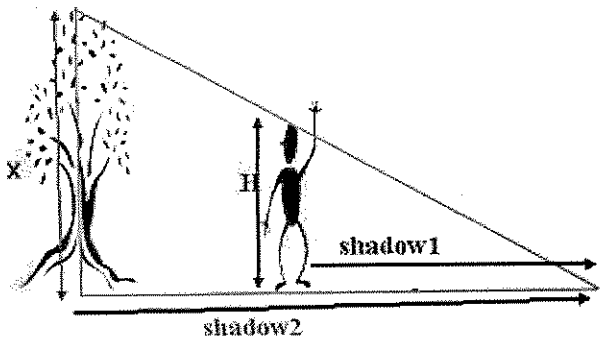
Day 12: Line segments and points, Cross sections, and rotations

Warm-up:

1. Height of person (H) = 64 in.
   Length of shadow 1 = 80 in.
   Length of shadow 2 = 120 in.



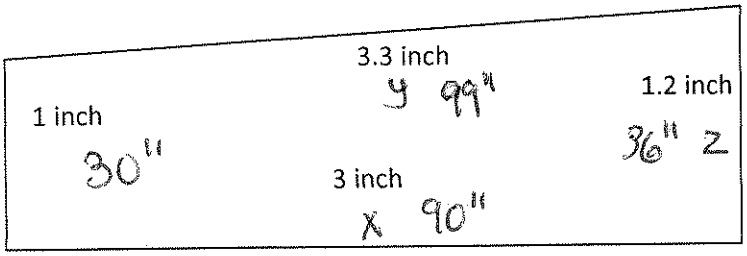
The two triangles in the figure are similar.
Explain why this is true. Height is measured at a right ∠, angle at bottom right is 3rd ∠ in both △s must be ≅

How tall is the tree? Justify your answer.

$\frac{x}{64} = \frac{120}{80}$ $80x = 7680$ $x = 96$ **96 inches**

2. A contractor is installing a new counter top in a kitchen. The figure shown here is a model for a counter top. The measurements on the model diagram are given. If the actual countertop will be similar to the model, explain one thing that must be true about the actual countertop.

angles on counter are ≅ angles on model, sides on counter are proportional to sides



1:30

If the ratio of sides of the model to the actual countertop is ~~30:1~~, what are the dimensions of the actual countertop?

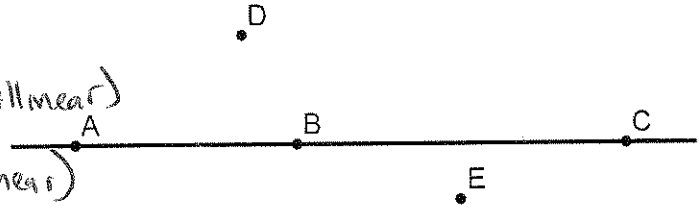
$\frac{\text{model } 1}{\text{counter } 30} = \frac{3}{x}$ $x = 90$ $\frac{1}{30} = \frac{3.3}{y}$ $\frac{1}{30} = \frac{1.2}{z}$

The Lesson: Line segments and points, Cross sections, and rotations

The word **between** in Geometry has a special meaning: a point is *between* two others if all three points are collinear (on the same line) and it is "between" the other two.

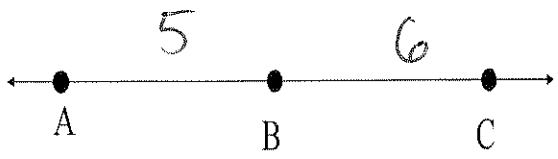
Example:

1. Is B between A and C? Yes
2. Is D between A and C? No (not collinear)
3. Is E between A and C? No (not collinear)



Segment addition postulate: If three points A, B, and C are collinear and B is between A and C, then $AB + BC = AC$.

Example: If AB = 5, and BC = 6, then AC = 11



A midpoint of a segment is a **point** that divides a segment into two congruent segments.

Examples:

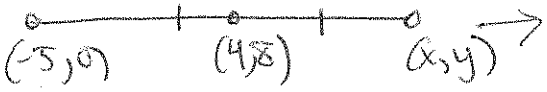
1. Billy and Evan are standing on a coordinate grid. Billy is currently on point (-1, 3) and Evan is currently on point (2, -7). They decide to meet in the middle of the segment connecting their locations. What point should they walk to? midpoint

$$\left(\frac{-1+2}{2}, \frac{3+-7}{2}\right) = \left(1/2, -4/2\right) = \boxed{(1/2, -2)}$$

2. Sarah is also standing on a coordinate grid at point (-5, 0). Her friend is somewhere on the grid. Sarah walks in a straight line to point (4, 8) and realizes that she's gone exactly half of the distance to her friend's location. On what point is her friend (assuming that her friend did not move).

(13, 16)

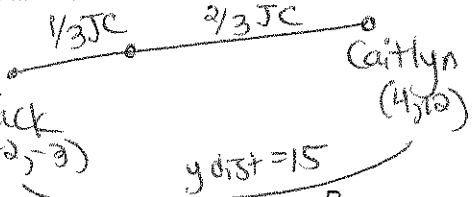
x=13 y=16



$-5+x=8$ $0+y=16$

$\frac{-5+x}{2}=4$ $\frac{0+y}{2}=8$ $\left(\frac{-5+x}{2}, \frac{0+y}{2}\right)=(4,8)$

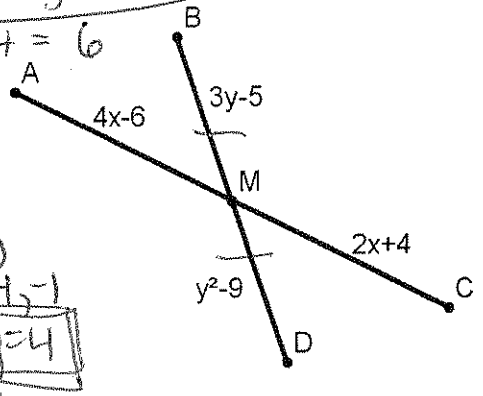
3. Caitlyn and Jack are standing on a coordinate grid. Caitlyn is at point (4, 12) and Jack is at point (-2, -3). Cailtyn can walk much faster than Jack, so they agree to met at the point 1/3 the distance from Jack (so Caitlyn would walk 2/3 the distance and Jack would walk 1/3 the distance). On what point do they meet?



$\left(-2+\frac{6}{3}, -3+\frac{15}{3}\right)$

$(-2+2, -3+5)$ $\boxed{(0,2)}$

4. In the following diagram, $\overline{AC}$ bisects $\overline{BD}$ and each other



a. What is the official name for point M?

midpoint of $\overline{BD}$

b. Find the value(s) of x and y.

$4x-6=2x+4$

$2x=10$

$\boxed{x=5}$

$3y-5=y^2-9$

$0=y^2-3y-4$ BD $0=(y-4)(y+1)$

$y=4,-1$

$\boxed{y=4}$

c. Find AM, MC, BM, and BC. (Two points together with no line or segment above them mean "the distance between." AM translates to "the distance between A and M.")

$AM=4(5)-6$ $\boxed{AM=14}$

$MC=2(5)+4$ $\boxed{MC=14}$

$BM=3(4)-5$ $\boxed{BM=7}$

$BD=3(4)-5+4^2-9$

$12-5$

$7+7$

$\boxed{BD=14}$

Extra
Day 12

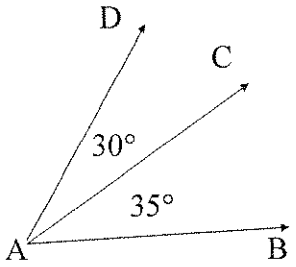
2/10/2014

*NOT IN NOTES * PLEASE COPY

Angle Addition Postulate

If C is in the interior of $\angle DAB$ then

$$m\angle DAC + m\angle CAB = m\angle DAB$$

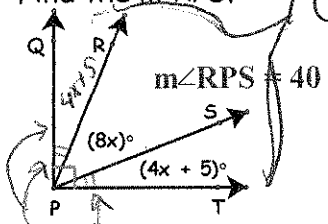


$m\angle DAB = 65°$

10

*Practice: Not in Notes

1. Find the m<RPS.



$m\angle RPS = 40$

means ≅ <s

so $m\angle QPR = 4x+5$ also

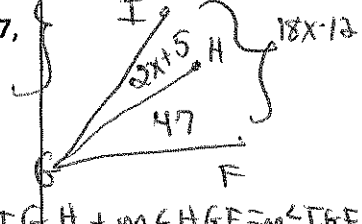
$m\angle QPT = 90°$ (because right ∠ both perpendicular)

3) $4x+5+8x+4x+5=90$
$16x+10=90$
$16x=80$
$x=5$
be careful... x is not answer!!
$m\angle RPS = 8(5) = 40$

2. H is in the interior of IGF. You are given that $m\angle IGH = (2x+5)$, $m\angle FGH = 47$, $m\angle IGF = (18x-12)$. Find $m\angle IGH$ and $m\angle FGI$.

$m\angle IGH = 13$
$m\angle FGI = 60$

1st draw a pic!

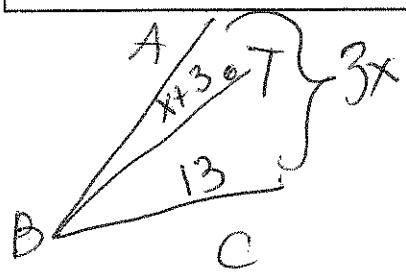


$m\angle IGH + m\angle HGF = m\angle IGF$
$2x+5+47 = 18x-12$
$2x+52 = 18x-12$
$64 = 16x$
$x = 4$
$m\angle IGH = 2(4)+5$
$m\angle IGH = 13$
$m\angle FGI = 2(4)+5+47$
$m\angle FGI = 60$

Warning! Look at pic... don't assume you add the two variable pieces to = the #

3. If T is in the interior of ∠ABC, and $m\angle ABC = 3x$, $m\angle ABT = x + 3$, and $m\angle TBC = 13$, find $m\angle ABC$.

$m\angle ABC = 24$



$x+3+13=3x$