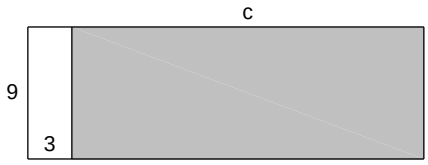
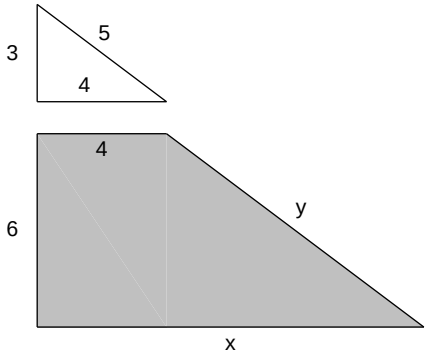
1. Find the length of c of the shaded rectangle so that it is a gnomon to the white rectangle with sides 3 and 9.

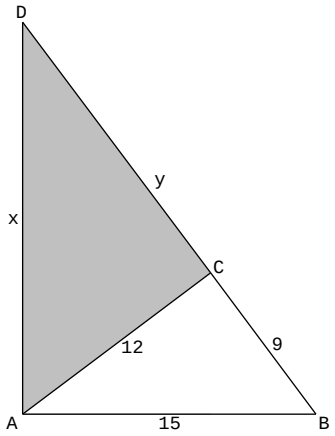


2. Find the values of x and y so that the shaded figure is a gnomon to the white triangle.



3. Rectangle A is 10 by 20. Rectangle B is gnomon to rectangle A. What are the dimensions of rectangle B?

4. Find the values of x and y so that the shaded triangle is a gnomon to the white triangle ABC.



5. A rectangle has a 10 by 10 square gnomon. What are the dimensions of the rectangle?

6. Below is a list of works of art often said to incorporate the Golden Ratio. Please pick one (or more), and photocopy it from a book. (Please do not use print-outs from the web, as they can be distorted in shape, and so your results will not mean much.)

   - Giotto's *Madonna in Glory*
   - Duccio's *Madonna Rucellai*
   - Cimabue's *Santa Trinita Madonna*
   - Dürer's *Adoration of the Magi*
   - Da Vinci's *Mona Lisa*, *St. Jerome*, *Madonna on the Rocks* (either version), *A Head of an Old Man*, *Annunciation*
   - Michelangelo's *David*
   - Seurat's *The Bathers*
   - Mondrian's *Place de la Concorde*
   - Severini's *Maternity*

   Once you've chosen your painting,

   (a) Really look at it, and try to think of as many ways as possible that the Golden Ratio may have been used.

   An artwork may incorporate the Golden Ratio in many ways. One obvious way would be if the painting itself were a Golden Rectangle, but there are lots of other possibilities:

   - a line in the painting may be cut in the Mean and Extreme Ratio
   - a rectangle in the painting may be a Golden Rectangle (that is, the ratio of long side to short side may be the Golden Ratio)
   - an isosceles triangle in the painting may be a Golden Triangle (that is, the ratio of long side to short side may be the Golden Ratio)
   - a rectangle fitting snugly around a figure in the painting may be a Golden Rectangle, and similarly for a Golden Triangle
   - a body might have been drawn so that various parts are in the Golden Ratio

- the distances between several items may (when the ratio of those distances is taken) in the Golden Ratio, etc

Feel free, by the way, to read up on the claims relating to your choices on the web or in books (Mario Livio's chapter on "Painters and Poets have Equal License" discusses many but not all of the above). Just make sure you do the measuring yourself. Draw any lines as thinly as you can, as you're dealing with a much smaller version than the original, so a thin line on a shrunk version would correspond to a very thick line on the original.

(b) Measure all the distances you thought of in the previous part. Clearly label your measurements, and (as indicated in the previous part) draw the lines on the photocopy you're using.

(c) Decide upon an accuracy range for your measurements.

(d) Calculate all the ratios you thought of in the first part, including acceptance ranges for each.

(e) Does the Golden Ratio fall into any of these?

(f) Do you think the artist had the Golden Ratio in mind when creating this artwork? (This may not follow immediately from your previous results if, for instance, you think the Golden Ratio was close enough that it might have been intentional, even if it didn't fall into your ranges. After all, your ranges only reflect your measurement range, not any adjustments or errors the artist might have made.)