GeoGebra:

Effective use of GeoGebra in the classroom

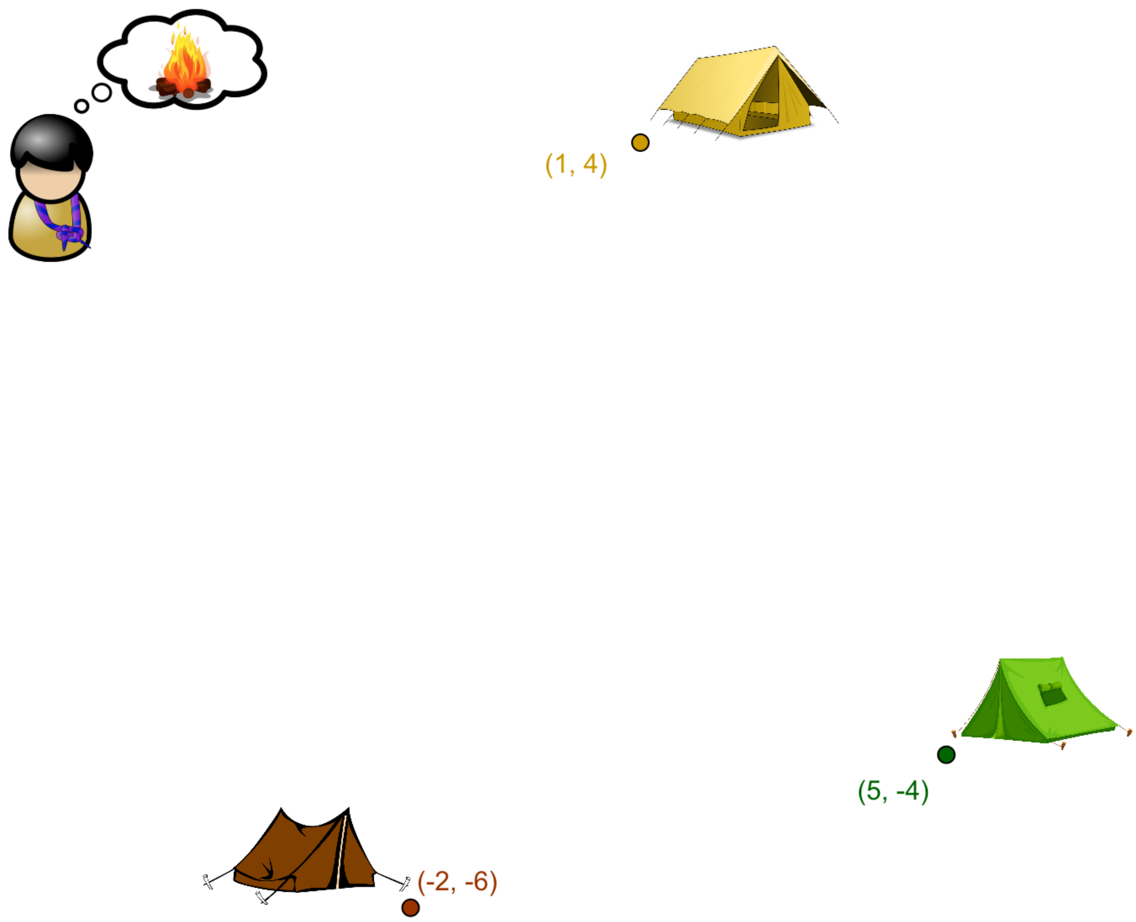
Workshop 1 Booklet

Name: ______________________________

@ProjectMaths_ie

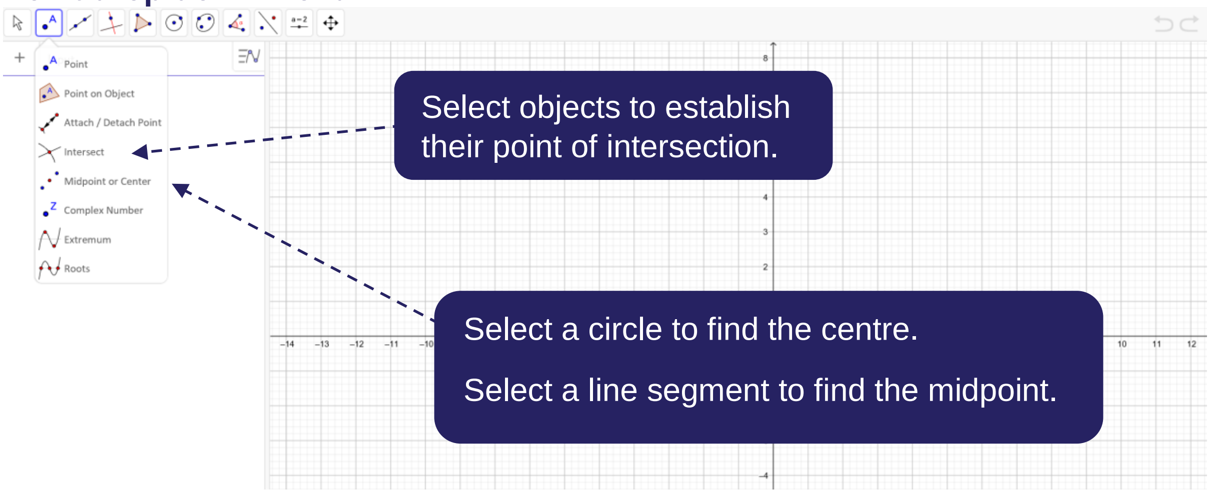
Rich Task 1- Problem

A Scout Troop have pitched 3 tents to sleep in and wish to build one fire to cook with. Where is the fairest location for the fire?

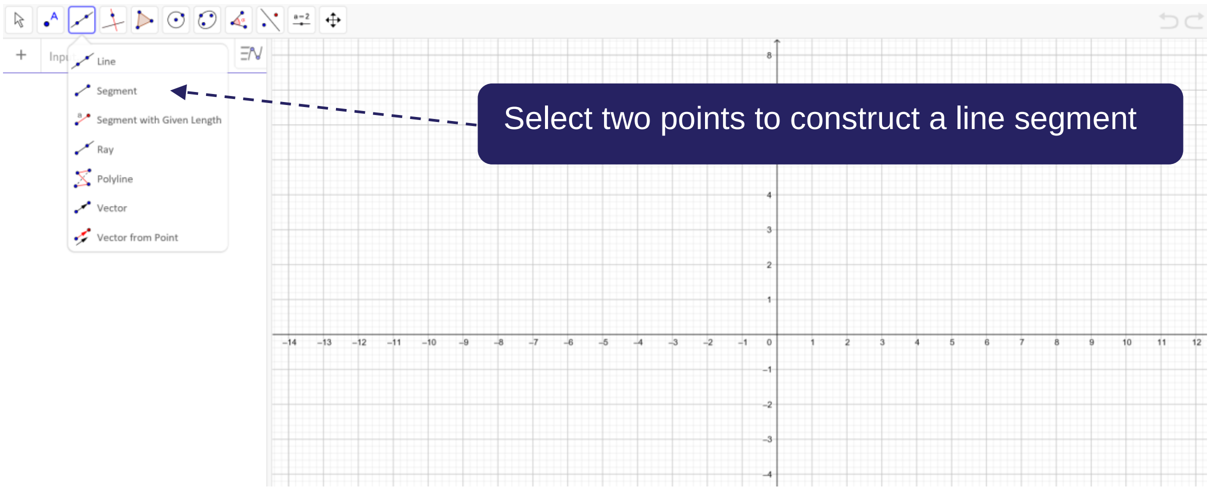


Rich Task 1- Cheat Sheet

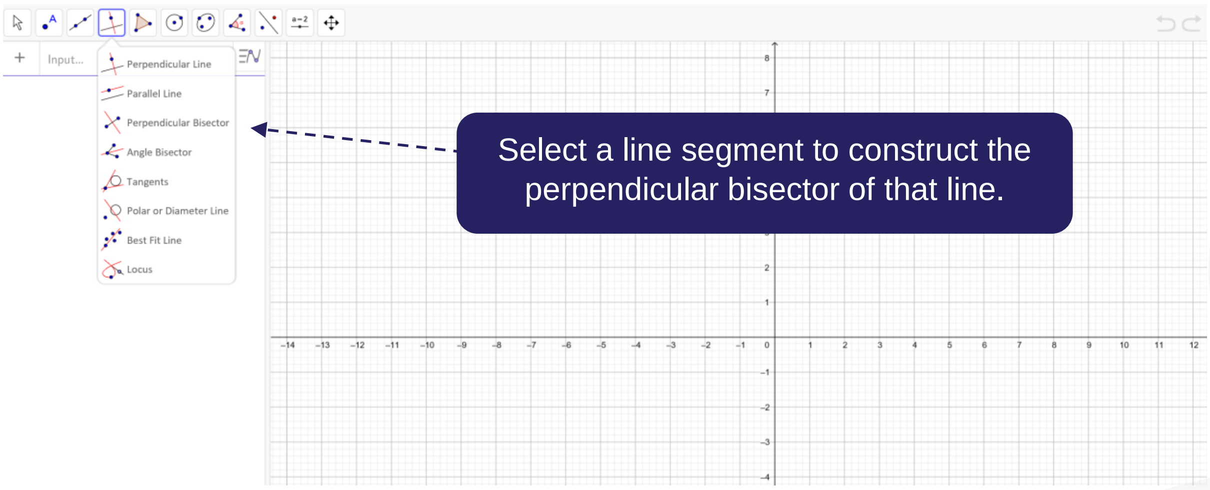
Point drop-down menu



Types of lines drop-down menu



Interacting lines drop-down menu



Rich Task 1- Questioning

Bloom's Taxonomy

L1: How do you plot a point? (Requires students **remember** how to use GeoGebra to plot points)

L2: Can you find the fairest point between 2 of the tents? (**Understanding** of midpoint)

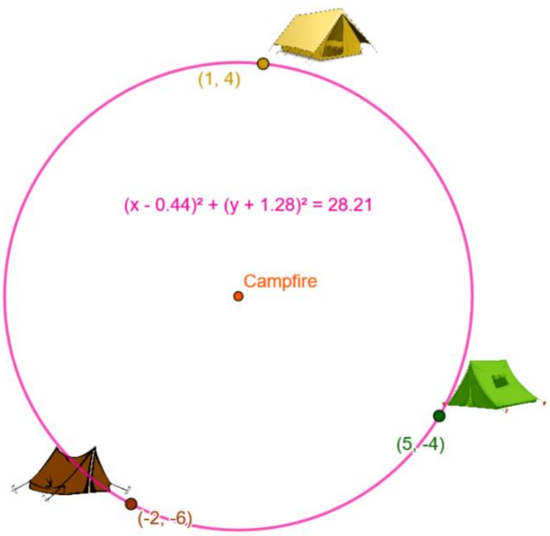
L3: How can I find the fairest point between 3 tents? (Must **apply** understanding of bisecting lines to find the circumcentre)

L4: What is the relationship between the synthetic and coordinate geometry in this task? (**Analyse** the connection between algebra and geometry)

L5: Would this solution work if there were more than 3 tents? (**Evaluate** the solution to the problem and if it applies to multiple contexts)

L6: Could you create a similar problem? (**creating** new problem)

Prompts for Extension Questions



Triangles	Acute	Right Angled	Obtuse
Is the triangle always?			
Is the circumcentre always inside the triangle?			

Rich Task 2 – Option 1

Task to investigate effect of *a, b* and *c* in the function of

$$g(x) = a + b * sin(c * x)$$

1. Use GeoGebra to graph the function $f(x) = sin(x)$

2. Using sliders to control the values of *a, b* and *c,* graph the function of

$$g(x) = a + b * sin(c * x)$$

3. Write down the equation of as many functions as you can that have a maximum value of 3 and a minimum value of -3.

4. Write down the equation of as many functions as you can that have a maximum value of 3 and a minimum value of 1.

5. Write down the equation of as many functions as you can that intersect with roots of $f(x) = sin(x)$

- Two points to bear in mind while you're doing this activity
    - How could this activity be used with other types of functions?
    - What do the sliders in this activity represent mathematically?

Rich Task 2 – Option 2

Task to investigate effect of *a, b* and *c* in the function of

$$h(x) = a * (x + b)^2 + \ c$$

1. Use GeoGebra to graph the function

$$h(x) = a * (x + b)^2 + \ c$$

2. Using sliders to control the value of a, b and c, graph

$$h(x) = a * (x + b)^2 + \ c$$

3. Write down the equation of as many functions as you can that have a minimum y-value of -1.

Solutions:

4. Write down the equation of as many functions as you can that have a turning point at the origin.

Solutions:

5. Write down the equation of as many functions as you can that have roots of 2 and 6.

Solutions:

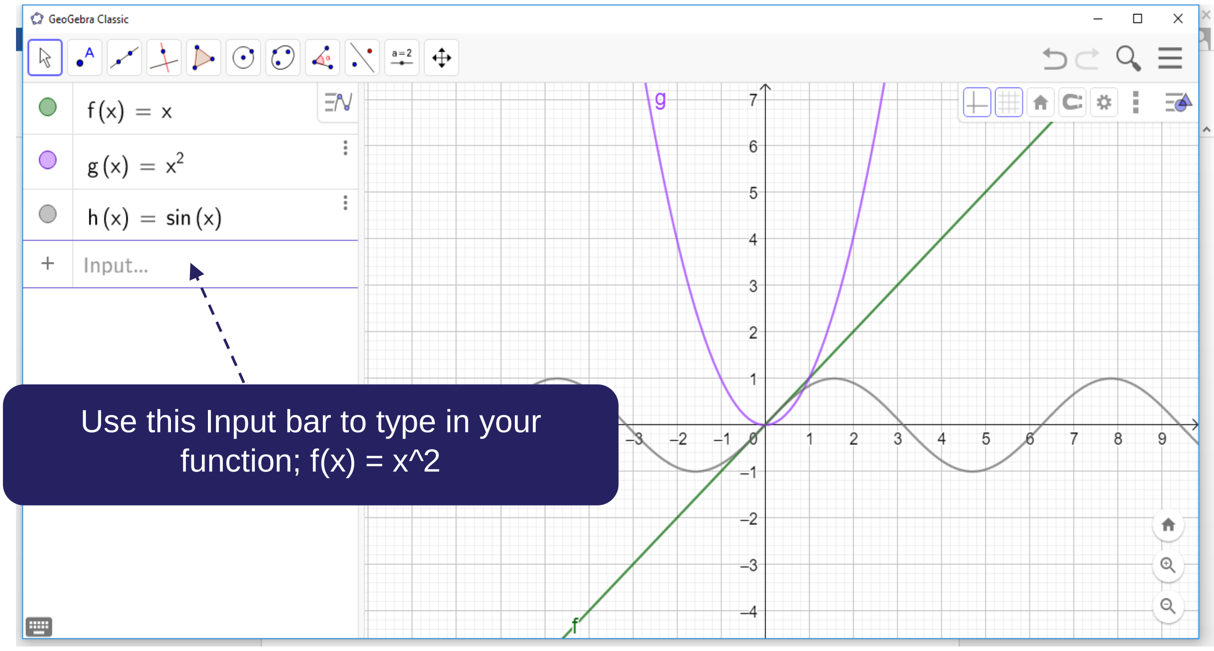
- Two points to bear in mind while you're doing this activity
    - How could this activity be used with other types of functions?
    - What do the sliders in this activity represent mathematically?

Extension Questions:

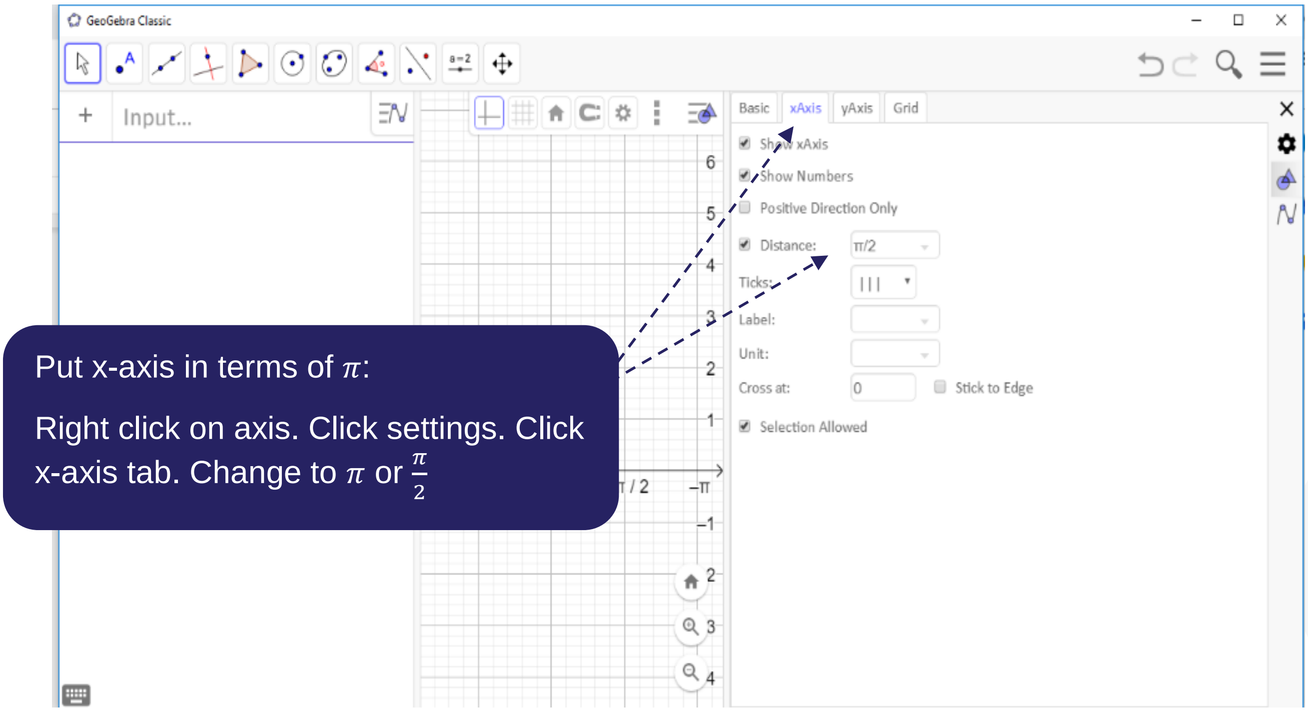
1. Write down the equation of as many functions as you can that have no roots.
2. What changes would you make to the function to make it invertible?

Rich Task 2 – Cheat Sheet

Creating graphs of different functions

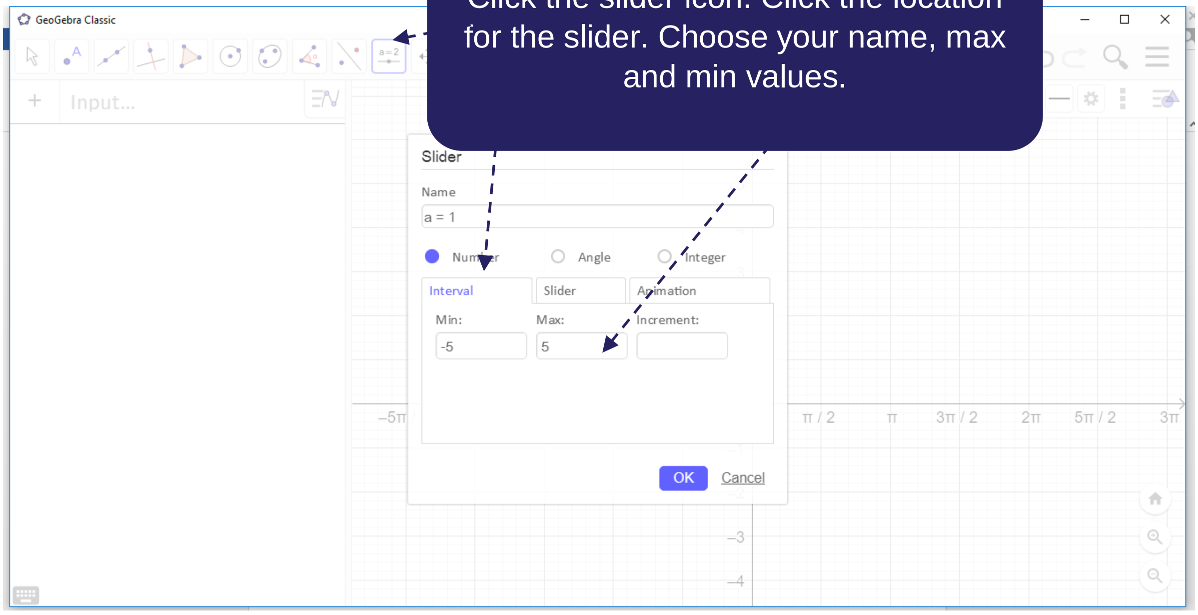


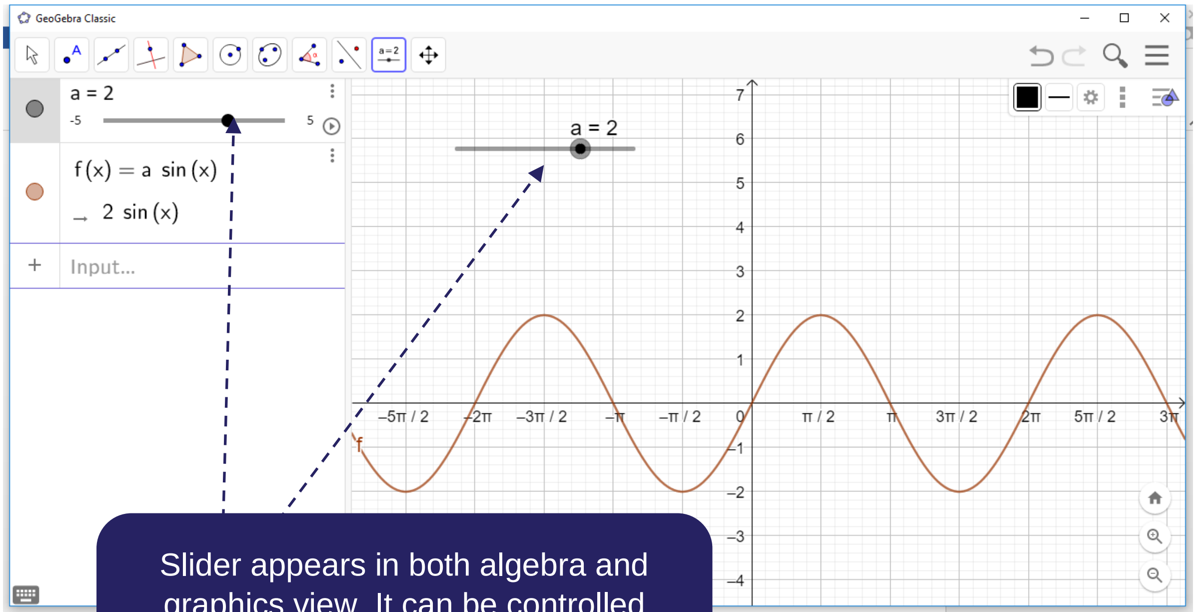
Creating graphs of Trigonometric functions in radians



Using Sliders

Click the slider icon. Click the location for the slider. Choose your name, max and min values.





Slider appears in both algebra and graphics view. It can be controlled from either.

Effective Questioning

Research conducted by Cotton (2001) and Hattie (2012) showed that:

20% of classroom questions are higher cognitive questions 20% are procedural questions (‘have you got your books with you?) 60% are lower cognitive questions.

Elements of Effective Questioning:

- Questions must have a purpose
- Questions must be linked to learning outcomes and success criteria
- It promotes discussions
- Results in students being more likely to develop a deeper understanding of an idea because they have tried to explain it themselves
- Promotes higher order thinking and extends learning.

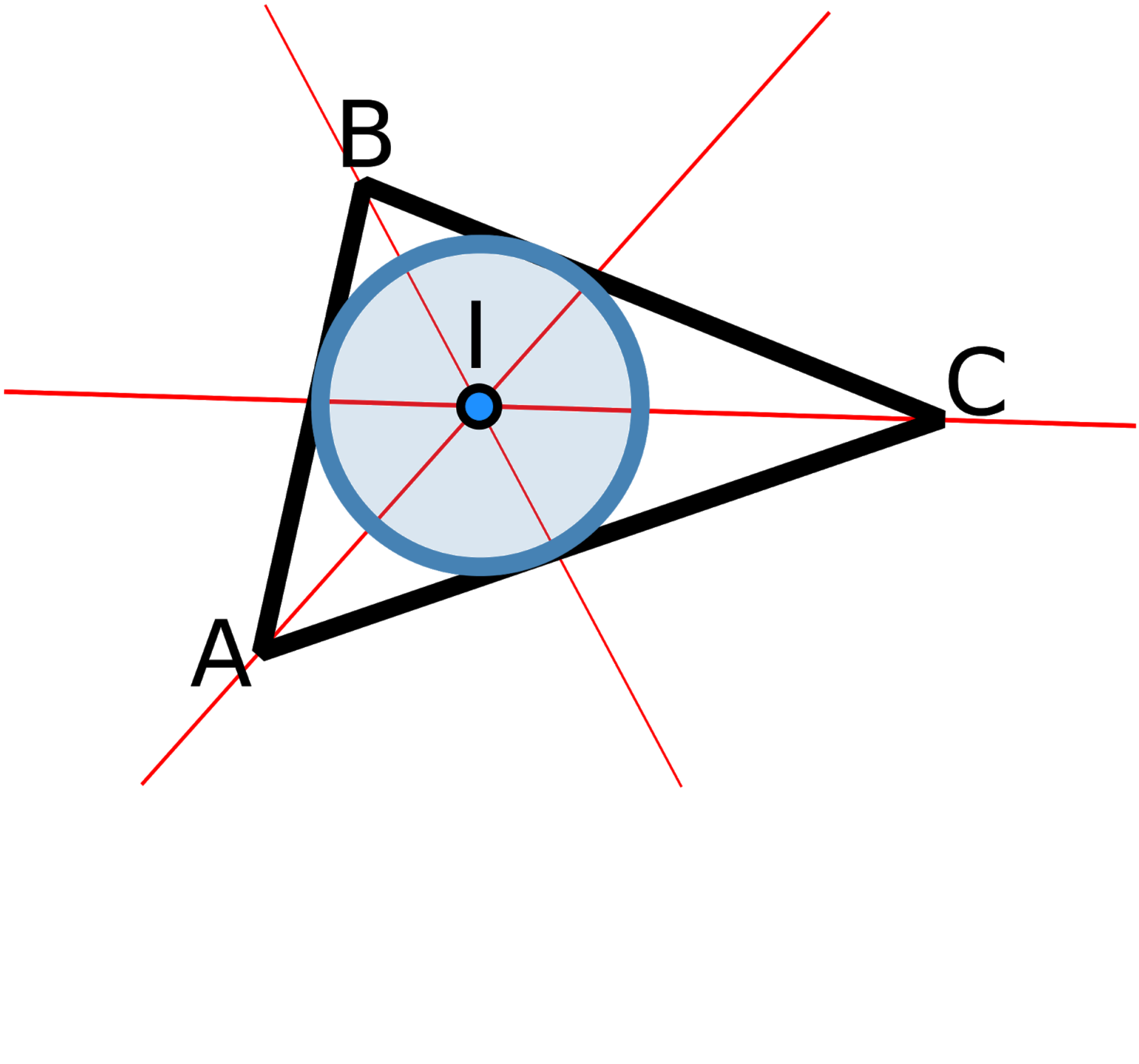
Bloom’s Taxonomy

Notes:

Some of your higher order questions:

Task 3 – Take-home Task

Use GeoGebra to investigate why the point of intersection of the angular bisectors of a triangle is equidistant to the sides of the triangle.



Useful links

Online GeoGebra application	http://www.geogebra.org
GeoGebra support manual	https://wiki.geogebra.org/en/Manual
GeoGebra videos from PDST PP Maths	https://tinyurl.com/PMGeoGebra
School support resources	www.scoilnet.ie
Effective use of task 2 without devices	https://tinyurl.com/PostPrimary3 (task2)
Effective use of GeoGebra	https://tinyurl.com/PostPrimary4 (tandl)
Leaving Certificate Maths Syllabus	https://tinyurl.com/LCSyllabus
Junior Certificate Maths Syllabus	https://tinyurl.com/JCsyllabus
Task 3 Discussion pad	https://tinyurl.com/PostPrimary2 (task3)
Workshop evaluation form	https://tinyurl.com/Geoevaluate
Geometry workshop questionnaire	https://tinyurl.com/GeomTrigWS