



General Certificate of Education  
Advanced Level Examination  
June 2012

## **Critical Thinking**

## **CRIT3**

**Unit 3 Beliefs, Claims and Arguments**

## **Source Material**

This source material is to be read in conjunction with questions in Unit CRIT3.

## Document A

### What is beauty?



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1. There is an old and well-known saying: 'Beauty is in the eye of the beholder'. Put more formally this means that aesthetic judgements are purely subjective; that there is no objective standard by which to measure whether something (or someone) is beautiful or ugly, or somewhere in between. It's all down to individual likes and dislikes. If this were the right answer to the question then surely it would follow that people would be fairly evenly divided in their likes and dislikes, with little general agreement as to what or whom they do or do not find attractive.
2. However, the opposite seems to be the case: the majority of people tend to have the same broad preferences. Imagine a large cinema audience split at random into two groups and asked to vote on which of two actors in the film (call them A and B) is the more attractive. The first group votes overwhelmingly, perhaps even unanimously, for Actor A. How confidently can the vote in the other group be predicted? The answer is: very confidently, suggesting that A simply is more attractive, physically, than B. On the other hand, if the vote had been close, but different in one group from the other, would you conclude that people do after all have different ideas of beauty, or that A and B are more or less equally attractive? From this thought experiment alone, it is pretty clear that beauty is not in the eye of the beholder but in the appearance of the beheld. It is objective after all. Otherwise, what would be the basis for the widespread agreement that so obviously exists?
3. But perhaps the concept of beauty is culturally determined, and can change over time, and/or from one community or generation to another. We may then say that although beauty is not in the eye of each beholder separately, it is in groups of like-minded beholders. But surprising as it may seem, people from different ages, races and backgrounds do agree on what is and isn't beautiful. Babies as young as 3 months can identify and show a preference for faces that most adults would deem beautiful. Europeans can pick out the same beautiful Japanese faces as Japanese subjects; Japanese can agree on which European faces another European will view as beautiful. In fact, humans can even agree on the attractiveness of different monkey faces, thus ruling out most unique racial, cultural and even species influences. So what's going on?

### Beauty and the Golden Ratio

4. One theory that has been widely discussed since ancient times is that beauty can be accounted for mathematically. There is even a specific number, known by the Greek letter  $\phi$  (phi), that is supposedly a universal property of beautiful things, including the human form. It is an irrational number, so it cannot be expressed exactly as a decimal fraction. To six decimal places, it is **1.618034...**, but for practical purposes, two or three places of decimals are close enough.

5. What is so special about this number – or any number for that matter – and what, in particular, does it have to do with aesthetic judgement? The answer is not in the number itself so much as the relative lengths, shapes and visual proportions it gives rise to. Take a straight line that has been cut (at X) into two unequal sections such that the ratio of the shorter section (AX) to the longer (XB) is the same as the ratio of the longer section (XB) to the whole line (AB). If the length of AX is 1 unit, XB will be 1.618... units.

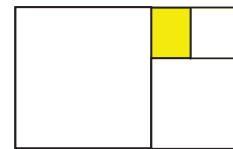
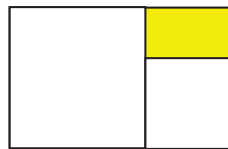
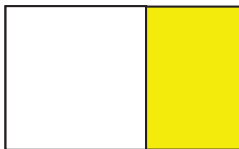


*The Golden Ratio*



*The Golden Rectangle*

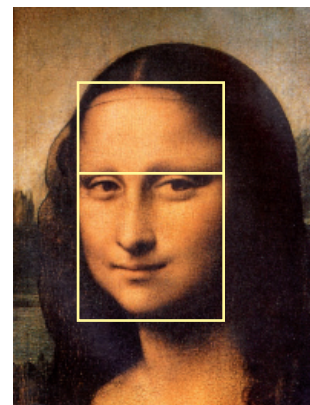
6. This is the Golden Ratio, and shapes or objects that have such proportions are said to be more beautiful than others. A Golden Rectangle, for example, is one whose sides are in the ratio of 1 : 1.618... What is unique about the golden rectangle is that if a square is subtracted from it, the remaining rectangle is also a golden rectangle; and so on, and so on... That is what is special about  $\phi$ .



7. The Parthenon in Athens was reputedly built in accordance with the proportions of the Golden Rectangle. The Ancient Greek mathematicians certainly knew about  $\phi$ . And it has often been observed that the face of Leonardo's Mona Lisa displays the same mystical proportions, not only in outline but also in some of the distances between the facial features. Compare, for example, the forehead with the rest of the face.



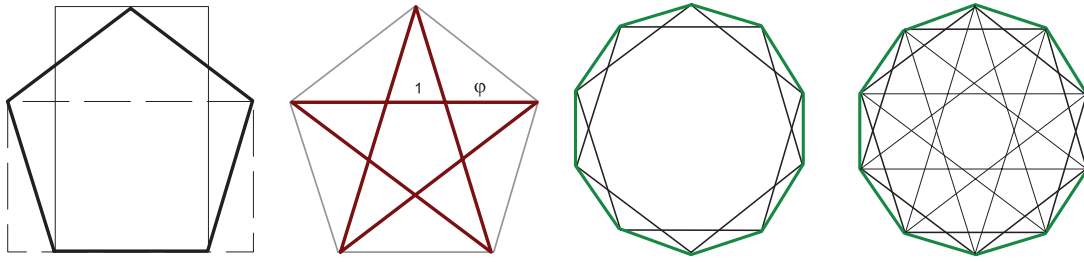
The Parthenon in Athens



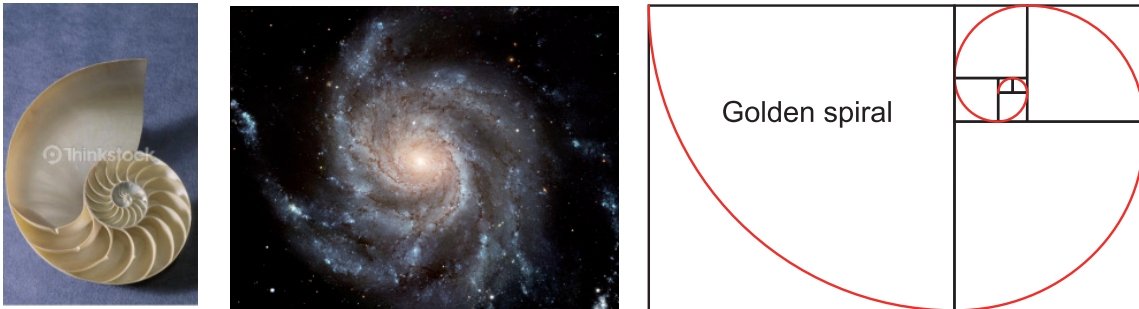
Mona Lisa

8. All manner of merchandise and packaging approximates closely to the proportions of the Golden Rectangle: credit cards, cameras, laptop-computers; many books, posters, picture frames.... If it is true that these proportions are pleasing to look at, that would be a good reason for designing them accordingly. If two very similar products are on display side by side, and the only difference between them is their shape, which is the consumer more likely to choose? Clearly the one that is visually more attractive.

9. The extraordinary properties of  $\phi$  do not end with rectangles. Many other important geometrical shapes also display, and can be constructed using, the same proportions. Here are just some.



10. Last but not least, the proportions of the Golden Ratio are found in countless naturally occurring phenomena – small and large – from the intricate structure of the Nautilus seashell to the awe-inspiring formation of stars in a distant galaxy. The beautiful spiral pattern in each case has close connections with the Golden Ratio.



11. All in all, there is so much confirming evidence for the Golden Ratio theory of beauty that it has to be taken seriously.

Document A: Includes some facts and comments from DAN EDEN, Viewzone:  
<http://viewzone2.com/facesx.html>:

Parthenon image  
 © Thinkstock  
 (Roof outline added)

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**Document B**

Transcript from BBC Radio: *In Our Time*

Presenter Melvyn Bragg (MB) is in discussion with Jackie Stedall (JS) from Queen's College, Oxford.

MB What's your view that the buildings like the Parthenon follow this Ratio?

JS I don't know. I think... people can see this Ratio too often in too many things. It does give pleasing proportions; so maybe people just built in pleasing proportions and these happen to be close to what we now know as the Golden Rectangle. Whether they actually had this in mind as they built is doubtful, I would say.

MB Does it suggest that if they didn't have (the Ratio) in mind, the fact that they did build something that does seem to follow those proportions mean that it is instinctive in human beings?

JS Yes, it's certainly instinctive.

MB Where does that come from then?

JS I don't know, I'm not a psychologist... (Laughter)

Melvyn Bragg is talking to Jackie Stedall, Junior Research Fellow in History of Mathematics at Queen's College, Oxford

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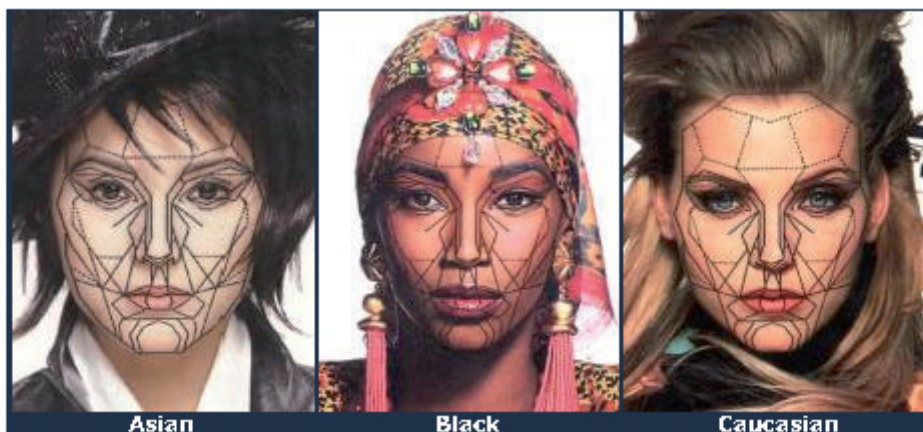
## Document C

It is one thing to look for beauty in the mathematical proportions of buildings and artworks. It is another altogether to claim that the same proportions can be used to measure, scientifically, the attractiveness that humans see in each other. But that is effectively what Dr Stephen Marquardt – an expert and long-time practitioner in the field of facial surgery – has claimed.

Marquardt has developed a complex facial mask, shown below, based on the pentagon and the decagon. These regular geometric shapes embody the ratio of 1:φ (1.618...). Marquardt's research suggests that those faces in which the features coincide closely with the lines that form the mask are the faces that people find beautiful.

Marquardt's scientific findings overturn the old idea that beauty is in the eye of the beholder. They also put paid to the theory that ideas of human beauty vary from one cultural group, or one period of history, to another. To show that beauty does not vary in such a way, the same mask has been superimposed on a selection of faces selected from different racial groups, and stretching from classical to modern times. As the photographs show, the correlation between faces that match the mask and those that are widely perceived to be beautiful holds despite the ethnic and historical differences between them.

### The Marquardt Beauty Mask



Source: adapted from *Human Beauty* by GARY B. MEISNER [www.goldennumber.net/html](http://www.goldennumber.net/html)  
 Images courtesy of Dr STEPHEN MARQUARDT and [www.beautyanalysis.com](http://www.beautyanalysis.com)

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