Area Challenge Questions for File 2

Each of these questions is based on **n** = 4 and ***J*** = 1. The vertex frame that results is a square embedded in a circle of radius 1.

1. Set ***S*** = ***P*** = 1. What is the area of that square? How did you derive your answer?

FACT: There are at least 4 ways to do this.

> A) Suppose you **do not** know about square roots. You **do not** know about the formula for the area of a triangle. You do know about the area of a rectangle and you know that if you cut apart an image and reorganize the pieces then the total area remains the same, as long as the pieces do not overlap. How might you proceed?
>
> B) Suppose you **do not** know about square roots. You **do not** know about the area of a triangle. You **do not** know how to rearrange pieces as in A. You do know about the area of a rectangle and you know how to reflect a portion of the image so that it overlaps with the rest of the image. How might you proceed?
>
> C) Suppose you **do not** know about square roots, but you do know the formula for the area of a triangle. How might you proceed?
>
> D) Suppose you know about square roots. How might you proceed?

2. Set ***S*** = 3 and ***P*** = 4. What is the area of the resulting triangle?

3. Set ***S*** = 3 and ***P*** = 2. What is the area of the resulting hexagon?

4. What can you say about the relative size of the images in 2 and 3?

5. Set ***S*** = 5 and ***P*** = 4. What is the area of the resulting pentagon?

6. Set ***S*** = 7 and ***P*** = 4. What is the area of the resulting 7-gon?

More challenging challenge questions:

CLAIM: If **n** = 4, ***J*** = 1 and ***P*** = 2, a hexagon results whenever ***S*** is an odd number larger than 1. Let that area be denoted H(***S***).

7. Derive a formula for H(***S***). Make sure your answer is consistent with 3 above.

CLAIM: If **n** = 4, ***J*** = 1 and ***P*** = 4, a 7-gon results whenever ***S*** is an odd number larger than 5. Let that area be denoted A_{7gon}(***S***).

8. Derive a formula for A_{7gon}(***S***). Make sure your answer is consistent with 5 and 6 above.