CW2: The Golden Ratio
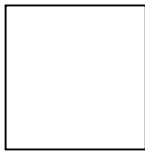
① **What is the Golden Ratio?** (Give a verbal explanation and number representation to 3 decimal places.)

_____

_____

② Construct A Golden Rectangle: Method One Use a straightedge!
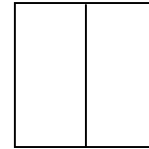
Step1:
Make a square ON A SHEET OF GRAPH PAPER, any square (just remember that all sides have to have the same length, and all angles have to measure 90 degrees!):
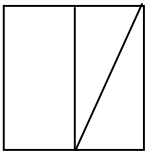
Step 2
Now, divide the square in half (bisect it). Be sure to use your protractor to divide the base and to form another 90°angle: (Notice that we have made two rectangles.)
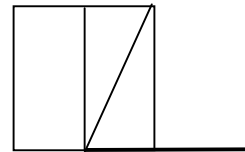
Step 3
Now, draw in one of the diagonals of one of the rectangles:
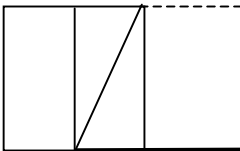
Measure the length of the diagonal: _____

Step 4
Now extend the base of the square from the midpoint of the base by a distance equal to the length of the diagonal (the length of the diagonal should be equal to the distance from the midpoint of the OLD base to the edge of your NEW base):

Step5
Construct a new line perpendicular to the base at the end of our new line, and then connect to form a rectangle:

Measure the length and the width of your rectangle.

Length _____   Width _____

Now, find the ratio of the length to the width:

_____

What do you notice about the ratio? _____

_____

③ Construct A Golden Rectangle: Method Two Use a straightedge!

Step1:
Start with a square ON A SHEET OF GRAPH PAPER. Make sure all sides are congruent. Use a small square to conserve space, because the golden rectangle will be built around this square in a clockwise direction.
Call this square a unit square, and say that it has a side of length 1.

Step 2
Now, let's build another, congruent square to the right of first one: (a rectangle with width 1 and length 2 units)
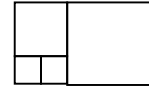
Step3:
Build a square on top of this rectangle, so that the new square will have a side of 2 units: (a new rectangle with width 2 and length 3)
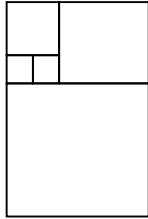
Step 4
Continue the process, building another square on the right of our rectangle. This square will have a side of 3: (a rectangle of width 3 and length 5)
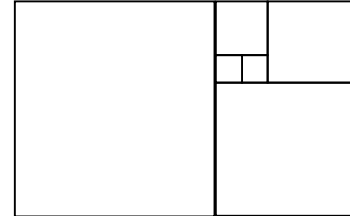
Step5:
Again, let's build upon this rectangle and construct a square underneath, with a side of 5. The new rectangle has a width of 5 and a length of 8
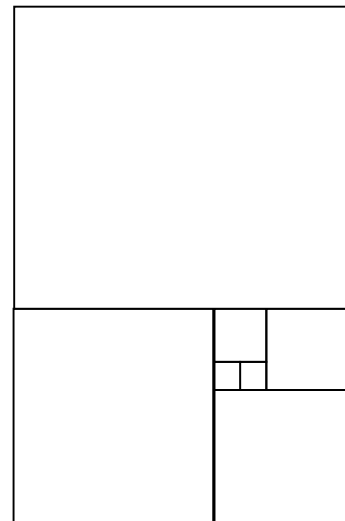
Step5:
Build upon this rectangle and construct a square to the left. The new rectangle has a width of 8 and a length of 13.

Step5:
The final rectangle has a width of 13 and a length of 21. Notice that the golden rectangle has successive side lengths from the Fibonacci sequence (1, 1, 2, 3, 5, 8, 13, ...)!

④ The Perfect Face

Find a face from a magazine – **choose a large sized picture so it will be easier to measure**. **ATTACH YOUR PICTURE**. Find the following measurements, to the nearest tenth of a centimeter:

a. Top-of-head to chin _____

b. Top-of-head to pupil

c. Pupil to nosetip _____

d. Pupil to lip _____

e. Width of nose _____

f. Outside distance between eyes _____

g. Width of head _____

h. Hairline to pupil _____

i. Nose-tip to chin _____

j. Lips to chin

k. Length of lips _____

l. Nose-tip to lips _____

Now, find the following ratios:

a/g = _____

b/d = _____

i/j = _____

i/c = _____

e/l = _____

f/h = _____

k/e = _____

Did any of these ratios come close to being Golden? If not, then maybe this face isn't so perfect after all.