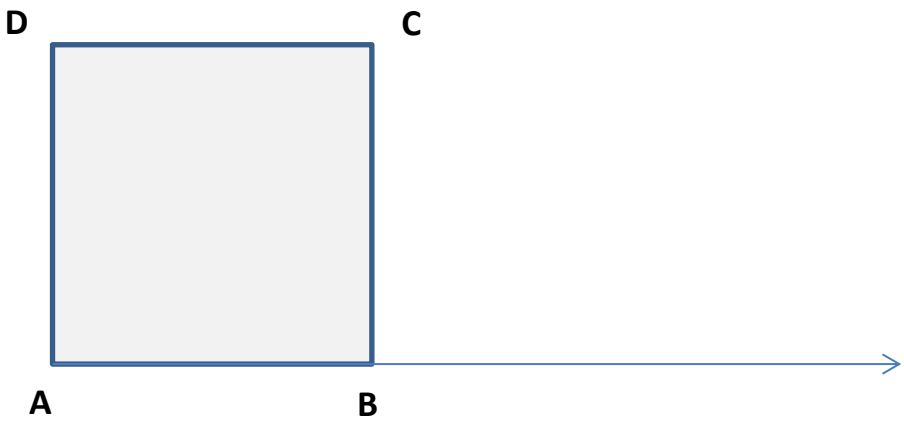
NAME _____

Special Ratios Activity

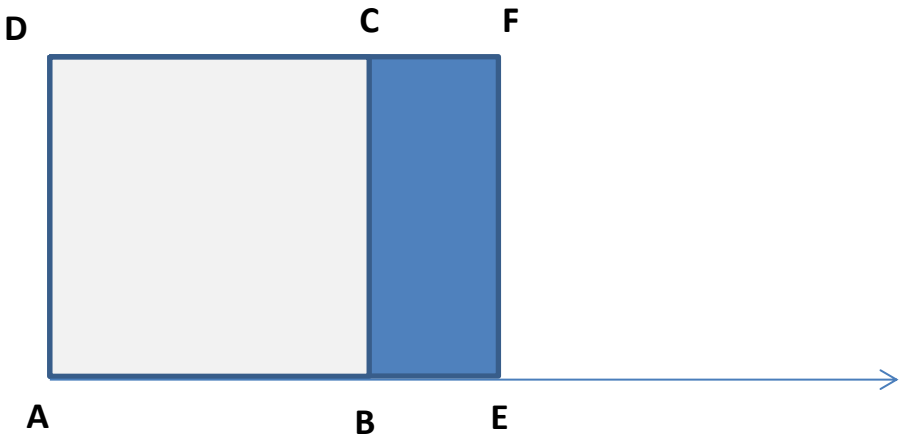
1. Hold a piece of string stationary with your left hand at vertex A of the square ABCD below and stretch the other end towards vertex C with your right hand. With your finger keeping track of the distance from A to C, swing the string down with your right hand and mark the point E on the ray $\overrightarrow{AB}$, so that AC = AE.



Assuming that AB=1, then BC = _____. What is AC=AE= _____? (Hint: use the Pythagorean Theorem.)

Draw a perpendicular up from E and extend segment $\overline{DC}$ until the two lines intersect. Label the point of intersection F, forming a rectangle AEFD. The ratio of the longer side of rectangle AEFD to the shorter side is _____ to _____ (put the larger number first) .

2. Rectangle AEFD below has sides in ratio of $\sqrt{2}$ to 1. As in part 1, start with one end of a string at vertex A and stretch to the opposite vertex F with your right hand. Swing the string down to mark point G on the ray $\overrightarrow{AB}$, so that AF = AG.

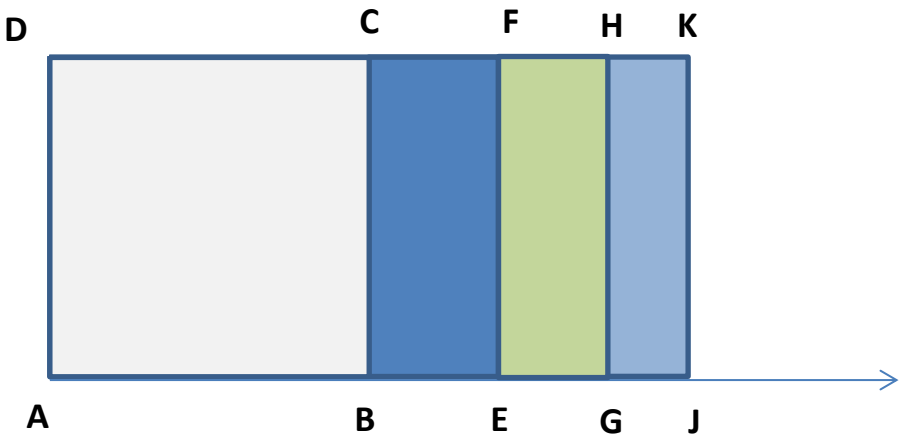


Assuming that AD=1 and AE= $\sqrt{2}$, then EF = _____. What is AF= AG= _____?
(Hint: use the Pythagorean Theorem.)

Draw a perpendicular up from G and extend segment $\overline{DC}$ until the two intersect. Label the point of intersection H, forming a rectangle AGHD. The ratio of the longer side of rectangle AGHD to the shorter side is _____ to _____ (put the larger number first) .

Compare the ratios of the rectangles ABCD and AGHD from parts 1 and 2. Conjecture what the ratio will be if we repeat the process to rectangle AGHD to form a rectangle AJKD. Check to see whether your conjecture is true or not.

3. Rectangle AJKD below has sides in ratio of 2 to 1. As in parts 1 and 2, start with one end of a string at vertex A and stretch to the opposite vertex K with your right hand. Swing the string down to mark point L on the ray $\overrightarrow{AB}$, so that AK = AL.



Assuming that AD=1 and AJ= 2 then KJ = _____. What is AK= AL= _____? (Hint: use the Pythagorean Theorem.)

Draw a perpendicular up from L and extend segment $\overline{DK}$ until the two intersect. Label the point of intersection M, forming a rectangle ALMD. The ratio of the longer side of rectangle ALMD to the shorter side is _____ to _____ (put the larger number first) .

Does this match the pattern of the ratios of the sides of the rectangles? _____

List the next three numbers in the pattern: _____ , _____ , _____

This process of beginning with a square and using a cord to construct rectangles whose sides are in square root ratios was actually used by the classic Maya in their architecture. For more information, check out the article “Maya Geometry in the Classroom” by Dr. John C.D. Diamantopoulos and Dr. Cynthia J. Woodburn.