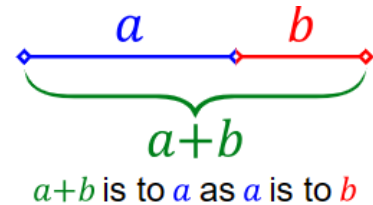


December 15th

No new **memory verse** today. Instead, as we are getting near the end of the year, do some memory verse revision. Test yourself by writing out some verses from memory. Do you need to do some practice? Spend some time today getting all your memory verses up to date. If too many of them have become “wobbly” make yourself an action plan for revising them gradually.

Some maths¹

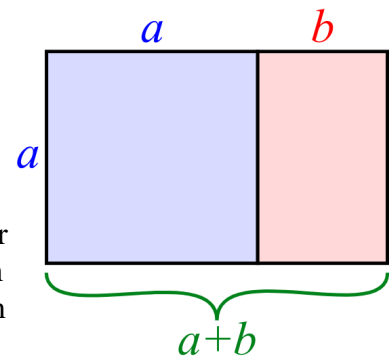
Anglo-American James Barr (1871–1950) died on **15th December**. He was a polymath whose main claim to fame was proposing the standard notation, ϕ (*phi*), for what is known as the Golden Ratio.



Do you remember learning about the irrational number² π (*pi*) which is approximately 3.142?³ ϕ is another irrational number and it is approximately 1.618. In the diagram above, the whole length of the line divided by the long part is equal to the long part divided by the short part.

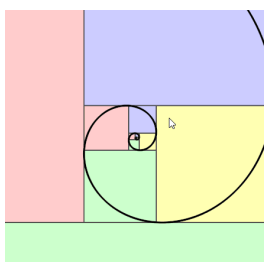
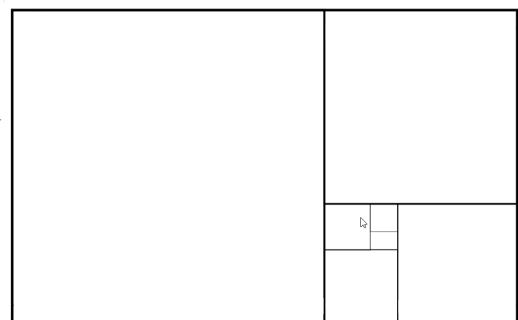
You can demonstrate this with a piece of string a metre long. If you cut it so that you have two pieces one of which is 61.8 cm long the other piece will be 38.2 cm long. 100 divided by 61.8 is approximately 1.618. 61.8 divided by 38.2 is also approximately 1.618.

If we apply the same proportions to a rectangle, we get a rectangle with the long sides 1m and the short sides 61.8 m.



Here is one way to construct a golden rectangle. First you need to draw a square.⁴ Now draw a dot on the bottom line of your square exactly half way along. Now extend the bottom line of the square for a short distance to the right. Place your compass on the dot and open it to touch the top right hand corner of the square. Draw a curve with your compass until it intersects with the line you have extended at the bottom of your square. (You may need to extend the bottom line further if they do not intersect.) The intersection is the bottom right hand corner of your golden rectangle.

This rectangle can be subdivided into your original square and a rectangle. The new smaller rectangle can be subdivided into another square and rectangle with exactly the same proportions. This can be repeated over and over again.



Greek mathematicians delighted in this ratio. “The beautiful never lacks proportion,” said Plato

(c.438-348BC) and Euclid (325-265BC) was the first to describe it as “golden”. This ratio is found in God's design for living things. The distance from your elbow to your wrist to your middle finger tip is a golden ratio you

- 1 Information from <https://creation.com/golden-numbers>, <https://answersingenesis.org/mathematics/golden-ratio-curious-connections-creation/>, <https://www.goldennumber.net/theology/> and other sources. Illustration of whirling squares: By Dicklyon - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=19888419>
- 2 A number which cannot be written as a fraction.
- 3 See the lesson for March 5th (Yet to come.)
- 4 See <https://www.wikihow.com/Draw-a-Square>.



carry around with you all the time! On the right you can see the spiral that the golden rectangle forms. This is found in many natural objects such as pine cones and sunflower seeds. God's perfect design is so beautiful that artists and architects copy it, using golden ratios in paintings and buildings to give satisfying proportions.

James Barr chose ϕ to indicate the golden ratio because the ancient Greek sculptor Phidias, *Φειδίας*, (480-430 BC) begins with a capital ϕ (Φ). He designed the sculptures that formed the frieze around the top of the Parthenon in Athens.⁵ The Parthenon itself is built in a golden rectangle shape and Phidias used it in the proportions of his figures too.

It is not only scientists who “think God's thoughts after Him” as Kepler⁶ put it; artists do so too!

Something to do

A good excuse to go out in the woods today and look for some pine cones. Can you see the spiral patterns?

Something to read from History



Today marks the birth of Nero (AD37-68) the Roman Emperor whose name has become a byword for cruelty. He reigned from AD54. The story of that reign can be found in today's Optional Resources files in a slightly adapted form of the retelling by the American children's author H el ene Adeline Guerber (1859–1929). I think you will agree with me that he was a thoroughly unpleasant character.

5 See the lesson for 14th November.

6 See the lesson for 15th November.