

1. The coordinate of A is $2x - 5$ and the coordinate of B is $x + 8$. If $AB = 30$, find the possible values of A.

$$|(2x - 5) - (x + 8)| = 30$$

$$|x - 13| = 30$$

$$x - 13 = 30$$

$$x = 43$$

CK

$$(2(43) - 5) - (43 + 8) \stackrel{?}{=} 30$$

$$(81) - (51)$$

$$30 = 30$$

$$x - 13 = -30$$

$$x = -17$$

CK

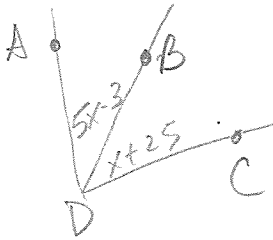
$$|(2(-17) - 5) - (-17 + 8)| \stackrel{?}{=} 30$$

$$|-39 - -9|$$

$$|-30| = 30$$

$A = 81$ $A = -39$

2. B lies on the interior of $\angle ADC$. $m\angle ADC = 64$. $m\angle ADB = 5x - 3$ and $m\angle BDC = x + 25$. Find x . Is \overline{DB} an angle bisector? yes



$$5x - 3 + x + 25 = 64$$

$$6x + 22 = 64$$

$$6x = 42$$

$$x = 7$$

$$5x - 3 = x + 25$$

$$4x = 28$$

$$x = 7$$

3. Fill in the blank.

- a. Supplementary angles sum to 180°
 b. Complementary angles sum to 90°
 c. Vertical angles are \cong
 d. Two angles that are supplementary to the same angle are congruent

4. State a formula for each.

a. Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

b. Distance: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

c. Midpoint: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

d. Slope - intercept form of a line: $y = mx + b$

e. Point - slope form of a line: $y - y_1 = m(x - x_1)$

5. In the diagram, \overline{OB} bisects $\angle AOC$ and $\overline{EC} \perp \overline{OD}$. Find the value of x .

a. $m\angle 5 = 2x, m\angle 3 = x$

$2x + 2x + x = 180$
 $5x = 180$

$x = 36$

b. $m\angle 1 = 2x, m\angle 2 = 6x + 2$

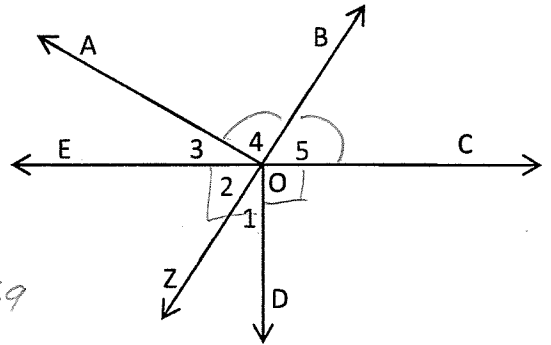
$2x + 6x + 2 = 90$
 $8x = 88$

$x = 11$

c. $m\angle 2 = 6x + 9, m\angle 5 = 2x + 49$

$6x + 9 = 2x + 49$
 $4x = 40$

$x = 10$



d. $m\angle 1 = x - 8, m\angle 2 = 2x + 5, m\angle 4 = 3x - 26$

$x - 8 + 2x + 5 = 90$

$3x - 3 = 90$

$3x = 93$

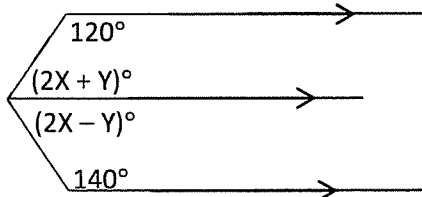
$x = 31$

6. Fill in the blank.

If two lines are cut by a transversal then ...

- a. Alternate interior angles are congruent
- b. Corresponding angles are congruent
- c. Same-side interior angles are supplementary

7. Find the value of x and y .



$2x + y + 120 = 180$
 $2x - y + 140 = 180$

$2x + y = 60$

$2x - y = 40$

$4x = 100$

$x = 25$

$2(25) + y = 60$

$y = 10$

8. In $\triangle ABC$, $A(2,1)$, $B(3,-5)$ and $C(-3,0)$

a. Classify the triangle by its sides.

SCALENE

$$AB = \sqrt{(2-3)^2 + (1-(-5))^2} = \sqrt{1+36} = \sqrt{37} \quad AC = \sqrt{(2-(-3))^2 + (1-0)^2} = \sqrt{25+1} = \sqrt{26}$$

$$BC = \sqrt{(3-(-3))^2 + (-5-0)^2} = \sqrt{36+25} = \sqrt{61}$$

b. Classify the triangle by its angles.

$$a^2 + b^2 = c^2 ?$$

$$37 + 26 = 61$$

Acute

$$63 > 61$$

$$c^2 < a^2 + b^2$$

c. Write the equation of the altitude drawn from A.

$A(2,1)$

$$m_{CB} = \frac{-5-0}{3-(-3)} = \frac{-5}{6}$$

$$y = mx + b$$

$$1 = \frac{6}{5}(2) + b$$

$$y = \frac{6}{5}x - \frac{7}{5}$$

$$m_{alt.} = \frac{6}{5}$$

$$1 - \frac{12}{5} = b \rightarrow b = \frac{-7}{5}$$

d. Write the equation of the median drawn from B.

midpt of AC

$$\left(\frac{2+(-3)}{2}, \frac{1+0}{2} \right) \Rightarrow \left(-\frac{1}{2}, \frac{1}{2} \right)$$

slope:

$$m_{BD} = \frac{-5 - \frac{1}{2}}{3 - (-\frac{1}{2})} = \frac{-\frac{11}{2}}{\frac{7}{2}} = -\frac{11}{7}$$

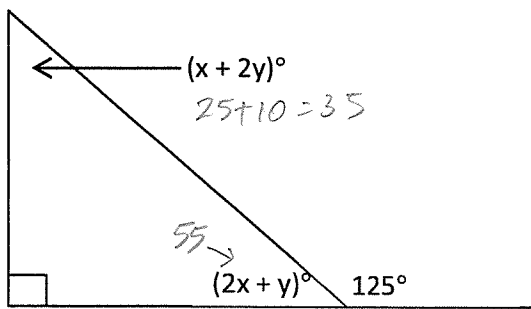
y-int. = $B(3,-5)$

$$-5 = -\frac{11}{7}(3) + b$$

$$-\frac{2}{7} = b$$

$$y = -\frac{11}{7}x - \frac{2}{7}$$

9. Find the value of x and y.



$$x + 2y + 2x + y = 90$$

$$2x + y + 125 = 180$$

$$3x + 3y = 90 \rightarrow x + y = 30$$

$$2x + y = 55 \rightarrow \frac{2x + y = 55}{-x - y = -25}$$

$$-x - y = -25$$

$$x = 25$$

$$2(25) + y = 55$$

$$y = 5$$

$$\frac{CKC}{35 + 55 = 90^\circ}$$

$$55 + 125 = 180^\circ$$

10. The angle sum of a polygon is 4140. How many sides does the polygon have?

$$(n-2)180 = 4140$$

$$n-2 = 23$$

$$n = 25$$

25

11. Complete each statement with sometimes, always or never.

- a. A square is always a rectangle.
- b. A rectangle is sometimes a rhombus.
- c. A rhombus is sometimes a square.
- d. A trapezoid sometimes has three congruent sides.
- e. The diagonals of a rectangle are always congruent.
- f. The diagonals of a parallelogram always bisect each other.
- g. The diagonals of a parallelogram are sometimes perpendicular.

12. A segment joins the midpoints of two sides of a triangle. Find the value of x and y.

ck

$$\frac{14}{14} = \frac{\checkmark 28}{28}$$

$$4y+2 = 7(y-1)$$

$$4y+2 = 7y-7$$

$$9 = 3y$$

$$\boxed{3 = y}$$

$$\frac{14}{3x+5} = \frac{28}{12x-8}$$

$$14(12x-8) = 28(3x+5)$$

$$168x - 112 = 84x + 140$$

$$84x = 252$$

$$\boxed{x = 3}$$

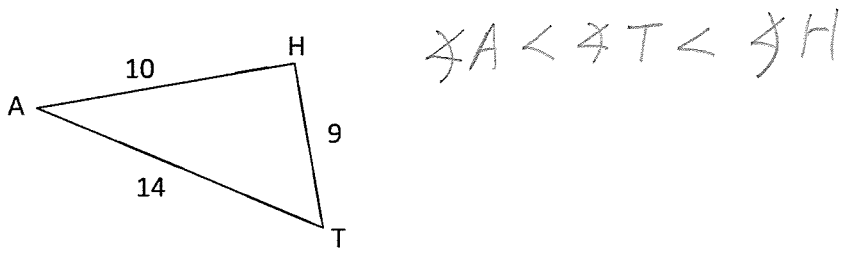
13. The lengths of two sides of a triangle are 20 and 52. Find the possible values for the 3rd side.

$$x + 20 > 52 \quad x + 52 > 20 \quad 20 + 52 > x$$

$$x > 32 \quad x > -32 \quad 72 > x$$

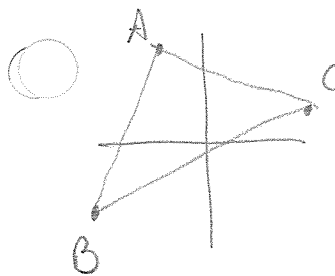
$32 < x < 72$

14. List the angles in the triangle in order from smallest to largest.



You must find all 3 altitudes & medians!

15. Find the point of concurrency of the altitudes of $\triangle ABC$ with vertices that have coordinates $A(-2, 6)$, $B(-8, -4)$, and $C(6, 2)$.



ALT from A:

$$m_{BC} = \frac{2+4}{6+8} = \frac{6}{14} = \frac{3}{7}$$

$$m_{\perp} = -\frac{7}{3}$$

$A(-2, 6)$

$$6 = -\frac{7}{3}(-2) + b$$

$$6 - \frac{14}{3} = b$$

$$\frac{4}{3} = b$$

$$\text{ALT} = y = -\frac{7}{3}x + \frac{4}{3}$$

ALT from B:

$$m_{AC} = \frac{6-2}{-2-6} = \frac{4}{-8} = -\frac{1}{2}$$

$$m_{\perp} = 2$$

$B(-8, -4)$

$$-4 = 2(-8) + b$$

$$12 = b$$

$$y = 2x + 12$$

ALT from C:

$$m_{AB} = \frac{6+4}{-2+8} = \frac{10}{6} = \frac{5}{3}$$

$$m_{\perp} = -\frac{3}{5}$$

$C(6, 2)$

$$2 = -\frac{3}{5}(6) + b$$

$$2 + \frac{18}{5} = b$$

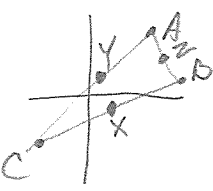
$$\frac{28}{5} = b$$

$$y = -\frac{3}{5}x + \frac{28}{5}$$

$$\begin{cases} 2x + 12 = -\frac{3}{5}x + \frac{28}{5} \\ 10x + 60 = -3x + 28 \\ 13x = -32 \\ x = -\frac{32}{13} \\ y = 2(-\frac{32}{13}) + 12 \\ y = \frac{92}{13} \end{cases}$$

$(-\frac{32}{13}, \frac{92}{13})$

16. Find the point of concurrency of the medians of $\triangle ABC$ with vertices that have coordinates $A(4, 6)$, $B(6, 2)$, and $C(-2, -4)$.



Median from A to BC:

$$x = \frac{6+2}{2} \quad y = \frac{2+4}{2}$$

midpt $X(2, -1)$

$$m_{AX} = \frac{-1-6}{2-4} = \frac{+7}{2}$$

$$6 = \frac{7}{2}(4) + b$$

$$-8 = b$$

$y = \frac{7}{2}x - 8$

Med. from B to AC:

$$\frac{4+2}{2}, \frac{6+4}{2}$$

midpt $Y(1, 1)$

$$m_{BY} = \frac{2-1}{6-1} = \frac{1}{5}$$

$$2 = \frac{1}{5}(6) + b$$

$$\frac{4}{5} = b$$

$y = \frac{1}{5}x + \frac{4}{5}$

med from C to AB:

$$(\frac{4+6}{2}, \frac{6+2}{2})$$

midpt $Z(5, 4)$

$$m_{CZ} = \frac{4+4}{5+2} = \frac{8}{7}$$

$$-4 = \frac{8}{7}(-2) + b$$

$$b = -\frac{12}{7}$$

$y = \frac{8}{7}x - \frac{12}{7}$

$$(\frac{7}{2}x - 8 = \frac{1}{5}x + \frac{4}{5}) \cdot 10$$

$$35x - 80 = 2x + 8$$

$$33x = 88$$

$$x = \frac{88}{33} = \frac{8}{3}$$

$$y = \frac{4}{3}$$

$(\frac{8}{3}, \frac{4}{3})$

17. John flew a kite over his school from his house. If he let out 800 meters of string and the kite was flying at an angle of elevation of 35° approximately how far away is his school?

$$\cos 35 = \frac{x}{800}$$

$x \approx 655.3 \text{ meters}$

18. An observer on a cliff 1000 meters above sea level sights two ships due east. The angles of depression to the ships are 47° and 32° . Find, to the nearest meter, the distance between the ships.

$$\tan 47 = \frac{1000}{d_1}$$

$$\tan 32 = \frac{1000}{d_2}$$

$$d_1 = 932.515$$

$$d_2 = 1600.334$$

$$\text{distance} = 667.819 \rightarrow \boxed{668m}$$

