Numbas <-> GeoGebra

How to develop Numbas questions with dynamic GeoGebra diagrams.

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GeoGebra

▷ **Suite of free, powerful math software**

  ▷ **2 or 3D graphing calculator**

  ▷ **Computer Algebra tools (CAS)**

  ▷ **Geometry tools**

▷ **Website - geogebra.com**

  ▷ **App download**

  ▷ **Resource repository**

  ▷ **Cloud storage and digram organization**

Software options

▷ **Geometry App choices**
  ▷ **Geogebra Classic 5**
  ▷ **Geogebra Classic 6**
  ▷ **Browser applet**

Process

▷ **Plan the question and variables**

▷ **Create the diagram in GeoGebra**

▷ **Insert the diagram into Numbas**

▷ **Pass object definitions to GeoGebra**

▷ **Test, debug, fix, repeat**

Plan the question

▷ **Get inspiration**

▷ **Sketch and label a diagram**

▷ **Consider solution**

▷ **Consider variable names**

▷ **Select random variables**

Upload diagram to GeoGebra

▷ **Lock free objects**

▷ **Hide algebra and settings panels**

▷ **File>Share to upload to your account**

▷ **Adjust advanced settings**

  ▷ **Set size, hide icon to reset diagram, allow label dragging, no pan or zoom**

▷ **Note Material ID**

Insert diagram into Numbas

- ▷ **Create a new question**
- ▷ **Create the random variables**
- ▷ **Enable the GeoGebra Extension**
- ▷ **Create the diagram applet with *geogebra_applet( ) or geogebra_file( )***
- ▷ **Insert the applet into the statement with *{ }***

Pass object definitions to GGB

▷ **Second parameter is a javascript dictionary**

```
[A: A,
 B: vector(random(4..6),random(-3..-6)),
 C: [definition: vector(cx,cy), color: "red"],
 D: [caption: "centroid"]]
```

▷ **Can control properties like value, visibility, color, caption, etc.**

▷ **See GeoGebra Extension Docs for examples**

Test, debug, fix, repeat

▷ **This is an iterative process**

▷ **Must re-upload diagram to geogebra.com after each change**

▷ **Common problems**

  ▷ **Diagram too large**

  ▷ **objects not locked**

  ▷ **unwanted pan and zoom**