Ch 10 Review, pp. 421-424 #1-62

Def: The ratio of the number a to the number b is the number a/b.
A proportion is an equality between ratios. a/b=c/d

a, b, c, and d are called the *first, second, third, and fourth terms*.
The second and third terms, b and c, are called the means.
The first and fourth terms, a and d, are called the extremes.

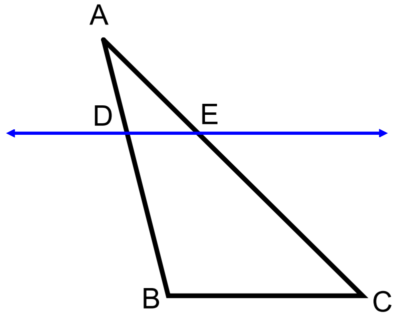
The product of the means is equal to the product of the extremes.
If a/b=c/d, then ad=bc.

Def: The number b is the geometric mean between the numbers a and c if a, b, and c are positive and a/b=b/c.

Def: Two triangles are similar iff there is a correspondence between their vertices such that their corresponding sides are proportional and their corresponding angles are equal.

10.3 - The Side-Splitter Theorem

Theorem 44 - The Side-Splitter Theorem
If a line parallel to one side of a triangle intersects the other two sides in different points, it divides the sides in the same ratio, that is, if in triangle ABC, DE||BC, then AD/DB=AE/EC.



Corollary to the Side-Splitter Theorem:
If a line parallel to one side of a triangle intersects the other two sides in different points, it cuts off segments proprtional to the sides, that is, AD/AB=AE/AC and DB/AB=EC/AC

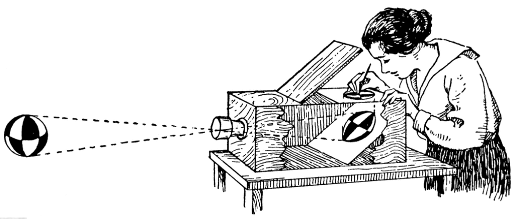
10.4 - AA Similarity

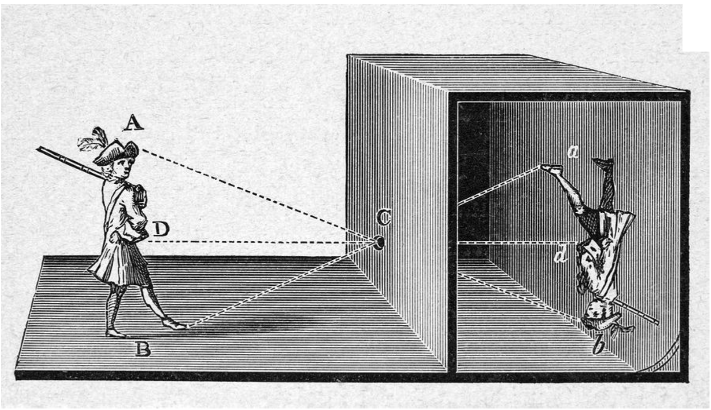
Theorem 45 - The AA Theorem - If two angles of one triangle are equal to two angles of another triangle, the triangles are similar.

Corollary to the AA Theorem - Two triangles similar to a third triangle are similar to each other.

10.5 - Proportions and Dilations

Camera Obscura





SAS Similarity Theorem: If an angle of one triangle is equal to an angle of another triangle and the sides including these angles are proportional, then the triangles are similar.

Given: ΔABC and ΔA'B'C' with ∠A=∠A' and $\frac{b}{b'} = \frac{c}{c'}$.
Prove: ΔABC~ΔA'B'C'

SSS Similarity Theorem: If the sides of one triangle are proportional to the sides of another triangle, then the triangles are similar.

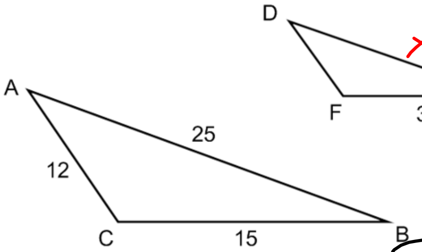
Given: ΔABC and ΔA'B'C' with $\frac{a}{a'} = \frac{b}{b'} = \frac{c}{c'}$.
Prove: ΔABC~ΔA'B'C'

Theorem 46 - Corresponding altitudes of similar triangles have the same ratio as that of the corresponding sides.

Theorem 47 - The ratio of the perimeters of two similar polygons is equal to the ratio of the corresponding sides.

Theorem 48 - The ratio of the areas of two similar polygons is equal to the square of the ratio of the corresponding sides.

Length of side DE if $\triangle ABC \sim \triangle DEF$

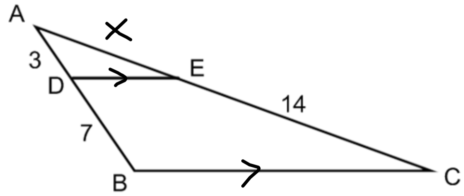


$$\frac{x}{25} = \frac{3}{15}$$

$$x = \frac{3}{15} \cdot \frac{25}{1} = 5$$

DE = 5

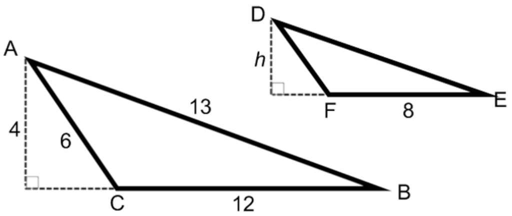
Length of segment AE if $DE \parallel BC$



$$\frac{x}{14} = \frac{3}{7}$$

$$x = \frac{3}{7} \cdot \frac{14}{1} = 6$$

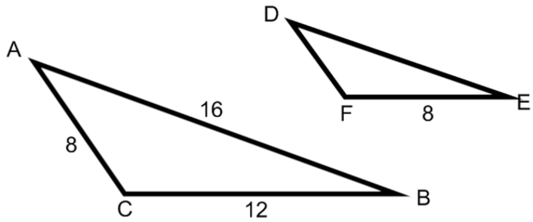
Altitude *h* of ΔDEF $\triangle ABC \sim \triangle DEF$



$$\frac{h}{4} = \frac{8}{12}$$

$$h = \frac{8}{12} \cdot \frac{4}{1} = \frac{8}{3}$$

Perimeter of ΔDEF

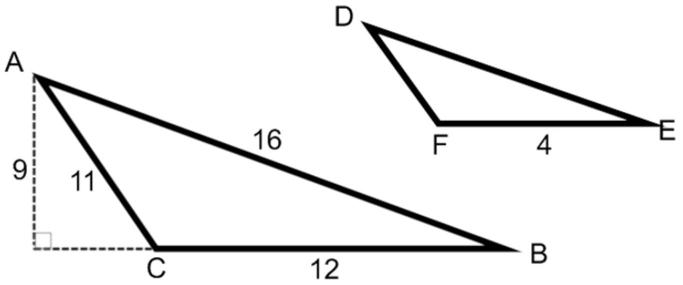


$$\frac{p\triangle DEF}{p\triangle ABC} = \frac{EF}{BC}$$

$$\frac{p\triangle DEF}{36} = \frac{8}{12}$$

$$p\triangle DEF = \frac{8}{12} \cdot \frac{36}{1} = 24$$

Area of ΔDEF



$$\frac{\alpha \triangle DEF}{\alpha \triangle ABC} = \frac{(EF)^2}{(BC)^2}$$

$$\frac{\alpha \triangle DEF}{\frac{1}{2}(12)(9)} = \frac{4^2}{12^2}$$

$$\frac{\alpha \triangle DEF}{54} = \frac{16}{144}$$

$$\alpha \triangle DEF = \frac{16}{144} \cdot \frac{54}{1} = \boxed{6}$$