Geometry activities and handouts

Activity 1

Have each participant draw a rectangle. Is it in standard position (one side parallel to the bottom of the page)? Discuss why it is in standard position.

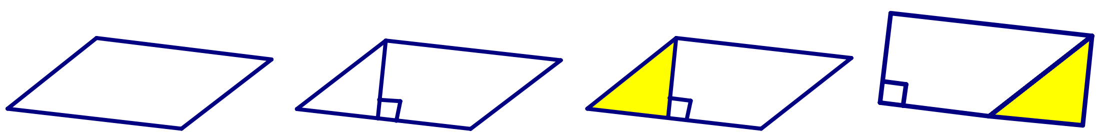
Have each participant color their rectangle. How many colored the inside of the rectangle? By definition, a polygon divides the plane into three sets of points: those points outside the polygon, those points inside the polygon, and those points ON the polygon. The rectangle is the set of points on it, not those inside it.

Have each participant compare the long and short side lengths of their rectangle. It is fairly typical to see:

$\frac{\text{Short}}{\text{Long}} \approx 0.6180339\ldots$, which is the golden ratio? What part of the group was close to the golden ratio?

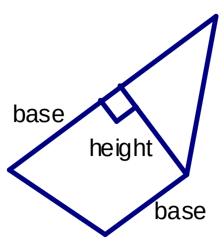
Activity 2

Have the participants show sketches on how to convert a parallelogram to a rectangle.



Activity 3

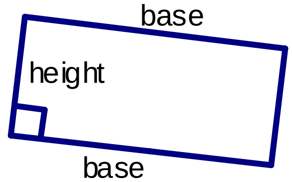
Review the formula for the area of a trapezoid.



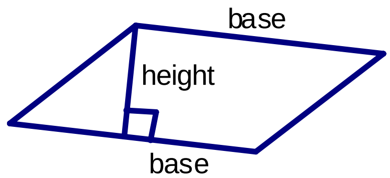
$\left(\frac{b_1 + b_2}{2}\right)(h)$ - - average of bases times height

Activity 4

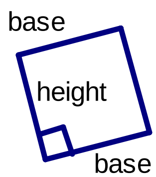
Have the participants discuss the trapezoid area formula as a means of finding the areas of other figures.



A = (Base)(height), not (length)(width)

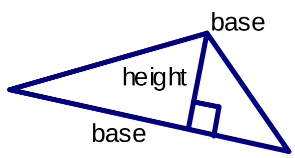


A = (Base)(height), as usual



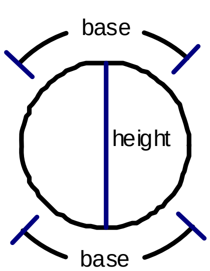
A = (base)(height), not (side)(side) or s^2

$$\left(\frac{\text{side} + \text{side}}{2}\right)(\text{side}) = \left(\frac{\cancel{2}(\text{side})}{\cancel{2}}\right)(\text{side}) = (\text{side})^2 = s^2$$



$$A = \frac{(\text{base})(\text{height})}{2}$$

$$\left(\frac{\text{base} + \text{zero}}{2}\right)(\text{height}) = \left(\frac{\text{base}}{2}\right)(\text{height}) = \frac{(\text{base})(\text{height})}{2}$$



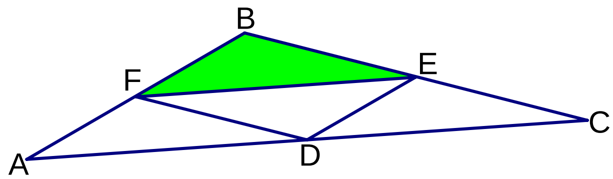
base is one fourth of the circumference or $0.5\pi r$

$$\left(\frac{0.5\pi r + 0.5\pi r}{2}\right)(2r) = \left(\frac{\pi r}{\cancel{2}}\right)(\cancel{2}r) = (\pi r)(r) = \pi r^2$$

Is this one formula fits all too confusing? Is there a value to teaching it?

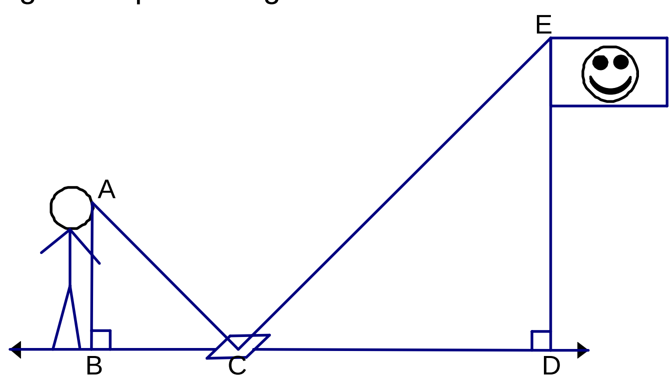
Activity 5

What conclusions can be drawn from this figure?



Activity 6

Finding the height of a pole using a mirror and marble.



NOTE - - if you opt to do this activity, you would need a mirror, marble, and a linear measuring device.

Activity 7

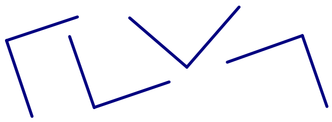
Have the participants compute the area of a triangle using Hero's formula:

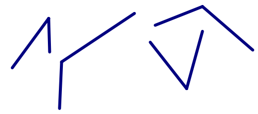
$A = \sqrt{s(s - a)(s - b)(s - c)}$, where $s = 0.5(a + b + c)$. How many were aware of this formula?

Activity 8

This is an alternate way to present definitions

These are right angles



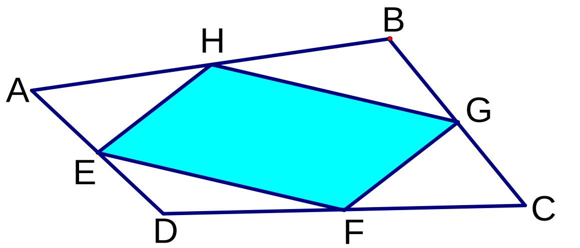


These are not right angles

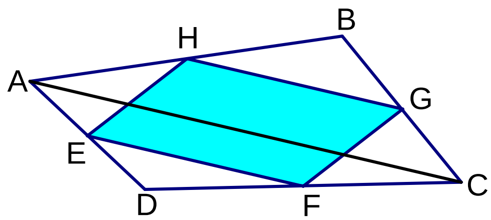
Have the participants divide into subgroups and each group creates a similar example, to be presented to the entire group. The entire group is to build a definition from the information given.

Activity 9

Ask the participants to tell the shape of EFGH, knowing that E, F, G, and H are midpoints of their respective sides.



Then ask the participants how they could prove their statement is correct.



Segment AC creates triangle ABC and it is known that H is a midpoint of AB and G is a midpoint of BC. Use the theorem that the segment joining the midpoints of two sides of a triangle is parallel to the third side and half its length. Similarly, EF is parallel to AC and half its length. Thus, GH and EF are parallel to AC, making them parallel, and since both of them are half the length of AC, they must be congruent. A quadrilateral with parallel sides that are the same length must be a parallelogram.

Activity 10

Show this example of the work of M. C. Escher and have participants search the internet for other examples to show and discuss.