Geometry
Unit 3 Test Review

Name: Key

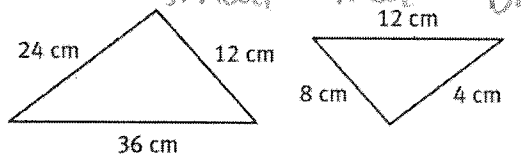
Unit 3 Topics:

- Activity 17 - Dilations and Similarity Transformations
  - □ Perform Dilations on and off the coordinate plane.
  - □ Describe dilations.
  - □ Understand the meaning of similarity transformations.
  - □ Use similarity transformations to determine whether the figures are similar.
  - □ Identify properties of similar figures.
  - □ Apply properties of similar figures.
- Activity 18 – Similar Triangles
  - □ AA~, SSS~, SAS~
  - □ Show triangles are similar.
  - □ Use similar triangles to solve problems.

1. For each pair of triangles, write which similarity criterion, if any, can be used to show the triangles are similar.

small/small ? med/med ? Big/Big

a)

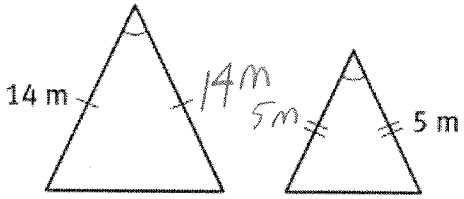


$\frac{4}{12} \stackrel{?}{=} \frac{8}{24} \stackrel{?}{=} \frac{12}{36}$

$\frac{1}{3} = \frac{1}{3} = \frac{1}{3}$ ✓

SSS~

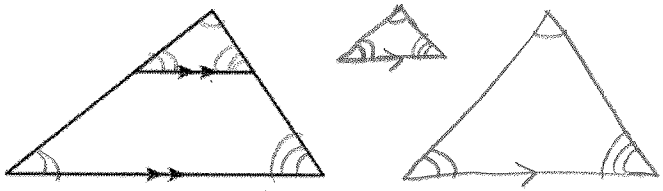
b)



$\frac{5}{14} \stackrel{?}{=} \frac{5}{14}$ ✓

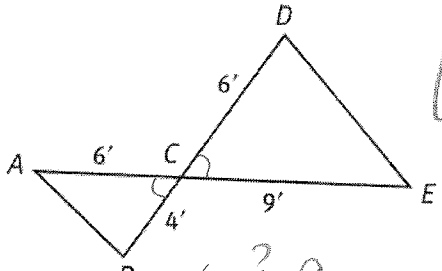
SAS~

c)



AA~

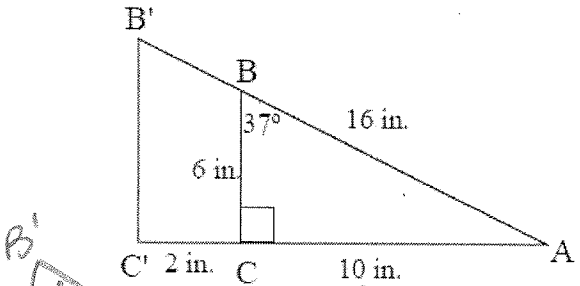
d)



SAS~

$\frac{6}{4} \stackrel{?}{=} \frac{9}{6} \rightarrow \frac{3}{2} = \frac{3}{2}$ ✓

2. $\overline{BC}$ is dilated at center A to $\overline{B'C'}$ Use the following diagram to find the measures and answer the question. Use the following diagram to answer the following.



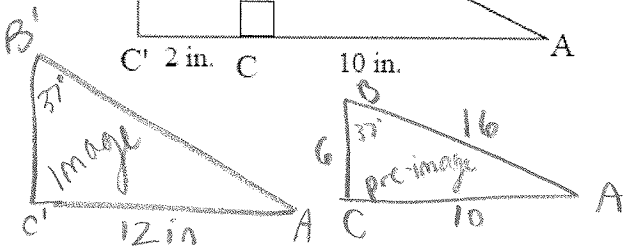
a) $\overline{B'C'}$ = 7.2 units

$\frac{12}{10} = \frac{x}{6}$

$72 = 10x$

$x = 7.2$

b) What is the scale factor of $\overline{BC}$ to $\overline{B'C'}$?

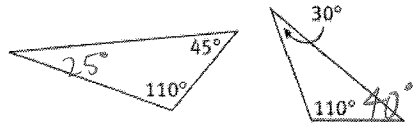


$\frac{12}{10} = \frac{6}{5}$ ← bigger than 1, so enlargement

3. On a map, 2 inches represents 35 miles. Two towns are measured to be 5 inches apart on the map. About how many miles apart are the two towns? Round to the nearest hundredth, if necessary.

$\frac{2}{35} = \frac{5}{x}$ $2x = 175$ $x = 87.5$ miles

4. Write whether AA similarity can be used to show that the pair of triangles are similar. Explain your answer.

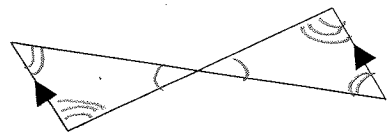
a) 

NO, b/c 2 ∠'s are not ≅ to each other.

b) 

Yes, b/c at least 2 ∠'s are ≅.

AA~

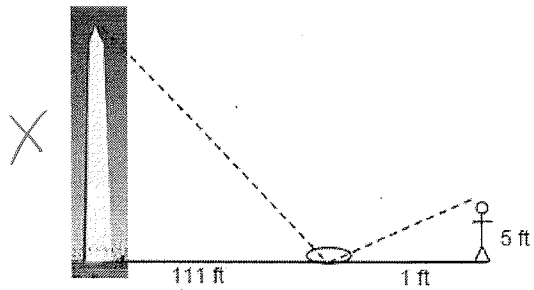
c) 

Yes, b/c vertical ∠s are ≅ & alt. int ∠s ≅, making at least 2 ∠'s ≅.

AA~

5. Julio was on vacation in Washington D.C. with his family and placed a mirror on the ground 111 feet from the Washington Monument. Julio then walked backwards until he was able to see the top of the monument in the mirror. His eyes are about 5 feet above the ground and he is 1 foot from the mirror. Using similar triangles, find the height of the Washington Monument.

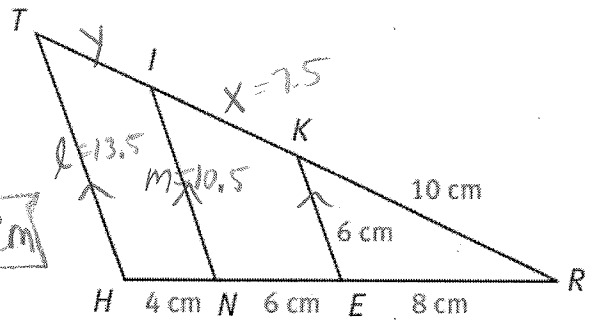
$\frac{5}{x} = \frac{1}{111}$ $x = 555$ ft



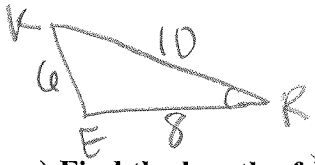
6. Given the diagram with $\overline{TH} \parallel \overline{IN} \parallel \overline{KE}$ and segment measures as shown.

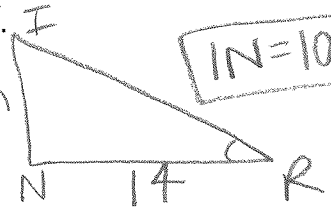
a) Find the length of $\overline{IK}$.

$\frac{x}{6} = \frac{10}{8}$ $8x = 60$ $x = 7.5$ IK = 7.5 cm



b) Find the length of $\overline{IN}$.





IN = 10.5 cm

$\frac{m}{6} = \frac{14}{8}$ $8m = 84$ $m = 10.5$

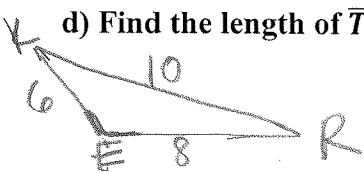
c) Find the length of $\overline{IT}$.

$\frac{y}{4} = \frac{10}{8}$ $8y = 40$ $y = 5$ IT = 5 cm

OR

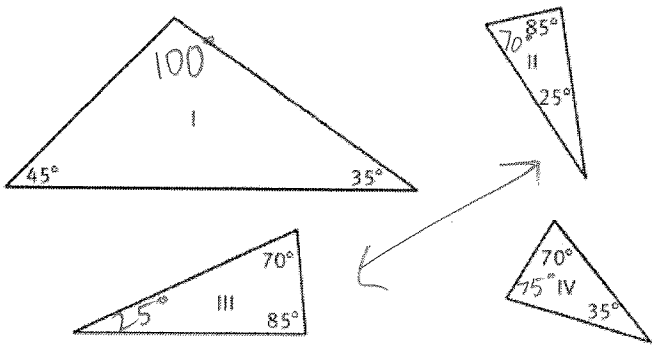
$\frac{y}{4} = \frac{7.5}{6}$ $6y = 30$ $y = 5$

d) Find the length of $\overline{TH}$.



$\frac{18}{8} = \frac{l}{6}$ $108 = 8l$ $l = 13.5$ TH = 13.5 cm

7. Consider the triangles shown. List the pairs of triangles that can be proved similar by the Angle-Angle Similarity Postulate.



II & III

8. 8. If ΔQRS is similar to ΔTUV, $m\angle Q = 60°$, $m\angle R = 24°$, what is the $m\angle V$?

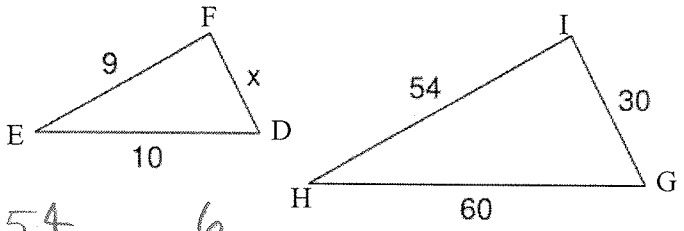
$180-60-24=96°$

$\angle S \cong \angle V \rightarrow m\angle V = 96°$

9. $\Delta DEF \sim \Delta GHI$ with the given side lengths.

a. Classify the dilation from $\Delta DEF \rightarrow \Delta GHI$

enlargement



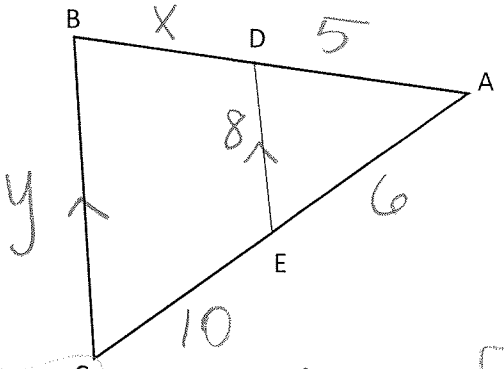
b. State the scale factor from $\Delta DEF \rightarrow \Delta GHI$

(should be bigger than 1) $\frac{60}{10}$ or $\frac{54}{9}$ $\frac{6}{1}$

c. Find x.

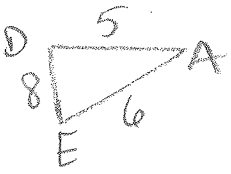
$\frac{30}{x} = \frac{54}{9}$ $\frac{270}{54} = \frac{54x}{54}$ $x = 5$

10. DE is parallel to BC. If $AD = 5, DE = 8, AE = 6, CE = 10$. Find BD and BC.



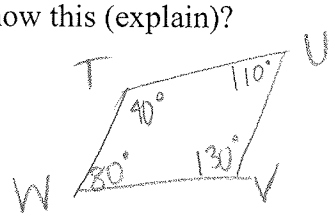
$BD =$ 8.33u $\frac{x}{10} = \frac{5}{6}$ $6x = 50$ $x = \frac{25}{3}$

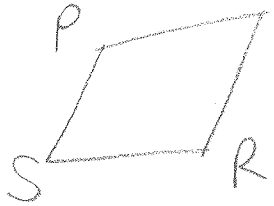
$BC =$ 21.33u



$\frac{16}{6} = \frac{yC}{8}$ $\frac{128}{6} = \frac{6y}{6}$ $y = \frac{64}{3}$

11. Given Quadrilateral TUVW is dilated by a scale factor of 3.5 with angle measures of $m\angle T = 40°$, $m\angle U = 110°$, $m\angle V = 130°$, $m\angle W = 80°$. What is $m\angle Q$ and $m\angle S$ in quadrilateral PQRS? How do you know this (explain)?



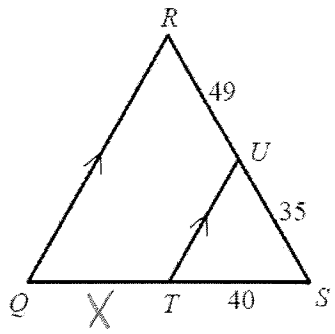


$m\angle Q = 110°$ $m\angle S = 80°$

$\angle Q \cong \angle U$ $\angle S \cong \angle W$

b/c in similar Δs all corresponding $\angle$s are $\cong$.

12. In ΔQRS, $\overline{QR} \parallel \overline{TU}$. Find the length of $\overline{TQ}$.



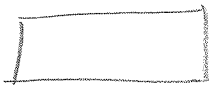
$\frac{49}{x} = \frac{35}{40}$

$1960 = 35x$

$x = 56$

QT = 56 u.

13. A given blueprint for a rectangular garden has a length of 12 inches and a width of 3.5 inches. The actual garden is 10 feet long. What is the width of the garden?



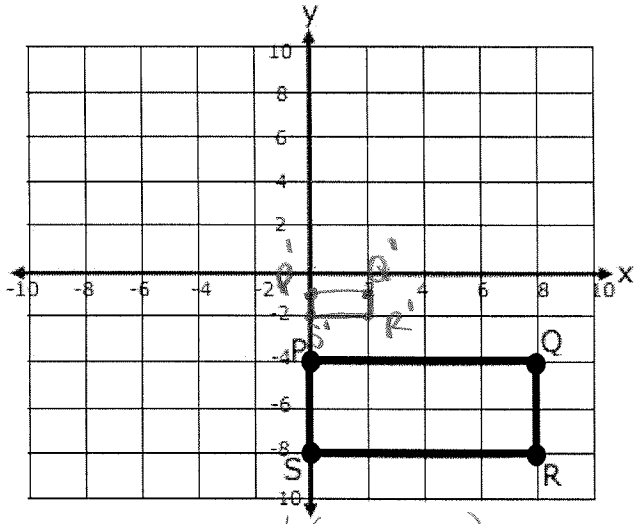
$\frac{x}{3.5} = \frac{10}{12}$

width = 29.167ft

$12x = 350$

$x = 29.167$ or $\frac{175}{6}$

14. Graph the image of rectangle PQRS as a result of $D_{0,\frac{1}{4}}$.



P: (0, −4) → P' (0, −1)

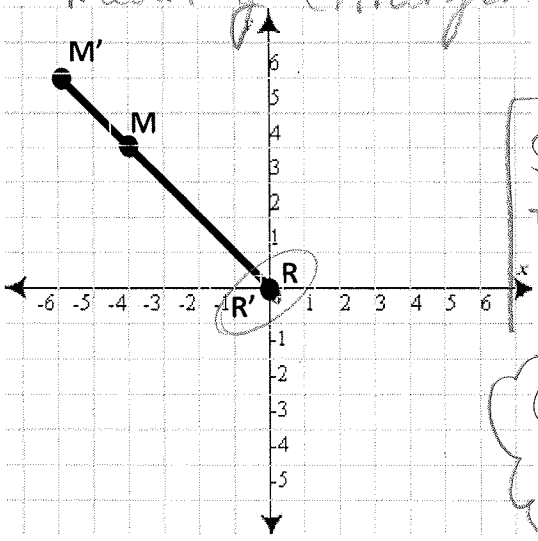
Q: (8, −4) → Q' (2, −1)

R: (8, −8) → R' (2, −2)

S: (0, −8) → S' (0, −2)

15. $\overline{RM}$ was dilated to form its image. $\overline{R'M'}$. What is the scale factor and center of dilation?

R'M' is bigger than RM meaning enlargement



scale factor = $\frac{3}{2}$

center of dilation at point R/R' origin

M(−4, 4) → M'(−6, 6)

$\frac{-6}{-4} = \frac{3}{2}$ or $\frac{6}{4} = \frac{3}{2}$

16. Consider $\overline{UB}$ with endpoints $U(-3,9)$ and $B(6,-9)$ and $\overline{U'B'}$ with endpoints $U'(-1,3)$ and $B'(2,-3)$. Describe the dilation that was applied to $\overline{UB}$ by stating the scale factor and center of dilation.

B: (6, −9) U: (−3, 9)

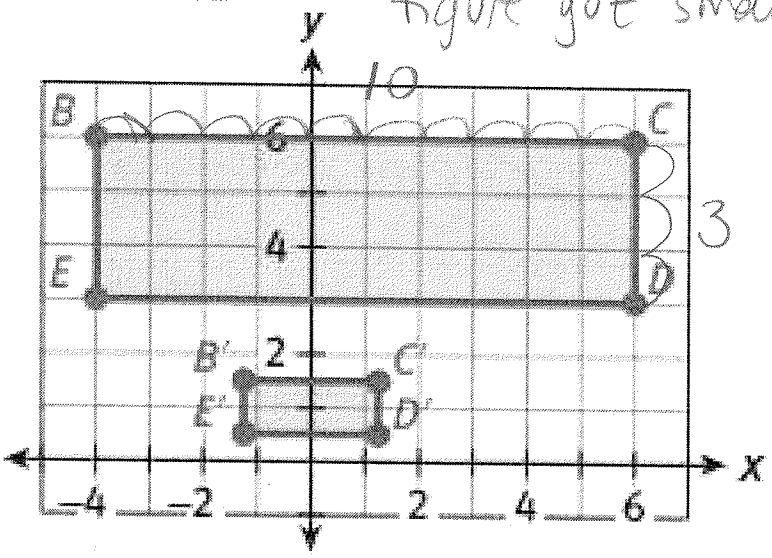
B': (2, −3) U': (−1, 3)

$\frac{-3}{-9} = \frac{1}{3}$ or $\frac{2}{6} = \frac{1}{3}$ $\frac{3}{9} = \frac{1}{3}$ or $\frac{-1}{-3} = \frac{1}{3}$

so scale factor $\frac{1}{3}$ center of dilation at the origin

17. Rectangle BCDE is mapped onto Rectangle $B'C'D'E'$ by a dilation. What is the scale factor? Express this dilation as a function.

figure got smaller, so reduction.



Scale factor: $\frac{-\frac{4}{5}}{-4} = -\frac{4}{5} \cdot \frac{1}{-4} = \frac{1}{5}$

Function: $D_{0,\frac{1}{5}}$ or $(x,y) \to (\frac{1}{5}x, \frac{1}{5}y)$

$B(-4,6) \to B'(-\frac{4}{5}, \frac{6}{5})$

$C(6,6) \to C'(\frac{6}{5}, \frac{6}{5})$

$D(6,3) \to D'(\frac{6}{5}, \frac{3}{5})$

$E(-4,3) \to E'(-\frac{4}{5}, \frac{3}{5})$

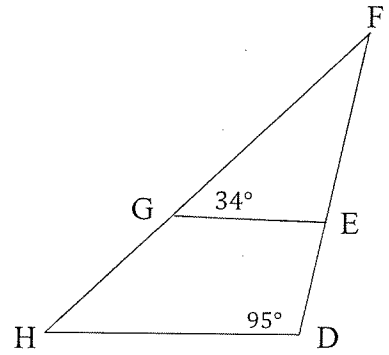
18. Which additional angle's measure, by itself, could be used to conclude that $\Delta EFG \sim \Delta DFH$?

$\angle HFD$

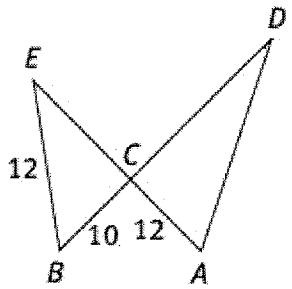
$\angle GHD$

$\angle HEF$

$\angle DEG$



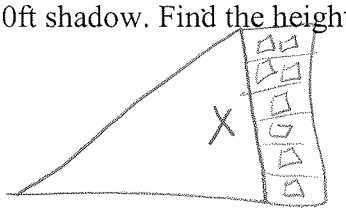
19. Jorge found DA by writing and solving the proportion shown, but he is incorrect. Write the correct proportion and solve for DA.

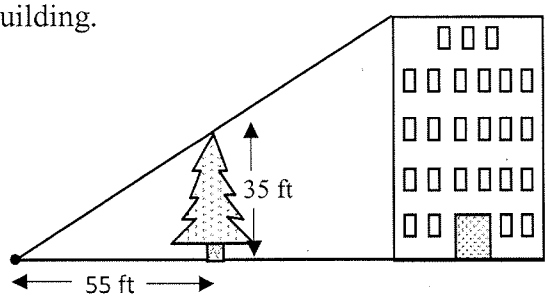


$$\frac{10}{12} = \frac{12}{DA}$$
$$10 \cdot DA = 12 \cdot 12$$
$$DA = 14.4$$

The triangles are not similar. There is not information to conclude that the Δ's are similar.

20. The tree that is 35ft tall casts a shadow that is 55ft long.
The building casts 110ft shadow. Find the height of the building.





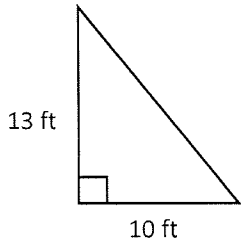
$\frac{x}{35} = \frac{110}{55}$ $\frac{55x}{55} = \frac{3850}{55}$ $x = 70$

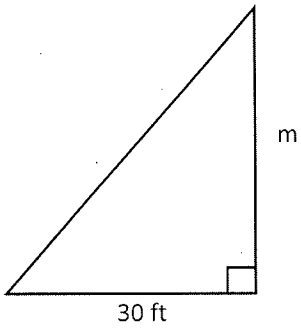
Height of building is 70ft

21. The right triangles shown are similar. What is the approximate value of m?

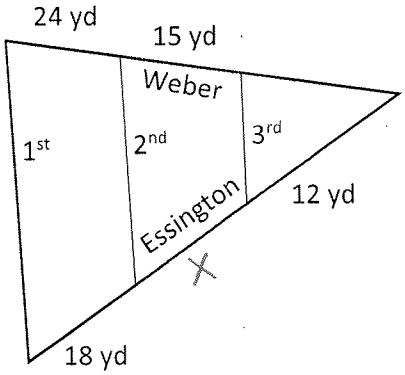
$\frac{m}{13} = \frac{30}{10}$ $\frac{10m}{10} = \frac{390}{10}$ $m = 39$

39ft





22. 1st, 2nd, and 3rd street all run parallel to each other. They Are crossed by Esington and Weber. To the nearest hundredths of a year, what is the length of Esington Street between 2nd and 3rd Street?



$\frac{24}{18} = \frac{15}{x}$ $\frac{24x}{24} = \frac{270}{24}$ $x = 11.25$

11.25yd

23. Given ΔABC on the coordinate plane to the right, ΔABC is the result of $D_{0,3}$. Graph $\Delta A'B'C'$

$A: (-2, 2) \rightarrow A': (-6, 6)$
$B: (-2, -2) \rightarrow B': (-6, 6)$
$C: (3, -2) \rightarrow C': (9, -6)$