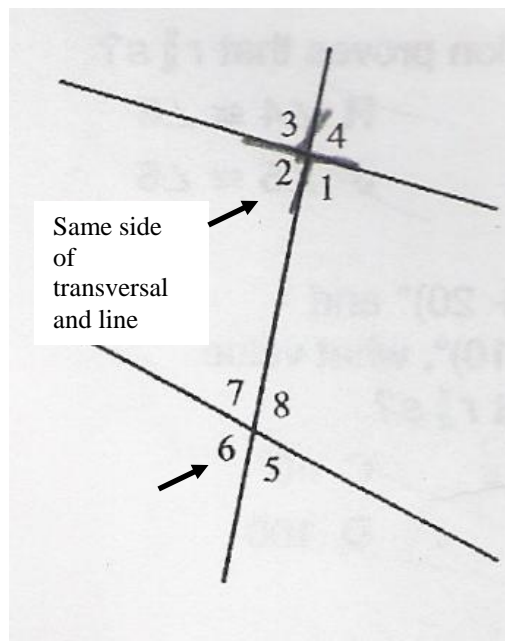


Geometry Problems

§ Use the drawing on the right to select the best description for each angle pair.

- 1: $\angle 2$ and $\angle 4$ are VERTICAL angles, because they are opposite angles formed by the intersection of two lines. Note that vertical angles are always equal.
- 6: $\angle 2$ and $\angle 6$ are CORRESPONDING angles because they are on the same side of the transversal and the same side of the line.



§ 10: Which is the equation of the line shown in the graph?

- So in the standard equation for a line, you need the slope and the y-intercept.

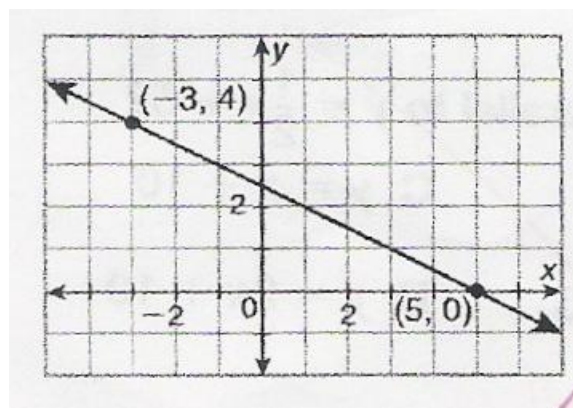
$$y = mx + b$$

- The y-intercept here is 2.5 or $\frac{5}{2}$.
- The slope we can directly calculate from the two points:

$$m = \frac{\Delta y}{\Delta x} = \frac{0 - 4}{5 - (-3)} = \frac{-4}{+8} = -\frac{1}{2}$$

- Hence, the equation should be:

$$y = -\frac{1}{2}x + \frac{5}{2}$$



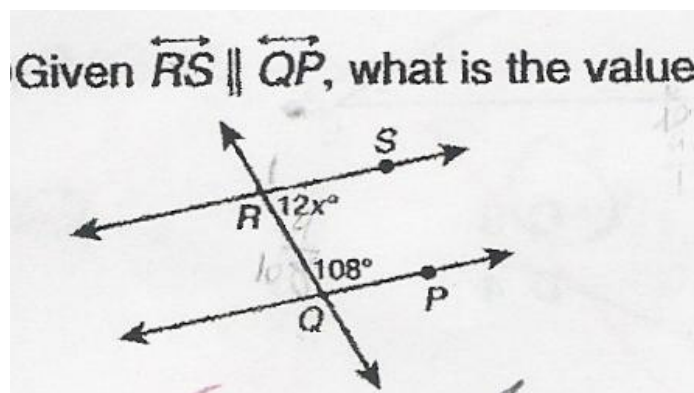
§ 12: What is the value of x ?

Note that the two angles indicated are INTERIOR angles on the SAME SIDE of the transversal. These angles are supplementary (add to 180°) when lines are *parallel*:

$$12x + 108 = 180$$

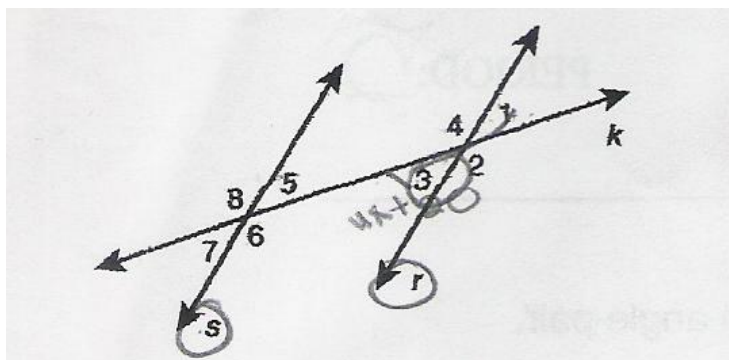
$$12x = 72$$

$$x = 6$$



§ 14: Which information proves that $r \parallel s$?

- If a transversal cuts through parallel lines, then we would expect that:
 - § Corresponding angles are EQUAL.
 - § Interior angles on the same side are SUPPLEMENTARY.
 - § Interior angles on different sides are EQUAL.



- $\angle 4 \cong \angle 6$: are interior angles on different sides, so having these equal would prove that the lines are parallel.

§ 15: What value of x proves that $r \parallel s$?

- Angles 3 and 5 are interior angles on different sides, so they should be EQUAL IF the lines are parallel.

$$m\angle 3 = m\angle 5$$

$$4x + 20 = 6x + 10$$

$$10 = 2x$$

$$x = 5$$

If $m\angle 3 = (4x + 20)^\circ$
 $m\angle 5 = (6x + 10)^\circ$, v

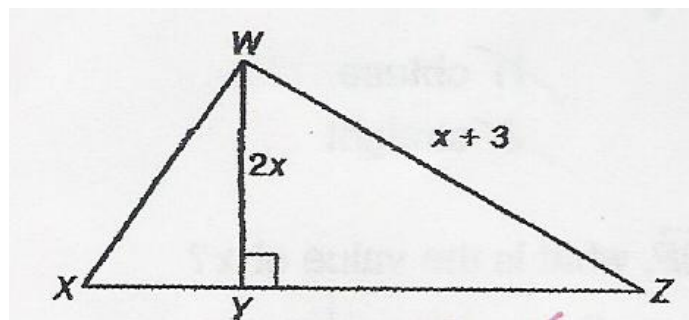
§ 16: Which is a possible value of x ?

- This goes back to what we know about the sides of a triangle.
- First, WY (a leg) must be shorter than WZ (the hypotenuse). The only way this would happen is if we choose $x = 1$, since:

$$WY : 2x = 2(1) = 2$$

$$WZ : x + 3 = 1 + 3 = 4$$

$$WY < WZ$$



§ 17: What is the slope of the line through $(-1,4)$ and $(5,2)$?

- If you have two points on the line, you can directly calculate the slope:

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 4}{5 - (-1)} = \frac{-2}{6} = -\frac{1}{3}$$

§ 18: Find $m\angle ABC$

- If these lines are parallel, then the two angles are **CORRESPONDING**, and should be **EQUAL**.

$$3x - 70 = x$$

$$2x = 70$$

$$x = 35$$

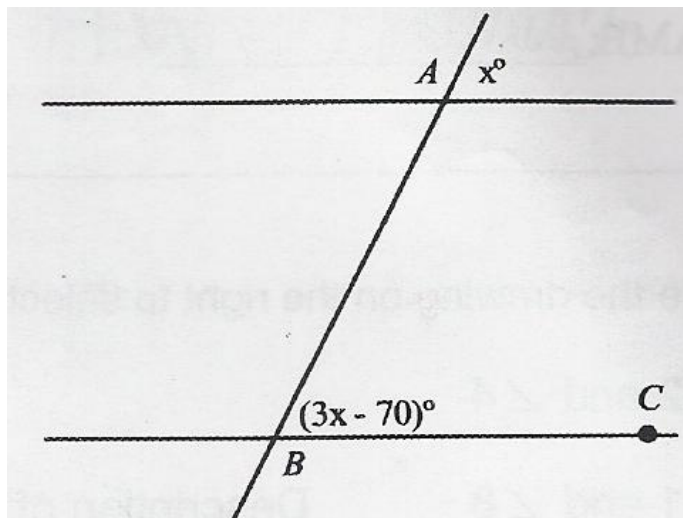
- Plug in x to get $m\angle ABC$:

$$m\angle ABC = 3x - 70$$

$$m\angle ABC = 3(35) - 70$$

$$m\angle ABC = 105 - 70$$

$$m\angle ABC = 35$$



§ 19: Given points A(1,5), B(-2,-1), C(1,1), and D(3,5), what types of lines are AB and CD?

- Neither of these lines is vertical or horizontal, because if they were vertical, both points would have the same x-value, and if they were horizontal, both points would have the same y-value.
- We need to calculate each slope and compare them to see if they are parallel or perpendicular:

$$m(AB) = \frac{-1-5}{-2-1} = \frac{-6}{-3} = 2$$

$$m(CD) = \frac{5-1}{3-1} = \frac{4}{2} = 2$$

- They have the **SAME** slope, so they must be **PARALLEL**.

§ 20: What is the equation of the line through (1,11) and (-2,2)?

- In order to find the equation of a line, we need the slope and just a point on the line:

$$m = \frac{2-11}{-2-1} = \frac{-9}{-3} = 3$$

- Let's using the point-slope form and convert to standard form. I will pick point (1,11) as my point (doesn't matter which one):

$$y - y_o = m(x - x_o)$$

$$y - 11 = 3(x - 1)$$

$$y - 11 = 3x - 3$$

$$y = 3x + 8$$

$$-3x + y = 8$$

§ 21: Which line is parallel to $y = \frac{1}{2}x + 5$?

- **PARALLEL** line have the **SAME SLOPE**: So I'd pick $y = \frac{1}{2}x - 7$

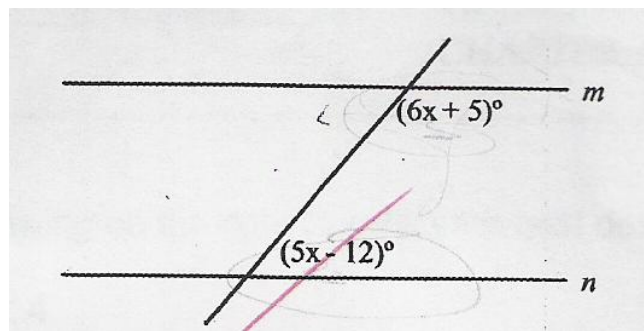
- § 22: Find the value of x so that $m \parallel n$.
- Remember that if $m \parallel n$, then INTERIOR angles on the SAME SIDE of the transversal are SUPPLEMENTARY:

$$(5x - 12) + (6x + 5) = 180$$

$$11x - 7 = 180$$

$$11x = 187$$

$$x = 17$$



- § 23: Write the equation of the line with slope 2 through the point (4,7) in slope-intercept form.
- Use the point-slope form and convert to the slope-intercept form. Note that you are given the slope ($m = 2$) and a point on the line (4,7):

$$y - y_o = m(x - x_o)$$

$$y - 7 = 2(x - 4)$$

$$y - 7 = 2x - 8$$

$$y = 2x - 1$$

- § 24: Write an equation going through points A (-5,4), B (-3,-2).
- So if you have two points, you can determine the equation of the line.
 - § First, calculate the slope.
 - § Then, use the point-slope form using either one of the points.
 - I will choose point (-5,4) as my point:

$$\text{§ } m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 4}{-3 - (-5)} = \frac{-6}{2} = -3$$

§ Point-slope form:

$$y - y_o = m(x - x_o)$$

$$y - 4 = -3(x - (-5))$$

$$y - 4 = -3(x + 5)$$

$$y - 4 = -3x - 15$$

$$y = -3x - 11$$