

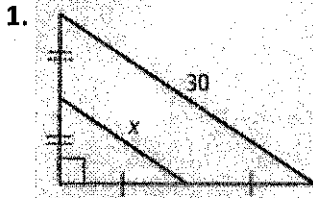
Name: Key
 Geometry

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Unit 5: Relationships within Triangles Study Guide

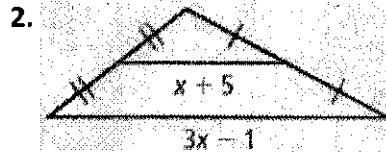
LT#1: Use properties of midsegments to solve problems.

Find the value of x .



$$x = \frac{1}{2}(30)$$

$$x = 15$$



$$x+5 = \frac{1}{2}(3x-1)$$

$$2x+10 = 3x-1$$

$$11 = x$$

3. $\triangle ABC$ has vertices $A(0,0)$, $B(2,2)$, and $C(5,-1)$. Find the coordinates of L , the midpoint of \overline{AC} , and M , the midpoint of \overline{BC} . Verify that $\overline{LM} \parallel \overline{AB}$ and $LM = \frac{1}{2}AB$.

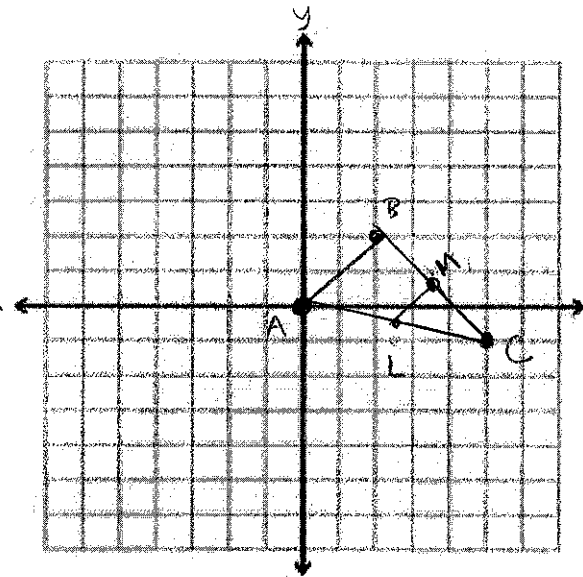
$$L = M_{AC} = \left(\frac{0+5}{2}, \frac{0+(-1)}{2} \right) = \left(\frac{5}{2}, -\frac{1}{2} \right)$$

$$M = M_{BC} = \left(\frac{2+5}{2}, \frac{2+(-1)}{2} \right) = \left(\frac{7}{2}, \frac{1}{2} \right)$$

$$m_{AB} = \frac{2-0}{2-0} = \frac{2}{2} = 1 \quad m_{LM} = \frac{-\frac{1}{2} - \frac{1}{2}}{\frac{5}{2} - \frac{7}{2}} = \frac{-1}{-1} = 1$$

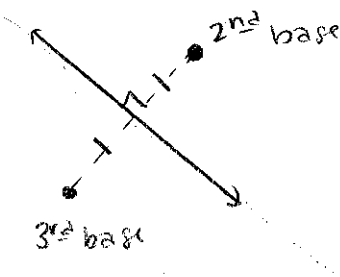
$$d_{AB} = \sqrt{(2-0)^2 + (2-0)^2} = \sqrt{8} = 2\sqrt{2}$$

$$d_{LM} = \sqrt{\left(\frac{5}{2} - \frac{7}{2}\right)^2 + \left(-\frac{1}{2} - \frac{1}{2}\right)^2} = \sqrt{2}$$



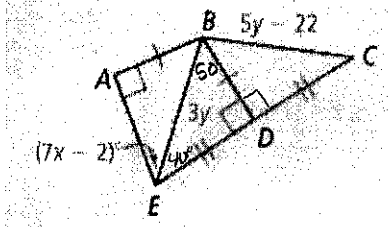
LT#2: Use properties of perpendicular bisectors and angle bisectors.

4. Describe how to find all the points on a baseball field that are equidistant from second base and third base.



perpendicular bisector of the distance between 2nd and 3rd base

In the figure, $m\angle DBE = 50$. Find each of the following.



5. $m\angle BED$

40°

6. $m\angle BEA$

40°

7. x

$7x - 2 = 40$

$7x = 42$

$x = 6$

8. y

$3y = 5y - 22$

$-2y = -22$

$y = 11$

9. BE

$3(11) = 33$

10. BC

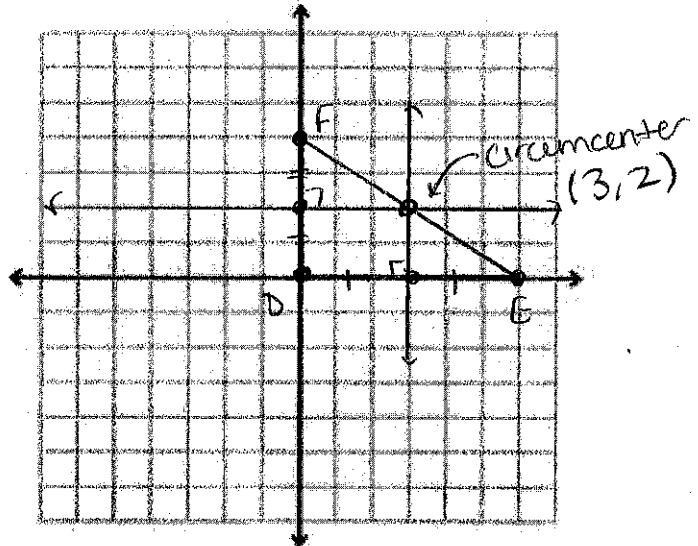
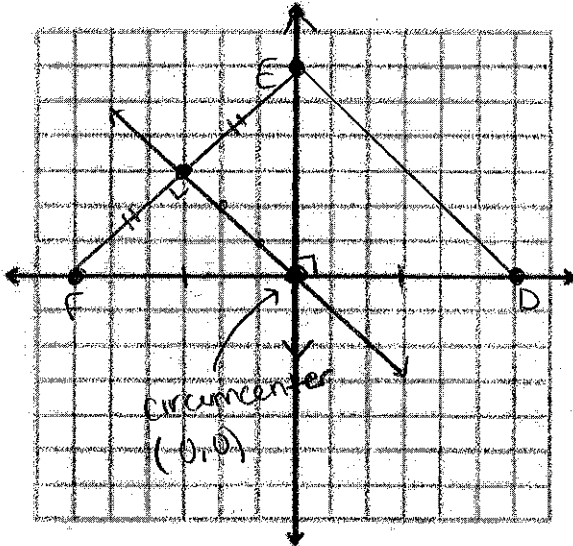
$5(11) - 22 = 55 - 22 = 33$

LT#3: Identify properties of perpendicular bisectors and angle bisectors.

Find the coordinates of the circumcenter of $\triangle DEF$. \perp bisectors

11. $D(6,0), E(0,6), F(-6,0)$

12. $D(0,0), E(6,0), F(0,4)$



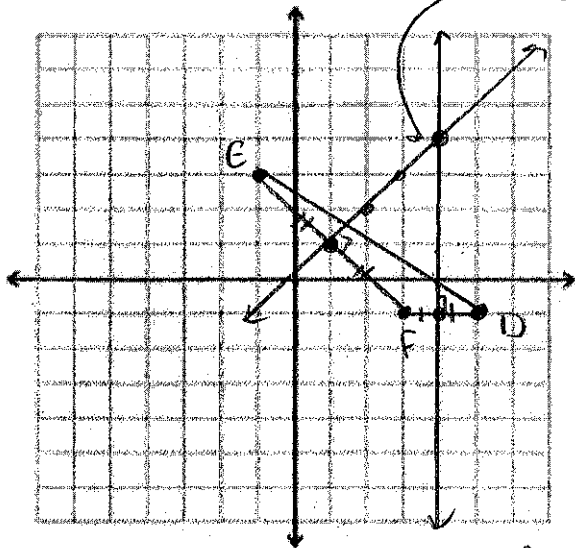
$m_{FE} = 1$

$m_{\perp} = -1$

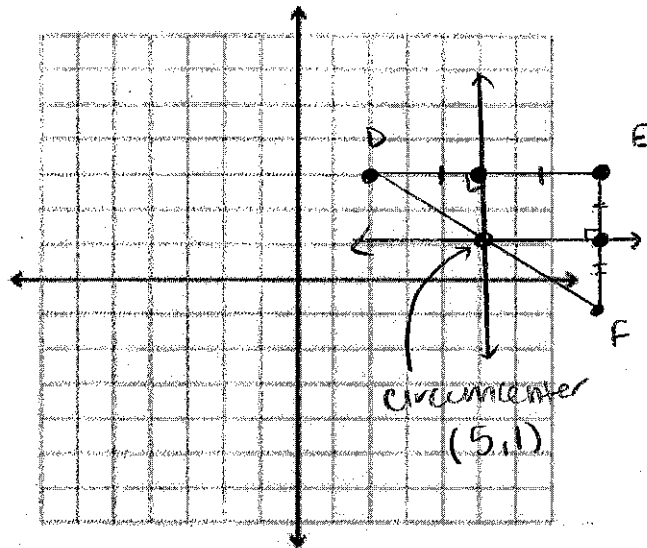
$M_{FE} = \left(\frac{0+6}{2}, \frac{6+0}{2} \right)$

$M_{FE} = (-3, 3)$

13. $D(5, -1), E(-1, 3), F(3, -1)$



14. $D(2, 3), E(8, 3), F(8, -1)$



$$m_{EF} = -1 \quad m_{FE} = \left(\frac{-1+3}{2}, \frac{3+1}{2} \right)$$

$$m_{\perp} = 1 \quad = (1, 1)$$

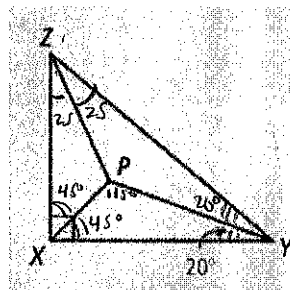
\angle bisectors

P is the incenter of $\triangle XYZ$. Find the indicated angle measure. $m\angle YZX = 50$

15. $m\angle PXY = 115^\circ$

16. $m\angle XYZ = 40^\circ$

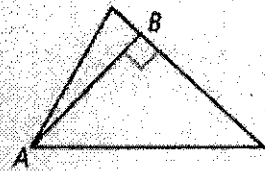
17. $m\angle PZX = 25^\circ$



LT#4: Identify properties of medians and altitudes of a triangle.

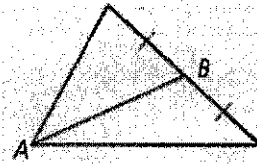
Determine whether \overline{AB} is a *median*, an *altitude*, or *neither*. Explain.

18.



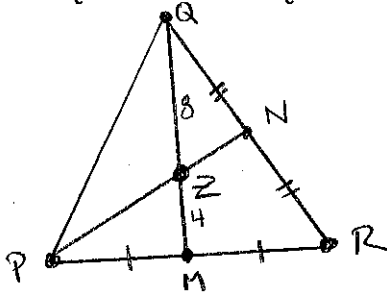
altitude
(\perp line from vertex to opposite side)

19.



median
(line from vertex to midpoint of opposite side)

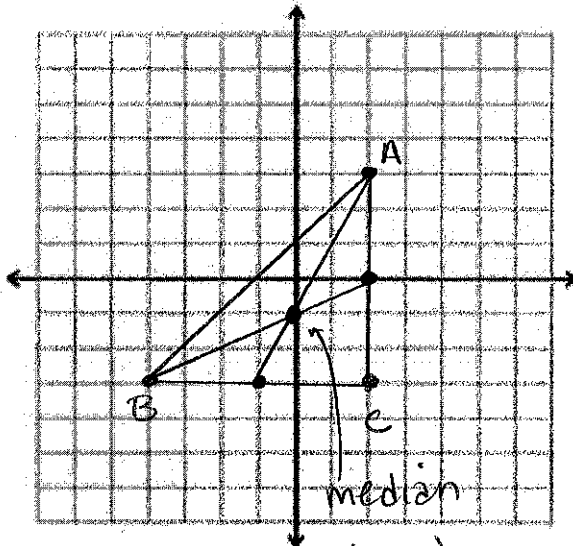
20. $\triangle PQR$ has medians \overline{QM} and \overline{PN} that intersect at Z . If $ZM = 4$, find QZ and QM .



$QZ = 8$
 $QM = 12$

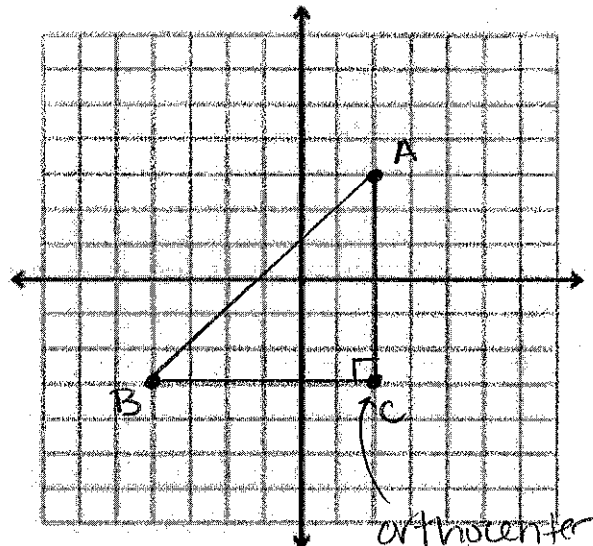
$\triangle ABC$ has vertices $A(2, 3)$, $B(-4, -3)$, and $C(2, -3)$. Find the coordinates of each point of concurrency.

21. centroid medians



(0, -1)

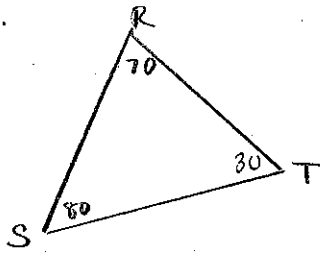
22. orthocenter altitudes



(2, -3)

LT#5: Use inequalities involving angles and sides of triangles..

23. In $\triangle RST$, $m\angle R = 70$ and $m\angle S = 80$. List the sides of $\triangle RST$ in order from shortest to longest.



\overline{RS} , \overline{ST} , \overline{RT}

Is it possible for a triangle to have sides with the given lengths? Explain.

24. 5in., 8in., 15in.

$$5+8 > 15 \quad 8+15 > 5 \quad 5+15 > 8$$

$$13 > 15 \times \quad 23 > 5 \checkmark \quad 20 > 8 \checkmark$$

no

25. 10 cm, 12 cm, 20 cm

$$10+12 > 20 \quad 12+20 > 10 \quad 10+20 > 12$$

$$22 > 20 \checkmark \quad 32 > 10 \checkmark \quad 30 > 12 \checkmark$$

yes

26. The lengths of two sides of a triangle are 12 ft and 13 ft. Find the range of possible lengths of the third side.

$$12 + x > 13$$

$$x > 1$$

$$12 + 13 > x$$

$$25 > x$$

$$13 + x > 12$$

$$x > -1$$

$1 < x < 25$

Use the figure below. Complete each statement with $>$, $<$, or $=$.

27. $m\angle BAD$ \blacksquare $m\angle ABD$

$<$

28. $m\angle CBD$ \blacksquare $m\angle BCD$

$>$

29. $m\angle ABD$ \blacksquare $m\angle CBD$

$<$

