

## ICT Geometry Lab Using Peanut Software's WinGeom Program

### Launch the Program

Log on, then follow Start -> My Computer -> Common Server -> Maths folder -> Peanut Software folder -> WinGeom (yellow triangle icon)

At the green screen, select Window -> 2-dim

Maximise to fill your screen.

### Lab 1: Circles and Intersections

Select Point -> Right-btn plant (should be ticked)

Select Circle -> Left-btn circle (should be ticked)

Click with the right button to plant some points on the screen.

Click and drag on these points with the left button to make circles.

Also try selecting Circle -> Radius-center... for fixed size circles.

Select Point -> Intersection -> Circ-circ...

Choose a circle in the top list and one in the bottom list and click **mark**.

If they intersect, a pair of points will be created at the intersections.

If they don't intersect, you'll get the message "Hmm...Could not find"

Now select Btns -> Drag vertices and use the left button to click/drag the points.

Note what happens to the points of intersection.

Finally select Other -> Replay in slow motion and tap the space bar to replay.

**Congratulations!** You have just completed Lab 1: Circles and Intersections.

### Lab 2: Lines and Line Segments

A line segment is a finite line joining two points.

A line is an infinite length going through two or more points.

Start afresh with a clean sheet on the screen.

Select Point -> Right-btn plant and Line -> Left-btn connect.

Plot some points on the screen and join a few up by creating line segments with the left mouse button.

To create lines, select Line -> Lines... and list the points you want to connect.

Create intersections of lines/segments using Point -> Intersection -> Line-line

Experiment with Line -> Rays, Line -> Parallels, Line -> Perpendiculars ->

Drag the vertices around using Btns -> Dag vertices.

**Congratulations!** You have just completed Lab 2: Lines and Line Segments.

### Lab 3: Measuring Angles, Lengths and Areas

WinGeom will display measurements on screen as instructed here. These values are updated instantly whenever the diagram is altered, eg by dragging vertices.

Start again with a clean sheet on screen.

Draw some points, circles, lines etc. until you have a variety of things to measure.

Select Meas to call up the measurements dialogue box.

Type in your list of things to measure. Press **enter** after each one. Use the **help** button to give you ideas such as  $\angle ABC$ ,  $AB^2 + BC^2$ ,  $[F1]*AB^2$  etc.

Close the Measurements box to see them on the left of the screen.

Drag the vertices and note the changes.

To take things out of your list, click Meas again, select the one you want to take out, then click either **hide** or **delete**. Close the Measurements box.

You can drag measurements as blocks of text around the screen by selecting Btns -> Text. Move the measurements to their appropriate place on the diagram.

**Congratulations!** You have completed Lab 3: Measuring Angles, Lengths & Areas.

#### Lab 4: Constructions

##### **We shall begin by emulating the procedure for bisecting an angle.**

Start with a clean sheet.

Plot three points A, B and C and use line segments AB, AC to make an angle at A. Drag out a circle from A and create points E and G where the circle meets the two “legs” of the angle AB and AC.

This is the first part of the construction.

The second part of the construction makes equal arcs from these two new points. We shall draw two identical circles, one centered on each of E and G.

From E draw a fixed radius circle and one the same size from G.

Label the points where these two circles intersect.

Join A to these two new points – all three points should be on a straight line.

(Use a line rather than a line segment for this.)

Drag the vertices around the screen to change the figure.

Check that the angle really is bisected using the Meas tool.

##### **Now a look at Pythagoras’ Theorem.**

Start with a clean sheet.

Draw a triangle using three points and three line segments.

Put a square along each side by selecting Units -> Polygon -> Attach -> Regular... then 4 sides to edges AB, CA, BC.

Note that the square is drawn **anticlockwise**. If on your diagram the square appears on the inside rather than the outside of the triangle, simply reverse the order of the letters (ie instead of PQ write QP).

Drag the vertices around. Use Meas to see what happens to the areas of the squares when  $\angle ABC$  is a right angle, less than a right angle or more than a right angle.

**Congratulations!** You have completed Lab 4: Constructions.

#### **Investigate**

Start with a clean sheet.

Make a diagram to illustrate the construction of perpendicular bisectors, regular polygons inside circles, triangle constructions such as SSA or SHA, or any others that you know.

#### **Download**

WinGeom is a free program by Rick Parris. It runs on all version of Windows and is available from the Peanut Software Homepage on <http://math.exeter.edu/rparris/> along with several other free programs for exploring Maths on the PC.

*Labs written by SDTF Oct 2003*