

ACCURATE CONSTRUCTION: THE GOLDEN RECTANGLE

The accurate construction you need for this (for the perpendicular bisector of a line, which allows you to construct right angles also) is given on p2.

1. Draw a square, ABCD, either using squared paper or by using accurate construction. The side length of the square is 1 unit (but make it bigger than 1 square or 1cm, about 5 cm would be a good size).
2. Bisect side AD, using ruler and compasses and label the midpoint M.
3. Put the point of your compasses on M, and set them to a radius equal to the length of MC.
4. Draw an arc, length MC and centred at M, which passes through B, C and where AD extended would go.
5. Extend AD to intersect with the arc, and label the intersection F.
6. Draw a line perpendicular to AF through F, and extend BC to form the fourth vertex, E, of a rectangle ABEF. ABEF is a Golden Rectangle.

Questions to answer:

1. Measure the lengths of the sides of ABEF
2. What is the ratio AF : AB?
3. If the length of the side of the square, ABCD, is 1 unit, what is the length of AM?
.....
4. Calculate the length of MC. (Hint: what kind of triangle is MCD?)
.....
.....
.....
.....
.....
.....
.....
5. Express AF in terms of AM and MC, justifying your answer, and so find its length.
.....
.....
.....
.....
6. Explain why ABEF is a Golden Rectangle.
.....
.....
.....

Construction for the perpendicular bisector of a line

This construction can also be used to construct a 90 degree angle or to find the midpoint of a line.

1. Mark two points on your line, A and B - this construction will give you a straight line which passes exactly half way between these two points and is perpendicular (at right angles) to the line.
2. Open your compasses to a distance more than half way between A and B.
3. With the point of the compass on one of the points, draw circular arcs above and below the line, at P and Q.
4. Keeping the compasses set to exactly the same distance, repeat with the compass point on your other point.
5. Draw a line through the P and Q.
6. PQ is the perpendicular bisector of AB - check that the angles are exactly 90 degrees and that it does indeed halve the distance between A and B.

