Pretty Rectangles

This investigation is something I read about when I was teaching 7th grade pre-algebra. I cannot remember the source, but I will add it here when I find it. When discussing the Golden Ration it's easy to just present it. I prefer students to investigate as much as possible to discover the beauty of mathematics.

The Scenario:
I saw this image of a bunch of random rectangles the other day and wondered if any of them were more appealing than the others. What do you think? Make a prediction in your notebook. Which rectangle is "prettiest?"

The Investigation:
This involves data collection. The more data, the more accurate the results. So, ask as many people as you can. Ask other teachers. Ask your parents, your brothers, your sisters, aunts, uncles, grandparents, step siblings, strangers in a restaurant. Ask many people as you can. The deadline is _____. I always gave this on a Friday and asked for everyone to have their data by Tuesday. This gave everyone a chance to ask as many people as possible.

The Math:
This is where the fun really begins! There is no real evidence that rectangles with side lengths that have the golden ratio are the most aesthetically pleasing. However, in my experience doing this with students and collecting and compiling the data from every student in every class, the two most popular rectangles in order are D and C, with D edging out C as a favorite by a small margin. Interestingly, the ratio of the side lengths (shorter:longer) for rectangle D is 0.618 and the ratio of the side lengths (shorter:longer) is 0.849. Rectangle D is very close to the Golden Ratio and Rectangle C is pretty close.

This is not meant to prove the aesthetics of the Golden Ratio, but it is a nice exercise in data collection and analysis in the middle grades.

In my experience, doing this with students, the majority of people surveyed tend to choose rectangle D. Rectangle D has dimensions that have a ratio very close to 0.618 or 1.618 depending on how you perform the division. The question that students need to answer is, simply: Why?

Some possible questions to lead a discussion about why any of the rectangles might win the beauty contest:
- What is it about rectangle ___ that makes it so popular?
- How are they different? (Area, length, width, (base, height)).
- What could we do with the base and height to compare them? (Look at the ratios as a comparison).

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The lengths and ratios of the lengths of the sides of the rectangles are:

Rectangle	Base (in.) (Short Side)	Height (in.) (Long Side)	Ratio Base:Height (Short Side:Long Side)	Ratio Base:Height (Long Side:Short Side)
A	1.5	1.5	1	1
B	1.1	3.74	0.294	3.4
C	1.46	1.72	0.849	1.178
D	2.12	3.43	0.618	1.618
E	1.37	4	0.3425	2.92

Students should recognize from previous investigations that the ratio of the lengths of the sides for rectangle D approximate the Golden Ratio (Golden Mean).