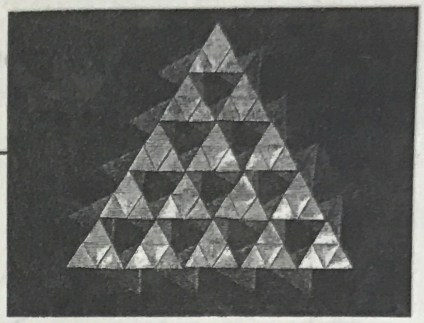
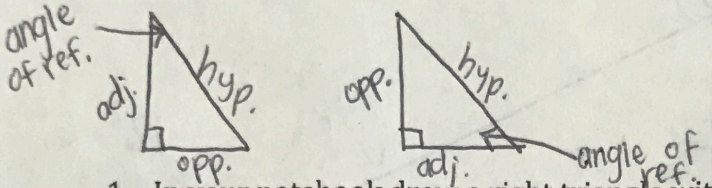
6.8 Are Relationships Predictable?

A Develop Understanding Task





1. In your notebook draw a right triangle with one angle of 60°.
   Measure each side of your triangle as accurately as you can with a centimeter ruler.
   Using the 60° angle as the ***angle of reference*** list the measure for each of the following:

Answers will vary

Length of the ***adjacent*** side: 4.9 cm Length of the ***opposite*** side: 8.7 cm

Length of the ***hypotenuse***: 9.8 cm

2. Create the following ratios using your measurements:

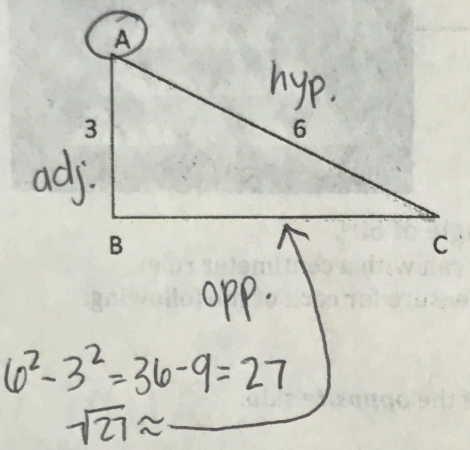
$$\text{sine} \quad \frac{\text{opposite side}}{\text{hypotenuse}} = \frac{8.7}{9.8} \approx 0.87 \qquad \text{cosine} \quad \frac{\text{adjacent side}}{\text{hypotenuse}} = \frac{4.9}{9.8} \approx 0.5$$

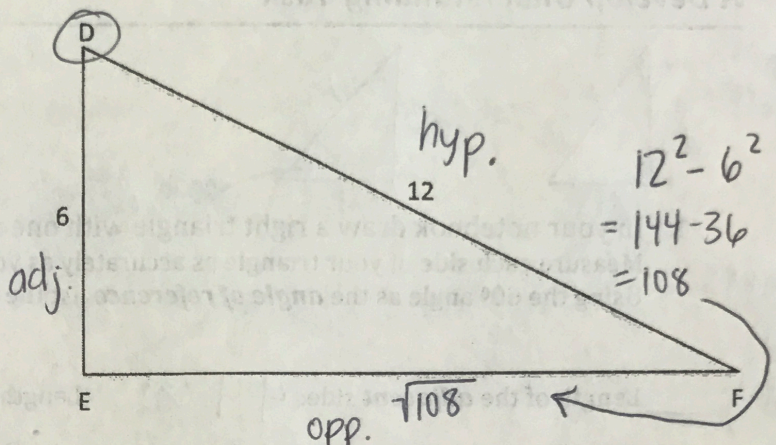
$$\text{tangent} \quad \frac{\text{opposite side}}{\text{adjacent side}} = \frac{8.7}{4.9} \approx 1.76$$

3. Compare your ratios with others that had a triangle of a different size. What do you notice? Explain any connections you find to others' work?

Ratios should be the same or close to the same as everyone else's.

4. In the right triangles below find the missing side length and then create the desired ratios based on the angle of reference (angle A and angle D).





List the ratios for ΔABC using angle A as the angle of reference.

$\sin(A)=\frac{\text{opposite side}}{\text{hypotenuse}}=\frac{\sqrt{27}}{6}\approx 0.8\overline{6}$

$\cos(A)=\frac{\text{adjacent side}}{\text{hypotenuse}}=\frac{3}{6}=0.5$

$\tan(A)=\frac{\text{opposite side}}{\text{adjacent side}}=\frac{\sqrt{27}}{3}\approx 1.73$

List the ratios for ΔDEF using angle D as the angle of reference.

$\frac{\text{opposite side}}{\text{hypotenuse}}=\frac{\sqrt{108}}{12}=0.8\overline{6}$

$\frac{\text{adjacent side}}{\text{hypotenuse}}=\frac{6}{12}=0.5$

$\frac{\text{opposite side}}{\text{adjacent side}}=\frac{\sqrt{108}}{6}=1.73$

5. What do you notice about the ratios from the two given triangles? How do these ratios compare to the ratios from the triangle you made on the previous page?

They are the same and really close to the ones on the front page

6. What can you infer about the angle measures of ΔABC and ΔDEF ? Explain?

They must have congruent corresponding angle because their side ratios are the same.

7. Why do the relationships you have noticed occur?

Because all triangles so far have a 90° and a 60° so all the triangles are similar which means the sides are proportional.

8. What can you conclude about the ratio of sides in a right triangle that has a 60°? Would you think that right triangles with other angle measures would have a relationship among there ratios?

Any two triangles with two pairs of matching angles will have the same ratio for sine, cosine, tangent.