasoning: Want the park to be equidistant from the cities (vertices)

19. A woodworker is cutting the largest wheel possible from a triangular scrap of wood. The wheel just touches each side of the triangle, as shown.



a. Which point of concurrency is the center of the circle?

Point of Concurrency Used: Incenter

How do you know? Center of an inscribed circle → equidistant to the sides of the triangle

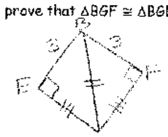
b. What type of segments are $\overline{BG}$, $\overline{CG}$, and $\overline{AG}$?

Type of Segment: Angle Bisectors

How do you know? Used to create an Incenter

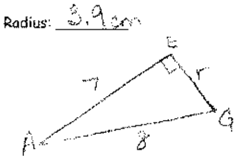
c. Which theorem can you use to prove that $\triangle BGF \cong \triangle BGE$? Draw and label the triangles. Mark all congruent parts.

Theorem: HL



d. Find the radius of the wheel to the nearest tenth of a centimeter. Justify your answer.

Radius: 3.9cm



CPCTC so EB = 3 → EA = 10 - 3 = 7

$r^2 + 7^2 = 8^2$

$r^2 + 49 = 64$

$r^2 = 15$

$r = \sqrt{15}$

$\boxed{r = 3.872}$

SKIP #18 & 19