

Secondary II Unit 4 Review

Solution Guide

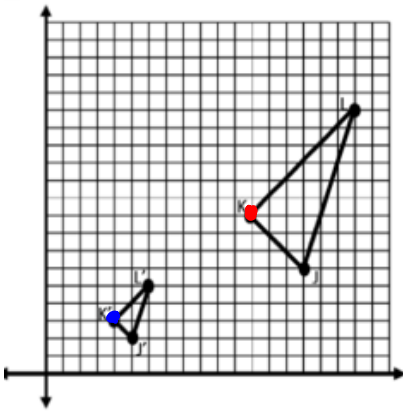
1. Define Preimage: Figure BEFORE dilation (original)
2. Define Image: Figure AFTER dilation
3. Define Dilation: Making a figure larger or smaller (shrinking/growing)

4. If $\frac{a}{b} = \frac{3}{4}$, then

a) $\frac{b}{a} = \frac{4}{3}$ b) $\frac{a+b}{b} = \frac{3+4}{4} = \boxed{\frac{7}{4}}$

c) $\frac{a}{3} = \frac{b}{4}$ d) $4a = 3b$

5. Find the scale factor:



$$K : (12, 9) \leftarrow \text{preimage}$$

$$K' : (4, 3) \leftarrow \text{image}$$

$$\frac{12 \cdot sf}{12} = \frac{4}{12}$$

$$\text{Scale factor} = \frac{1}{3}$$

6. Quadrilateral ABCD has coordinates A: (2,2) B: (4,2) C: (2,6)
D: (6,8).

a) What are the vertices of image EFGH after a dilation with a scale factor of 3, using the origin as the center of dilation?

$$\begin{array}{cccc}
 A:(2,2) & B:(4,2) & C:(2,6) & D:(6,8) \\
 2 \cdot 3 = 6 & 2 \cdot 3 = 6 & 4 \cdot 3 = 12 & 2 \cdot 3 = 6 \quad 6 \cdot 3 = 18 & 6 \cdot 3 = 18 & 8 \cdot 3 = 24
 \end{array}$$

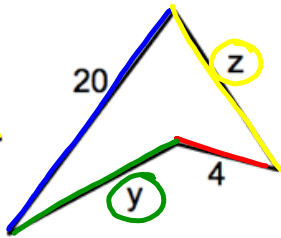
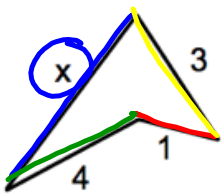
$$\boxed{E:(6,6) \quad F:(12,6) \quad G:(6,18) \quad H:(18,24)}$$

b) What are the vertices of the image JKLM after a dilation with a scale factor of $\frac{1}{2}$, using the origin as the center of dilation?

$$\begin{array}{cccc}
 A:(2,2) & B:(4,2) & C:(2,6) & D:(6,8) \\
 2 \cdot \frac{1}{2} = 1 & 2 \cdot \frac{1}{2} = 1 & 4 \cdot \frac{1}{2} = 2 & 2 \cdot \frac{1}{2} = 1 \quad 6 \cdot \frac{1}{2} = 3 & 6 \cdot \frac{1}{2} = 3 & 8 \cdot \frac{1}{2} = 4
 \end{array}$$

$$\boxed{J:(1,1) \quad K:(2,1) \quad L:(1,3) \quad M:(3,4)}$$

7. Solve the variables using the similar figures below.



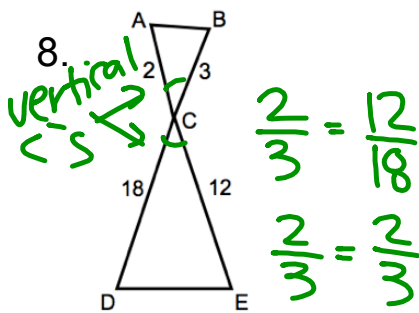
$$\frac{x}{20} = \frac{1}{4} \quad \frac{4x}{4} = \frac{20}{4}$$

$$x = 5$$

$$\frac{y}{4} = \frac{4}{1} \quad y = 16$$

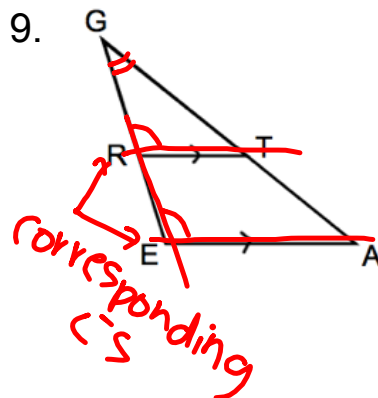
$$\frac{z}{3} = \frac{4}{1} \quad z = 12$$

If similar, which theorem can be used to state these two triangles are similar? If using proportional sides, be sure to show they are proportional. Then complete the similarity statement.



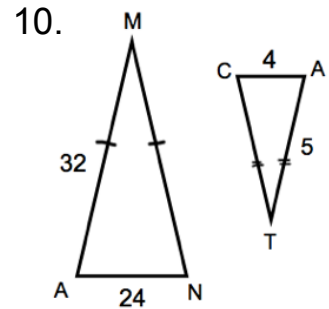
SAS ~ T

$\triangle ABC \sim \triangle EDC$



AA ~ T

$\triangle GRT \sim \triangle GEA$



$$\frac{32}{24} = \frac{5}{4}$$

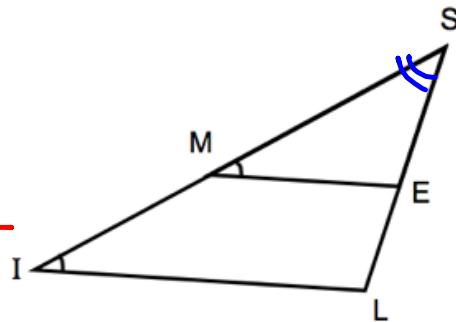
$$\frac{4}{3} \neq \frac{5}{4}$$

NOT similar

11. Prove using either a two-column or flow chart.

Given $\angle SME \cong \angle SIL$

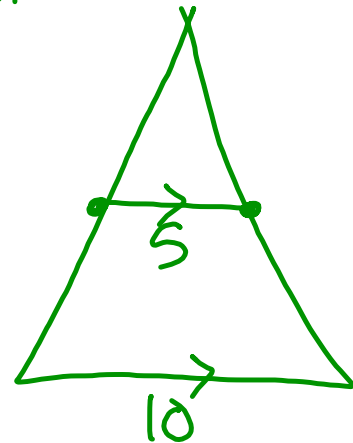
Prove $\triangle SME \sim \triangle SIL$



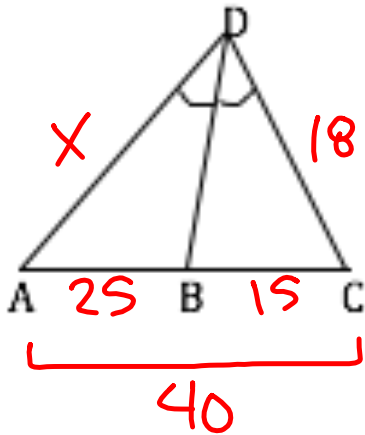
| Statement | Reason |
|------------------------------------|-----------|
| $\angle SME \cong \angle SIL$ | Given |
| $\angle S \cong \angle S$ | reflexive |
| $\triangle SME \sim \triangle SIL$ | AA~T |

12. What TWO characteristics make a segment a midsegment of a triangle?

- 1- parallel to one side
- 2- $\frac{1}{2}$ measure of parallel side



13. In the figure, $DC=18$, $AC=40$ and $AB=25$. Find AD .



$$BC = 40 - 25 = 15$$

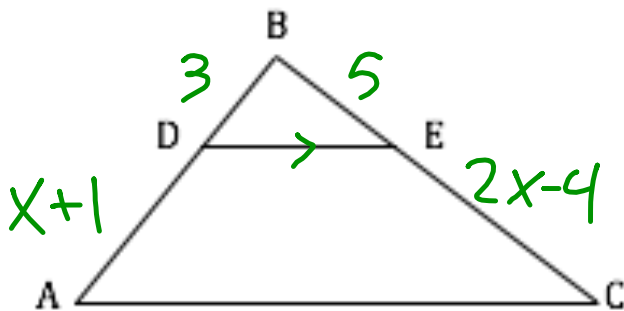
$$\frac{X}{18} = \frac{25}{15} \left. \begin{array}{l} \text{can} \\ \text{reduce or cross} \\ \text{multiply from here} \end{array} \right\}$$

$$\frac{X}{18} \times \frac{5}{3} = \frac{3X}{3} = \frac{90}{3}$$

$$X = 30$$

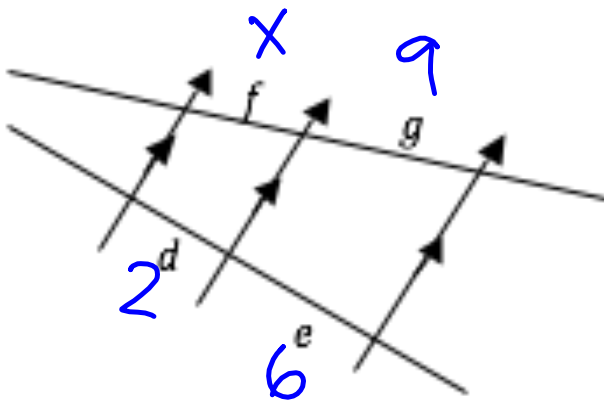
$$\boxed{AD = 30}$$

14. Given that $AC \parallel DE$, $AD = x+1$, $BD = 3$,
 $BE = 5$ and $EC = 2x - 4$, solve for x .



$$\begin{aligned} & \frac{3}{x+1} = \frac{5}{2x-4} \\ & 3(2x-4) = 5(x+1) \\ & 6x - 12 = 5x + 5 \\ & \quad -5x \quad -5x \\ & x - 12 = 5 \\ & \quad +12 \quad +12 \\ & \boxed{x = 17} \end{aligned}$$

15. Given that $d = 2$, $e = 6$, and $g = 9$, find f .



$$\frac{x}{9} = \frac{2}{6}$$
$$\frac{6x}{6} = \frac{18}{6}$$
$$\boxed{x=3}$$

$$\frac{a}{x} = \frac{x}{b}$$

$x = \text{geometric mean}$

16. Find the geometric mean between 3 and 18.

$\frac{a}{b}$

$$\frac{3}{x} \times \frac{x}{18} = \frac{\sqrt{54}}{\sqrt{x^2}}$$

$$\begin{array}{r} 3 \\ \sqrt{54} \\ \hline 18 \end{array}$$

$$\begin{array}{r} 3 \\ \sqrt{18} \\ \hline 9 \end{array}$$

$$\begin{array}{r} 3 \\ \sqrt{9} \\ \hline 3 \end{array}$$

$$\sqrt{3 \cdot 2 \cdot 3 \cdot 3}$$

$$\boxed{3\sqrt{6} = x}$$

geometric mean

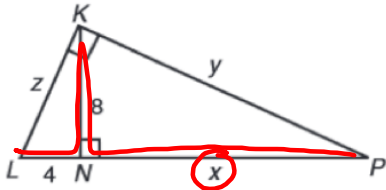
17. 6 is the ^xgeometric mean of $\frac{13}{a}$ and _____

$$\frac{13}{6} \times \frac{6}{x}$$

$$\frac{13x}{13} = \frac{36}{13}$$

$$\boxed{x = \frac{36}{13}}$$

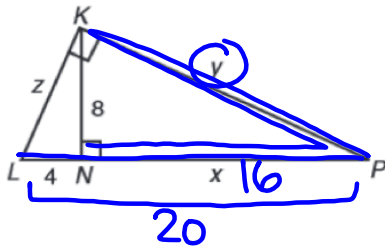
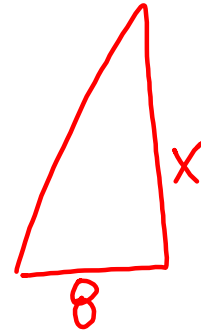
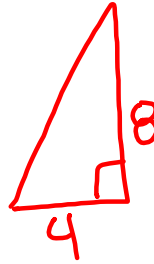
18. Find the values of the variables.



$$\frac{4}{8} = \frac{8}{y}$$

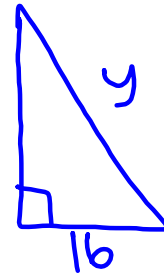
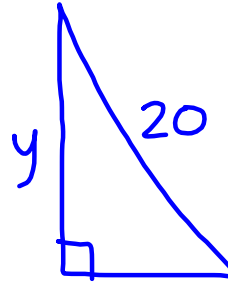
$$4x = \frac{64}{4}$$

$$x = 16$$



$$\frac{20}{y} = \frac{y}{16}$$

$$\sqrt{320} = \sqrt{y^2}$$



$$16 \sqrt{20}$$

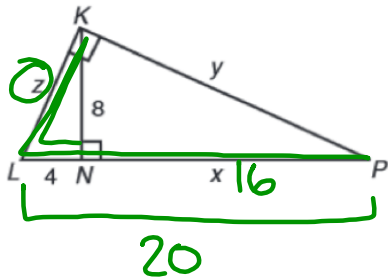
$$4 \sqrt{4} \sqrt{5} \sqrt{4}$$

$$2 \sqrt{2}$$

$$\sqrt{4 \cdot 4 \cdot 5 \cdot 2 \cdot 2}$$

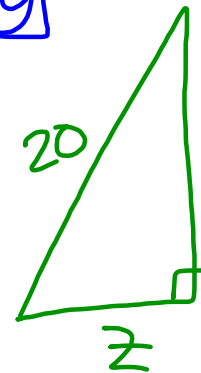
$$4 \cdot 2 \sqrt{5} = y$$

$$8\sqrt{5} = y$$



$$\frac{20}{z} = \frac{z}{4}$$

$$\sqrt{80} = \sqrt{z^2}$$



$$10 \sqrt{8}$$

$$5 \sqrt{2} \sqrt{2} \sqrt{4}$$

$$2 \sqrt{2}$$

$$\sqrt{5 \cdot 2 \cdot 2 \cdot 2 \cdot 2}$$

$$4\sqrt{5} = z$$

Give the formula for each of the following:

19. Volume of Triangular Prism:

$$V = Ah \quad \text{Area of } \Delta \quad A = \frac{bh}{2}$$

20. Volume of Rectangular Prism:

$$V = Ah \quad \text{Area of rect} \quad A = lw$$

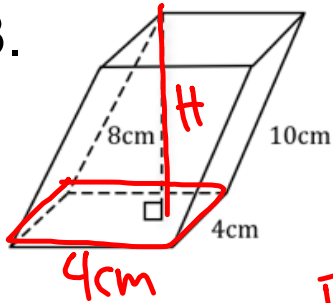
21. Volume of Rectangular Pyramid:

$$V = \frac{Ah}{3} \quad \text{Area of rect} \quad A = lw$$

22. Volume of Triangular Pyramid:

$$V = \frac{Ah}{3} \quad \text{Area of } \Delta \quad A = \frac{bh}{2}$$

23.



Prism

$$V = AH$$

$$V = 16 \cdot 8$$

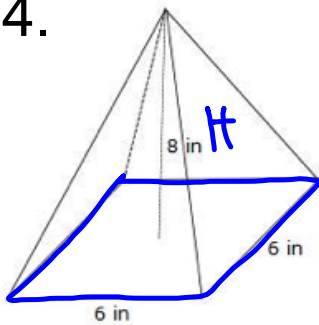
$$V = 128 \text{ cm}^3$$

Rectangle

$$A = lw$$

$$A = 4 \cdot 4 = 16$$

24.



Pyramid

$$V = \frac{AH}{3}$$

$$= \frac{36 \cdot 8}{3}$$

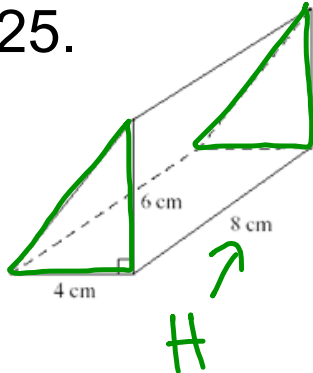
$$= \frac{288}{3} = 96 \text{ in}^3$$

Rectangle

$$A = lw$$

$$A = 6 \cdot 6 = 36$$

25.



Prism
 $V = Ah$

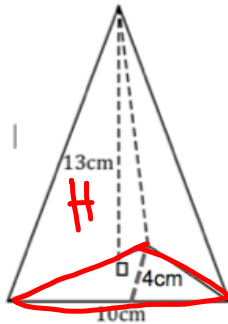
$$= 12 \cdot 8$$

$$V = 96 \text{ cm}^3$$

Triangle
 $A = \frac{bh}{2}$

$$A = \frac{4 \cdot 6}{2} = \frac{24}{2} = 12$$

26.



Pyramid
 $V = \frac{Ah}{3}$

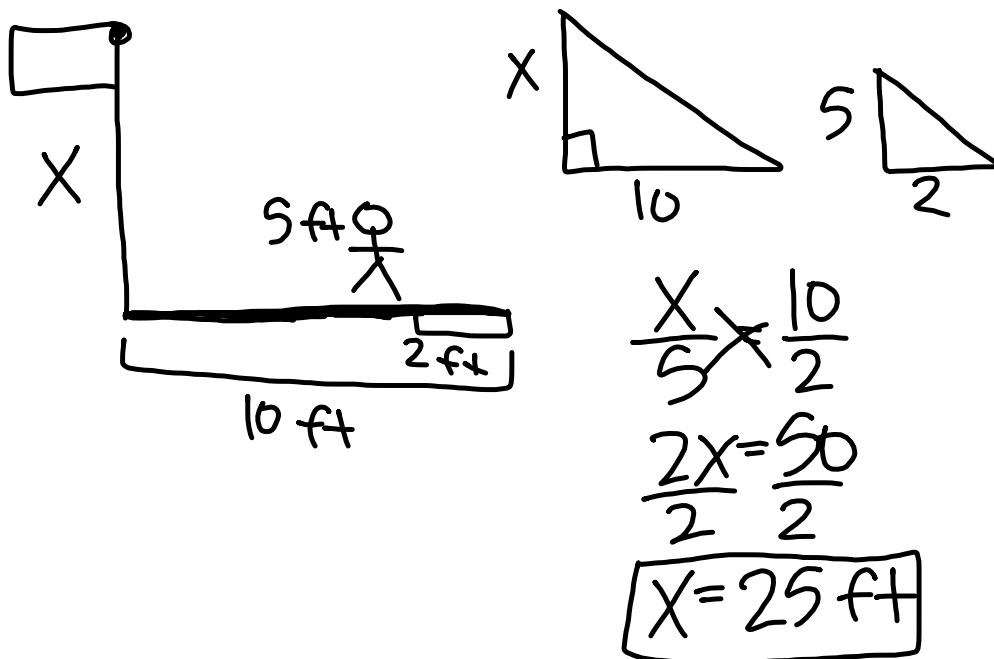
$$= \frac{20 \cdot 13}{3}$$

$$\approx 86.7 \text{ cm}^3$$

Triangle
 $A = \frac{bh}{2}$

$$= \frac{10 \cdot 4}{2} = \frac{40}{2} = 20$$

27. You are trying to estimate the height of the school's flagpole. You stand so the tip of the flagpoles shadow and the tip of your shadow meet. The length of the flagpoles shadow is 10 feet and the length of your shadow is 2 feet. You are 5 feet tall. Draw a diagram and determine the height of the flagpole.



28. You are visiting the coast and come to a lighthouse. You want to estimate its height. You put a small mirror on the ground 10 feet from the lighthouse. You have your little sister walk 2 feet away from the mirror to see the top. Your sister's eyes are 4 feet from the ground. Draw a diagram. To the nearest foot, how tall is the lighthouse?

