

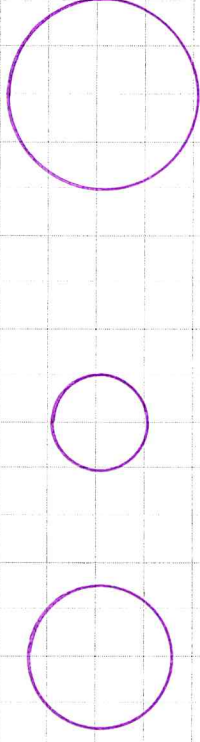
## Similar Triangles Handout

Congruent figures: Same size and same shape.

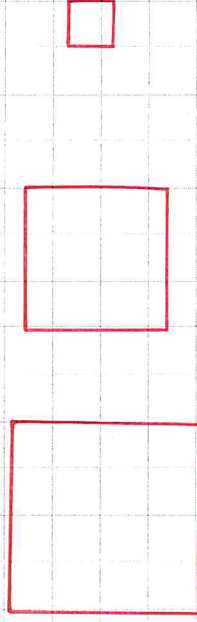
Similar figures: Same shape (Enlarged/Reduced)

Examples:

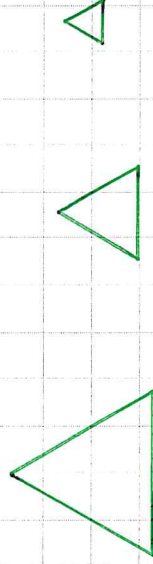
a) All circles are similar.



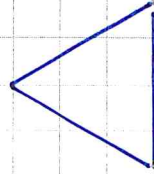
b) All squares are similar.



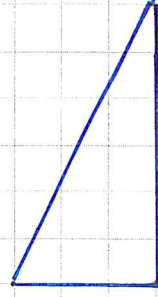
c) All equilateral triangles are similar.



d) Not all triangles are similar

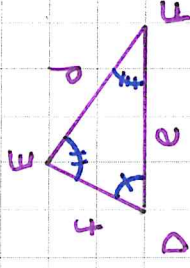
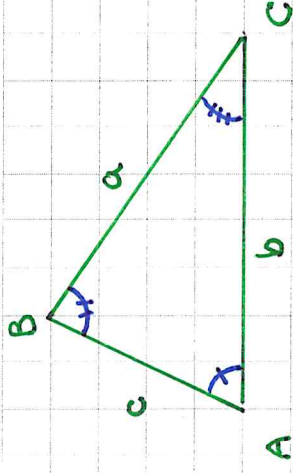


Equilateral Triangle



Right Triangle

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



ANSWER:  $\angle A = \angle D$ ,  $\angle B = \angle E$ ,  $\angle C = \angle F$

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

Corresponding angles match

Notation:  $\triangle ABC \sim \triangle DEF$

( $\triangle CAB \sim \triangle FDE$ )

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

In symbols:

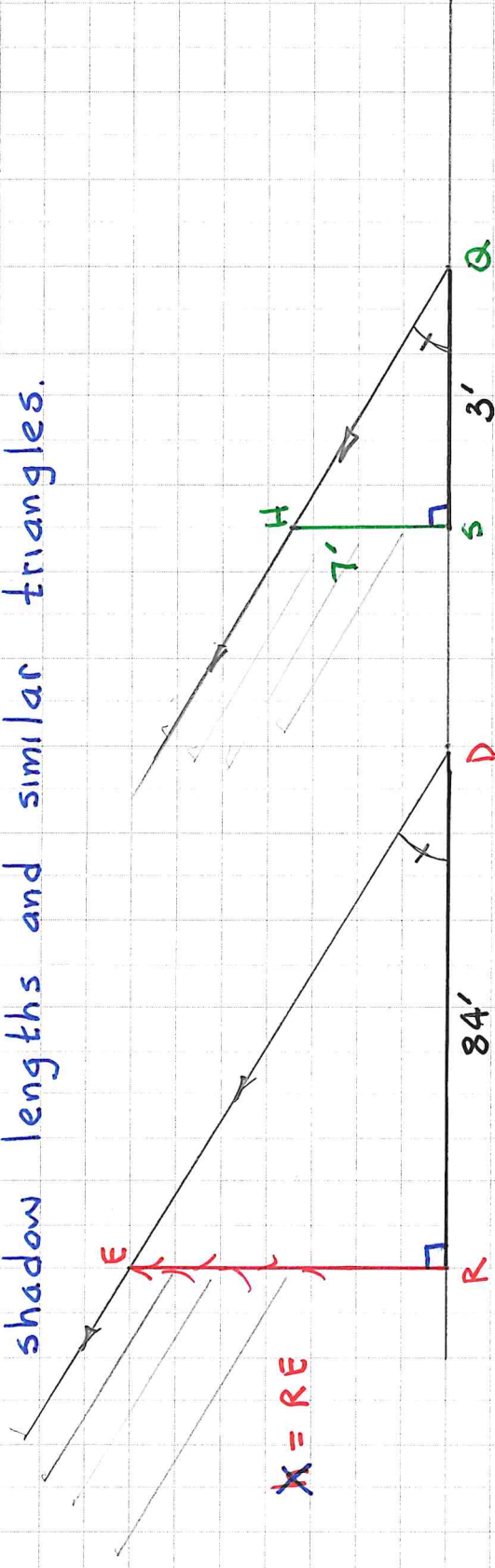
$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

or  $\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$

An Extended Proportion



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



Note:  $\angle R = \angle S$  (right angles) &  $\angle D = \angle Q$  (corresponding  $\angle$ s)

So,  $\triangle RED \sim \triangle SHQ$

Extended Proportion:  $\frac{RE}{SH} = \frac{ED}{HQ} = \frac{RD}{SQ}$

Shadow lengths

Then:  $\frac{x}{7} = \frac{84}{3} \Rightarrow 3x = 7(84) \Rightarrow x = \frac{7(84)}{3} = \boxed{196 \text{ ft.}}$

## Ex. ② Overlapping Triangles

a) Name two similar triangles.

$$\triangle HAT \sim \triangle EAR$$

b) Write an extended proportion.

$$\frac{HA}{EA} = \frac{AT}{AR} = \frac{HT}{ER}$$

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

$$\frac{2}{1} = \frac{12}{6} = \frac{10}{x} \Rightarrow 12x = 6(10) \Rightarrow x = \frac{60}{12} = \boxed{5}$$

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

$$\frac{3+x}{x} = \frac{9}{4} \Rightarrow 4(3+x) = 9x \Rightarrow 12 + 4x = 9x$$

$$\Rightarrow 12 = 5x \Rightarrow x = \boxed{12/5}$$

