






## Advanced 3D Vector Geometry with Autograph


### 3D Vectors – useful tips

 Creates a new 3D page

 and  zoom in or out on the axes.

 changes the camera angle.

Ctrl +  zooms in or out of the box (without changing the axes).

Shift +  moves the box (without changing the axes).

**Status box** and **Results box** are useful

View > Status box

View > Results box

The **Object** menu can be used as an alternative to right-clicking.

### Adding points and vectors

See: C4 Vectors with Autograph

Entering co-ordinates is often easier than adding points.

### 3D Vectors – Vector product, lines and planes

#### Vector (Cross) Product

Select 2 vectors and a point, right-click and select **Cross product**

It should then be possible to show that the **Scalar Product** of this vector with each of the original ones is 0.

You can also show the related Cartesian equation of the plane containing 2 vectors has coefficients equal to the components of normal vector.

#### Intersection of 2 planes

Select 2 planes, right-click and select **Intersection line**

#### Angle between 2 planes

Create a point not on either plane.

Select the point and one of the planes, right-click and select **Normal Line**.

Select the point and the other plane, right-click and select **Normal Line**.

Select both lines, right-click and select **Angle between lines**.

#### Intersection of 2 lines

Select 2 lines, right-click and select **Intersection**.

The co-ordinates of the point or “No intersection” is displayed.

#### Distance between a point and a line/plane

Select a point and a line/plane, right-click and select **Closest Point**.

#### Shortest distance between two lines

Select 2 lines, right-click and select **Shortest Distance**.