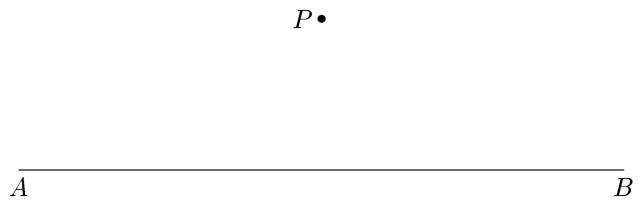
Points, lines and triangles

1. The Greeks only allowed themselves to use compasses and rulers to draw their geometrical diagrams (and there were no marks on the rulers). I'll let you use a set square as well, so you can always draw a right angle. (Actually you can do this even if you keep to the Greek rules, but it is a little more complicated.) You have a line AB and a point P, as in the picture. How can you draw a line through P, parallel to AB?



2. Can you see what the shortest route between two points on a ball looks like? Try to draw a picture of a ball with two points on it, and the shortest route from one to the other. Try to work it out using an actual ball (there is a ball, or perhaps a grapefruit, in the room for you to look at.)

3. A triangle is a figure with three edges which are lines. If Euclid is right about parallel lines, then the three angles of a triangle add up to 180°. If you take three points P, Q and R on a ball and draw the shortest routes between them, you will draw a triangle on the ball. Will the angles between the sides add up to 180°?