


## Geometry Worksheet Tasks - Tallaght Access Office Maths Initiatives (January 2018)

Based on work by *Martin Regan & Breege Melley St Columbas Comprehensive, Glenties* (modified by COS and PR IT Tallaght). ( See <http://www.projectmaths.ie/for-teachers/leaving-certificate/#> )


### Overall tasks to be completed using GeoGebra:

1. Construct a triangle and measure the lengths of sides and angles
2. Construct the perpendicular bisector of a line and verify
3. Construct the perpendicular bisectors of a triangle.
4. Construct the circumcentre of a triangle
5. Construct the circumcircle of a triangle


### Task 0 – Some GeoGebra basics

- (1) Screen has the *Drawing Pad*, the *Algebra Window* the *Input Bar* and the *Tool Bar*.
- (2) Remember the Undo button (Edit, Undo)
- (3) Park the cursor at the Selection arrow 
- (4) Hide the axes (Selection Arrow, Right click the Drawing Pad, click Axes)



### Task 1 – Constructing & Investigating Triangles

- (1) Draw a decent sized triangle (using the Polygon tool)
- (2) Change the colour (Right click it, Object Properties..)
- (3) Note lengths of sides in Algebra window
- (4) Measure the 3 angles  $\alpha$ ,  $\beta$  and  $\gamma$  – **click on the points in a CLOCKWISE direction.**
- (5) Put a Textbox  on the screen. Click Objects, (empty box). Type  $\alpha + \beta + \gamma$  in the empty box and click the OK button
- (6) Move the triangle corners around. **What conclusion can you draw?**

### Task 2 – Perpendicular Bisector

- (1) What is meant by the perpendicular bisector of a line?
- (2) Switch off object labelling using Options, Labelling, No New Objects
- (3) Click the **perpendicular bisector tool** in GeoGebra . (Hover over it to see how to use it.)
- (4) Construct the perpendicular bisector of one of the sides of the triangle.
- (5) **Verify** that it is a perpendicular bisector of that side of the triangle.
- (6) Drag a triangle vertex to **confirm your reasoning.**
- (7) Do you want to modify your answer to Q1?

### Task 3 – Constructing the circumcentre and circumcircle




- (1) Construct **the perpendicular bisectors** of all the sides of the triangles you have drawn.
- (2) Change the colour of the perpendicular bisectors of the sides. (A different colour to triangle sides)
- (3) Put a point of intersection on the point where the perpendicular bisectors meet (use the Intersect button ).
- (4) Drag a vertex.
- (5) **What do you notice about the perpendicular bisectors of the triangle? N.B. Write down what you notice:**
- (6) Write down what you understand **Circumcentre** of a triangle to be:
- (7) Put the circumcentre of the triangle on the diagram using the *Circle with Center through a Point* button  Drag the vertices. **Write down what you notice about the circle**

### Task 4: Investigating the location of circumcentre

- (1) Drag a vertex of the triangle and note the **location of the circumcentre**. Is it always inside the triangle? **Write an answer:**
- (2) When does the circumcentre move outside the triangle? **Write an answer:**
- (3) When is the circumcentre inside the triangle? **Write an answer:**
- (4) Is the circumcentre ever on one of the sides of the triangle? If so, when? **Write an answer:**

Could you verify your answer?

### Task 5: Find the incircle of a triangle (If you have time!)

- (1) Write down what you understand the **incircle** of a triangle to be:
- (2) Create a new GeoGebra file (File, New...) and construct the incircle of a triangle. You will need to use the Angle Bisector , Perpendicular Line  and Circle  buttons.