LESSON 5.2

NAME Key DATE

Practice B

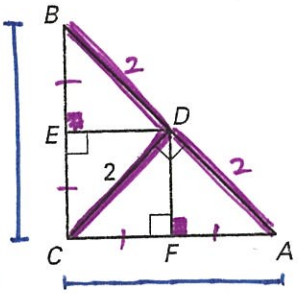
HW #67

For use with pages 272–278

PERPENDICULAR BISECTOR

Use the diagram shown. *D* is the circumcenter of $\triangle ABC$.

1. Find the length of DA. 2
2. Find the length of AB. 4
3. Explain why $\triangle ADF \cong \triangle BDE$. HL



$DC = 2$

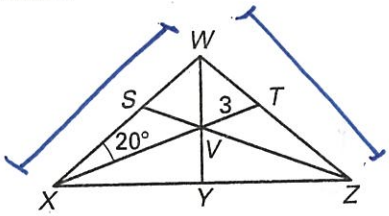
$\overline{AC} \cong \overline{BC}$

POINT OF CONCURRENCY

Use the diagram shown. *V* is the incenter of $\triangle XWZ$.

ANGLE BISECTOR

4. Find the length of VS. 3
5. Find the $m\angle SZX$. 20°
6. Explain why $\triangle XSV \cong \triangle ZTV$. ASA



$VT = 3$

$\overline{XW} \cong \overline{WZ}$

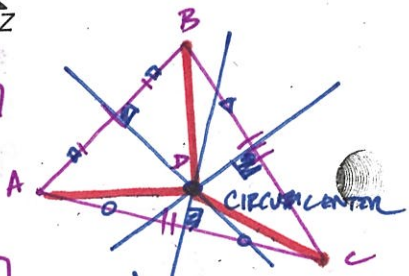
$m\angle WXT = 20°$

Complete the constructions described.

7. Draw a large acute scalene triangle $\triangle ABC$. Construct the perpendicular bisector of each side. Label the circumcenter D. ~~Measure $\overline{DA}$, $\overline{DB}$, and $\overline{DC}$.~~ $\overline{DA} \cong \overline{DB} \cong \overline{DC}$

8. Draw a large obtuse scalene triangle $\triangle ABC$. Construct the bisector of each angle. Label the incenter D. ~~Measure the perpendicular distance from point D to each side of the triangle.~~

7



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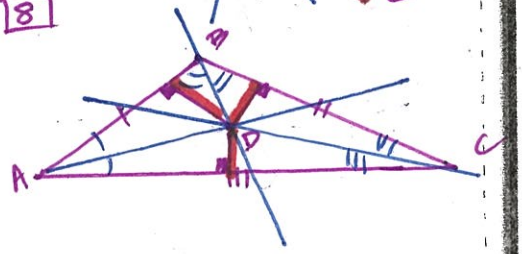


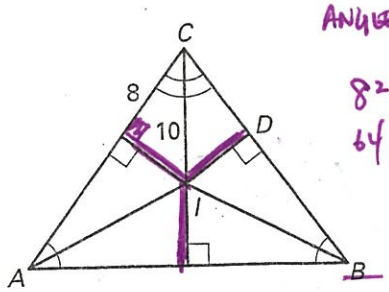
Complete the following sentences with *always*, *sometimes*, or *never*.

9. The perpendicular bisector of a triangle is ? the same segment as the angle bisector. SOMETIMES
10. The angle bisectors of a scalene triangle ? intersect at a single point. ALWAYS
11. The angle bisectors of a right triangle ? intersect inside the triangle. ALWAYS
12. The perpendicular bisectors of a right triangle ? intersect inside the triangle. NEVER

Find the indicated measure in each exercise.

13. Find ID.

ANGLE BISECTOR



$8^2 + ID^2 = 10^2$

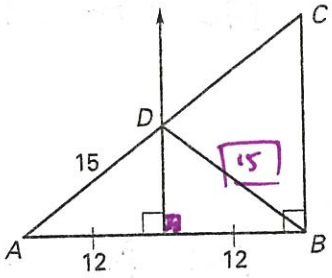
$64 + ID^2 = 100$

$ID^2 = 36$

$\sqrt{ID} = \sqrt{36}$

$ID = 6$

14. Find BD.



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LESSON 5.3

NAME _____ DATE _____

Practice B

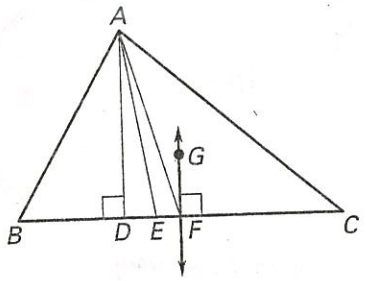
For use with pages 279–285

Use the diagram shown and the given information to match the type of special segment with the correct segment.

$\angle BAE \cong \angle EAC$ and $\overline{BF} \cong \overline{FC}$.

C 1. median
A 2. altitude
D 3. perpendicular bisector
B 4. angle bisector

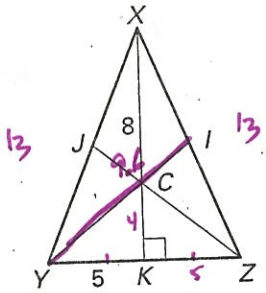
A. $\overline{AD}$
B. $\overline{AE}$
C. $\overline{AF}$
D. $\overline{GF}$



Use the figure shown and the given information.

C is the centroid of $\triangle XYZ$, $YK = 5$, $XC = 8$, $YI = 9.6$ and $\overline{XK} \perp \overline{YZ}$.

5. Find the length of $\overline{CK}$. 4
6. Find the length of $\overline{XK}$. 12
7. Find the length of $\overline{YC}$. 6.4
8. Find the length of $\overline{KZ}$. 5
9. Find the length of $\overline{JZ}$. 9.6
10. Find the perimeter of $\triangle XYZ$. 36



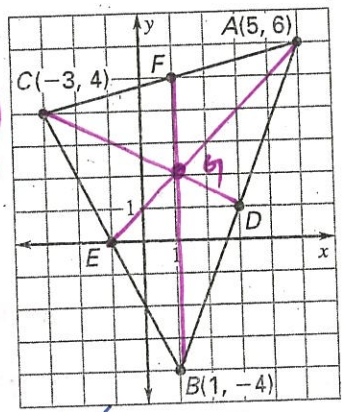
$4^2 + 5^2 = CZ^2$
$16 + 25 = CZ^2$
$\sqrt{41} = CZ^2$

$5^2 + 12^2 = XZ^2$
$25 + 144 = XZ^2$
$169 = XZ^2$
$\sqrt{169} = \sqrt{XZ^2}$
$13 = XZ$

Complete the following sentences with *always, sometimes,* or *never.*

11. The median of a triangle is ? the perpendicular bisector. SOMETIMES
12. The altitude of a triangle is ? the perpendicular bisector. SOMETIMES
13. The medians of a triangle ? intersect outside the triangle. NEVER
14. The altitudes of a triangle ? intersect inside the triangle. SOMETIMES

Use the graph shown.

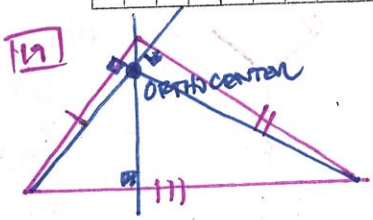


15. Find the coordinates of D, the midpoint of $\overline{AB}$. (3, 1)
16. Find the length of the median $\overline{CD}$. $\sqrt{45} = 3\sqrt{5}$ (DISTANCE FORMULA)
17. Find the coordinates of the centroid. Label this point as G. (0, 2)
18. Find the coordinates of E, the midpoint of $\overline{CB}$. Show that the quotient $\frac{AG}{AE} = \frac{2}{3}$. $\frac{\sqrt{32}}{\sqrt{72}} = \sqrt{\frac{32}{72}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$

Complete the constructions described.

19. Draw a large acute, scalene triangle $\triangle ABC$. Construct the orthocenter.
20. Draw a large right, scalene triangle $\triangle ABC$. Construct the centroid.

19



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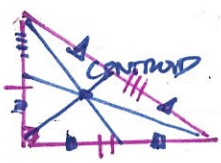


Lesson 5.3

LESSON 5.3

NAME _____ DATE _____

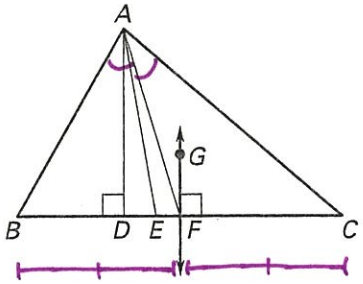
Practice C

For use with pages 279–285

Use the diagram shown and the given information to name each segment as one of the special segments of a triangle.

$\angle BAE \cong \angle EAC$ and $\overline{BF} \cong \overline{FC}$

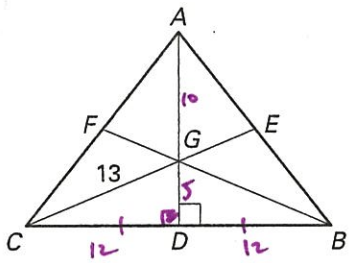
1. $\overline{AD}$ ALTITUDE
2. $\overline{AE}$ ANGLE BISECTOR
3. $\overline{AF}$ MEDIAN
4. $\overline{GF}$ PERPENDICULAR BISECTOR



Use the figure shown and the given information.

G is the centroid of $\triangle ABC$, $AD = 15$, $CG = 13$, and $\overline{AD} \perp \overline{CB}$.

5. Find the length of $\overline{AG}$. 10
6. Find the length of $\overline{GD}$. 5
7. Find the length of $\overline{CD}$. 12
8. Find the length of $\overline{GE}$. 6.5
9. Find the length of $\overline{GB}$. 13
10. Find the perimeter of $\triangle ABC$.



$5^2 + CD^2 = 13^2$

$CD = 12$

$15^2 + 12^2 = AB^2$

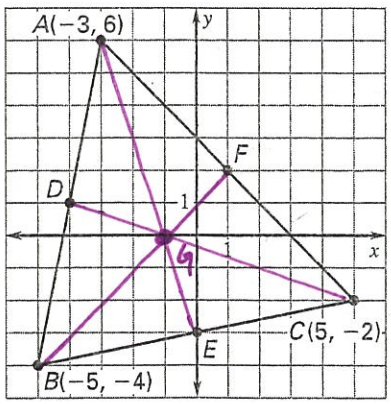
$\sqrt{369} = AB$

Complete the following sentences with *always, sometimes,* or *never.*

11. The centroid of a triangle is ? the circumcenter of the triangle. SOMETIMES
12. The altitude from the vertex angle of an isosceles triangle is ? the median. ALWAYS
13. The median to any side of an equilateral triangle is ? the angle bisector. ALWAYS
14. The altitudes of an acute triangle ? intersect outside the triangle. NEVER

Use the graph shown.

15. Find the coordinates of D, the midpoint of $\overline{AB}$. $(-4, 1)$
16. Find the length of the median $\overline{CD}$. $\sqrt{90} = 3\sqrt{10}$ (DISTANCE FORMULA)
17. Determine the equation $\overleftrightarrow{CD}$. $y = -\frac{1}{3}x - \frac{1}{3}$
18. Find the coordinates of the centroid. Label this point as G. $(-1, 0)$
19. Find the coordinates of E, the midpoint of $\overline{CB}$. $(0, -3)$
    Determine the equation $\overleftrightarrow{AE}$. $y = -3x - 3$
20. Show that the quotient $\frac{AG}{AE} = \frac{2}{3}$. $\frac{\sqrt{40}}{\sqrt{90}} = \sqrt{\frac{40}{90}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$
21. Determine the point of intersection of $\overleftrightarrow{CD}$ and $\overleftrightarrow{AE}$. Is your point of intersection G? $(-1, 0)$ YES



Lesson 5.3

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LESSON 5.3

NAME _____ DATE _____

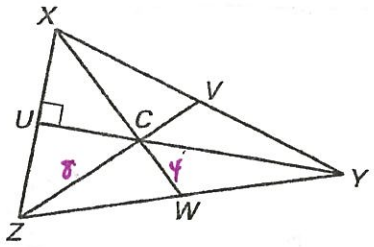
Standardized Test Practice

For use with pages 279–285

TEST TAKING STRATEGY **It is important to remember that your SAT score will not solely determine your acceptance into a college or university. Do not put added pressure on yourself to do well. If you are not satisfied with your SAT score, remember that you can take it again.**

1. *Multiple Choice* In the diagram, C is the centroid of $\triangle XYZ$, $\overline{UY} \perp \overline{XZ}$, $CW = 4$, and $CZ = 8$. Find CX.

(A) 3
(B) 6
(C) 9
(D) 8
(E) 12



2. *Multiple Choice* Use the diagram in Exercise 1. Find VZ.

(A) $\frac{16}{3}$ (B) 4 (C) 8
(D) 12 (E) 16

3. *Multiple Choice* In the diagram in Exercise 1, $\overline{UY}$ is ___?___.

(A) an altitude
(B) a perpendicular bisector
(C) a median
(D) an angle bisector (E) all of these

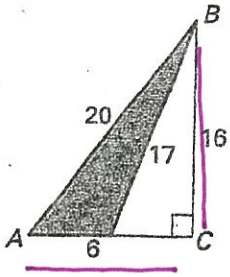
4. *Multiple Choice* What are the coordinates of the centroid of a triangle whose vertices are $A(3, 1)$, $B(7, 3)$, and $C(5, 7)$?

(A) $(5, \frac{11}{3})$ (B) $(5, \frac{16}{3})$ (C) $(5, 2)$
(D) $(6, \frac{8}{3})$ (E) $(6, \frac{11}{3})$

$X = \left(\frac{A+B+C}{3}, \right) \quad Y = \left(\frac{A+B+C}{3}\right)$

5. *Multiple Choice* What is the area of $\triangle ABC$?

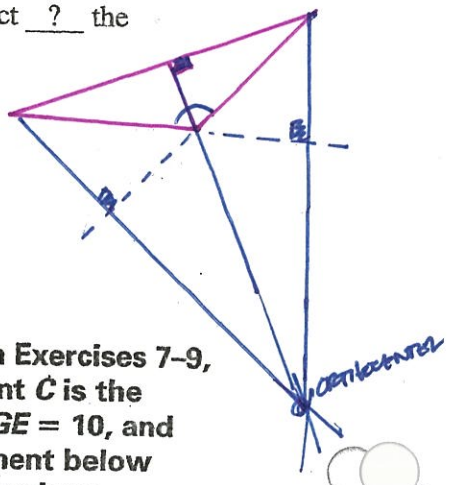
(A) 50
(B) 48
(C) 51
(D) 42
(E) 320



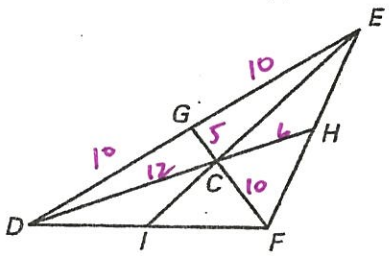
$A_\triangle = \frac{bh}{2}$
$= \frac{6(16)}{2}$
$= \frac{96}{2}$
$= 48$

6. *Multiple Choice* Complete the statement so that it is true. "The three altitudes of an obtuse triangle ___?___ intersect ___?___ the triangle."

(A) always; inside
(B) sometimes; inside
(C) always; outside
(D) sometimes; outside
(E) never; outside



Quantitative Comparison **In Exercises 7–9, use the diagram below. Point C is the centroid of $\triangle DEF$, $CH = 6$, $GE = 10$, and $GF = 15$. Choose the statement below that is true about the given values.**



(A) The value in column A is greater.
(B) The value in column B is greater.
(C) The two values are equal.
(D) The relationship cannot be determined from the given information.

	Column A	Column B
7. A	DE 20	DH 18
8. B	GC 5	CF 10
9. D	CE ?	CD 12