

Similar Triangles Handout

Congruent figures:

Similar figures:

Examples:

a) All circles are similar.

b) All squares are similar.

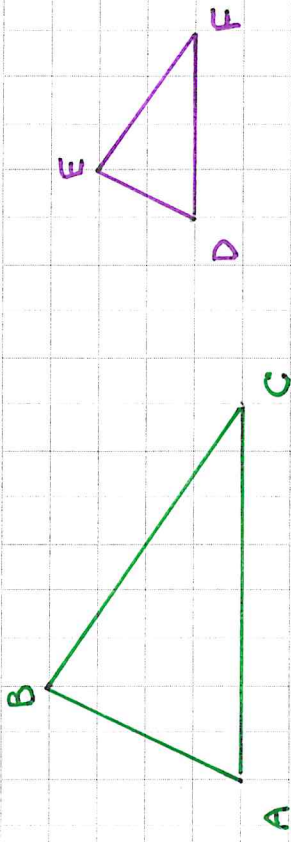
c) All equilateral triangles are similar.

d) Not all triangles are similar

Equilateral Triangle

Right Triangle

QUESTION: Suppose that $\triangle ABC$ is similar to $\triangle DEF$. Then what must be true about their angles?



ANSWER:

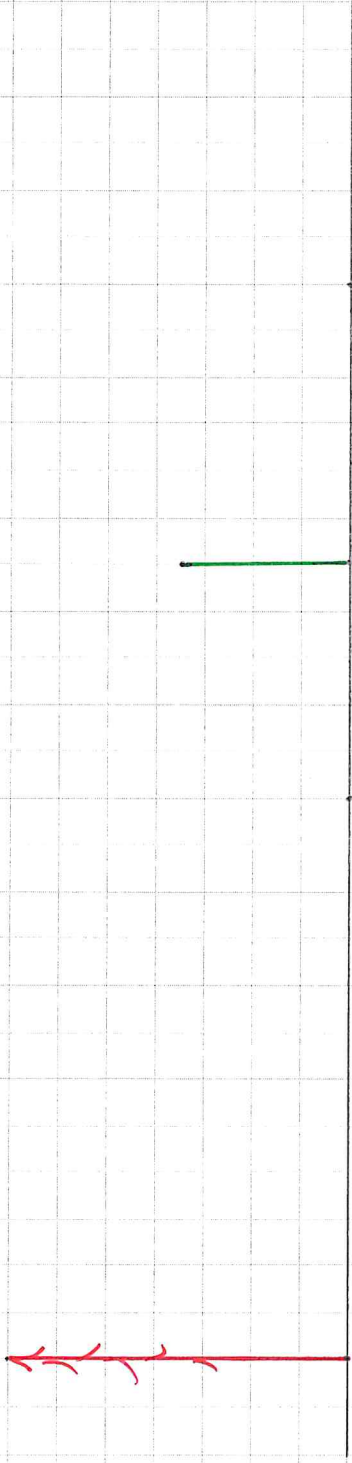
THEOREM: If two angles of one triangle are equal to two angles of another triangle, then the triangles are similar.

Notation:

THEOREM: If two triangles are similar, then their corresponding sides are in proportion.

In symbols:

Ex. ① APPLICATION: Find the height of a tree by using shadow lengths and similar triangles.



Note:

So,

Extended Proportion:

Then:

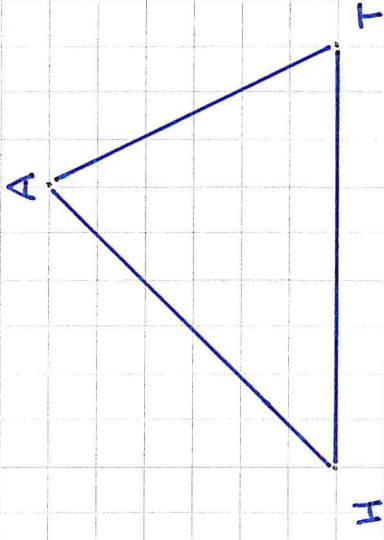
Ex. ② Overlapping Triangles

a) Name two similar triangles.

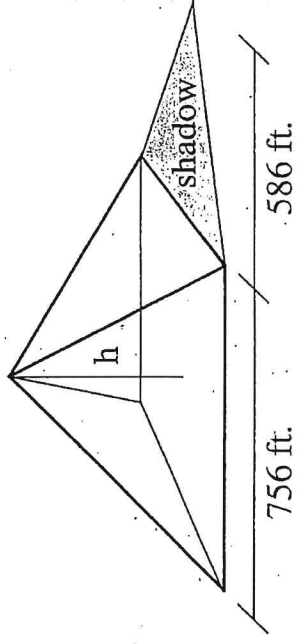
b) Write an extended proportion.

c) Given that: $AT = 10$, $HA = 12$ and $EA = 6$, find AR .

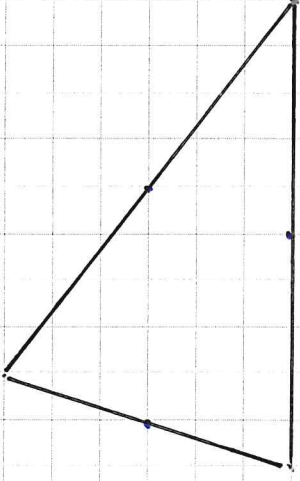
d) Given that: $ER = 4$, $HT = 9$ and $HE = 3$, find EA .



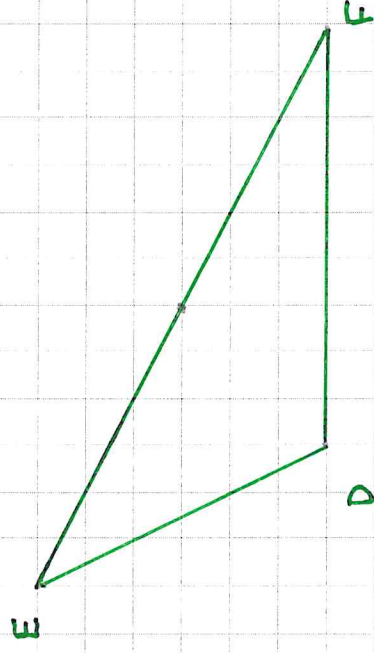
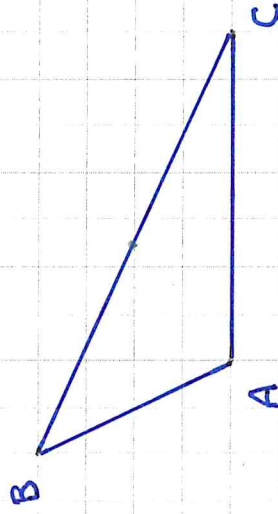
Ex. ③ Find the height of the great pyramid of Giza if a yardstick casts a 6 ft. shadow at the same time that the pyramid casts a 586 ft. shadow.



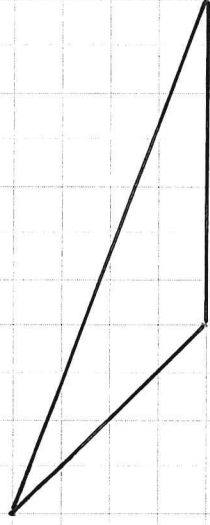
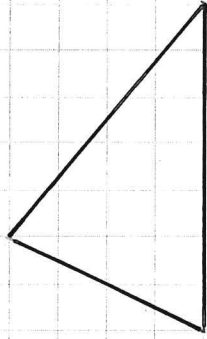
Definition: The median of a triangle is a segment that joins a vertex to the midpoint of the opposite side.



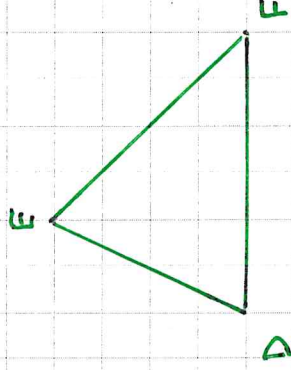
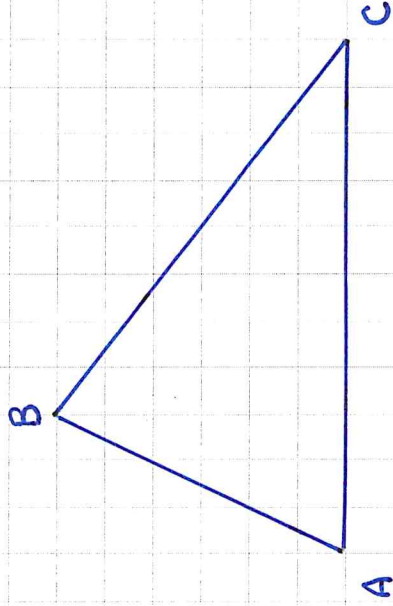
THEOREM: If $\triangle ABC \sim \triangle DEF$ then the corresponding medians are in the same proportion as the sides.



Definition: An altitude of a triangle is the segment drawn from one vertex of a triangle, perpendicular to the opposite side.

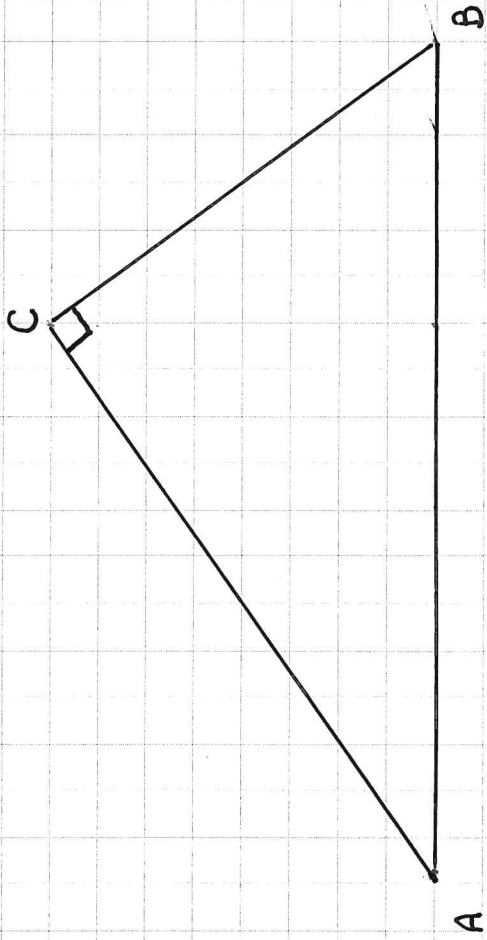


THEOREM: If $\triangle ABC \sim \triangle DEF$ then the altitudes are in the same proportion as the sides.



The Pythagorean Theorem

In any right triangle, the sum of the squares on the legs is equal to the square on the hypotenuse.



Proof: Note that $\triangle ABC \sim \triangle$

and $\triangle ABC \sim \triangle$

Now

and

Thus,