BGE Level 3
Computer Graphics Course

Book 2

Design and Technology Department
Springburn Academy

3D Modelling ▪▬▪▬▪▬▪▬▪▬▪▬▪▬▪▬▪▬

In S1 we used **AUTODESK INVENTOR** to create computer models of basic shapes and a noughts & crosses game. We will use this again to create more a complicated object (a mobile phone).
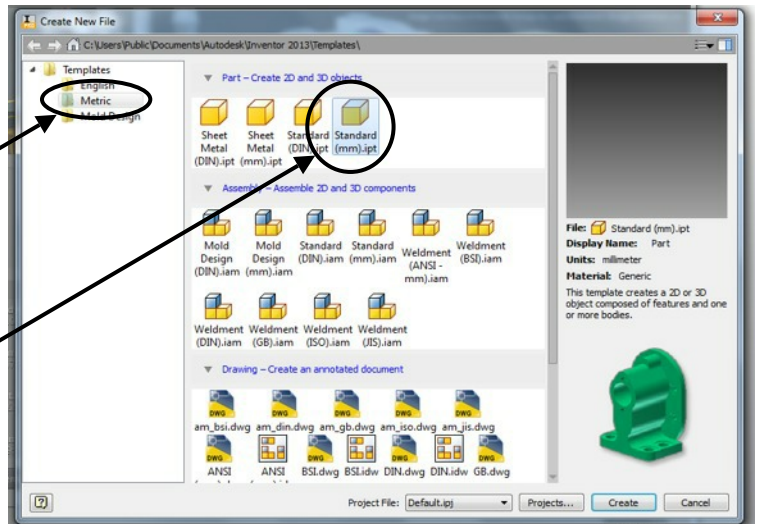
Lets do a little bit of revision first!

<u>Each</u> shape is a ***new part***.

Follow these basic set up guides to begin each ***new part***.

Select the METRIC template

Start a new standard(mm).ipt

To create a any new part we constantly repeat 4 basic steps.
1. Choose to draw a new sketch.
2. Select a workplane (this is like selecting a piece of paper to draw on)
3. Draw a 2D sketch of the shape you want and finish sketch. (like a square)
4. Use 3D modelling tools to make the shape into a 3D form (like a cube)

Choose a ***new 2D sketch*** and then click on a ***workplane*** to sketch on.
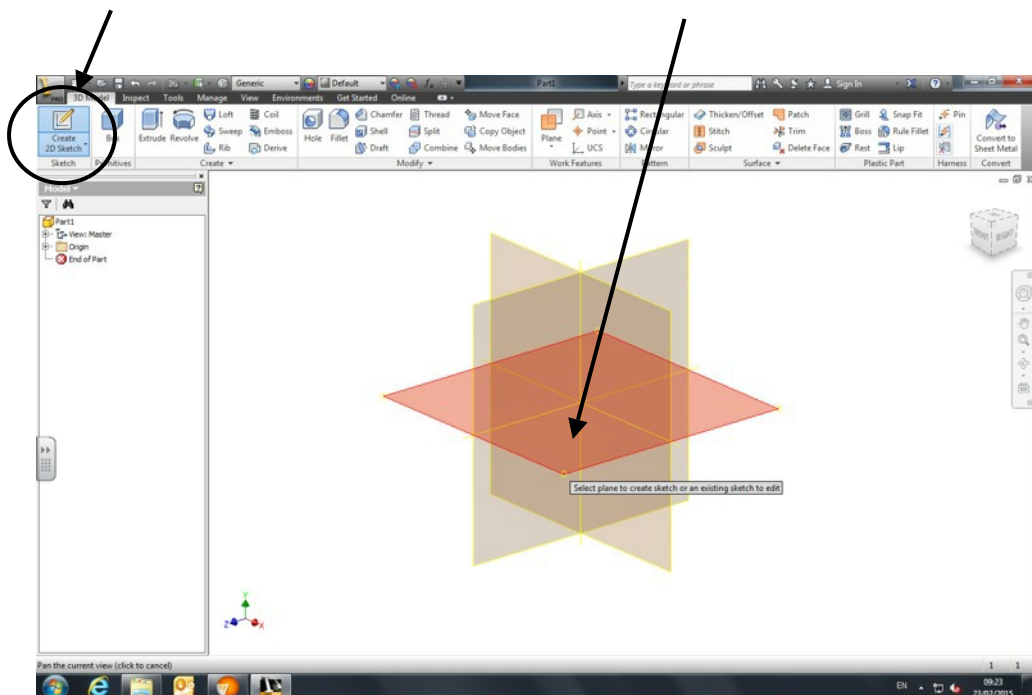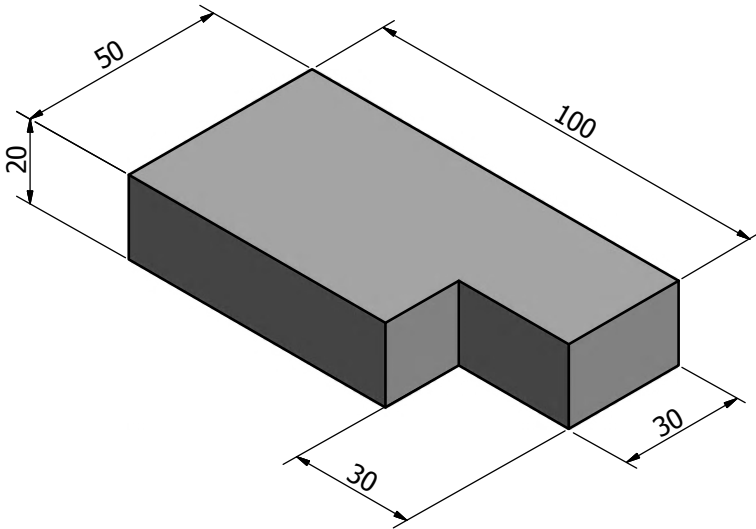
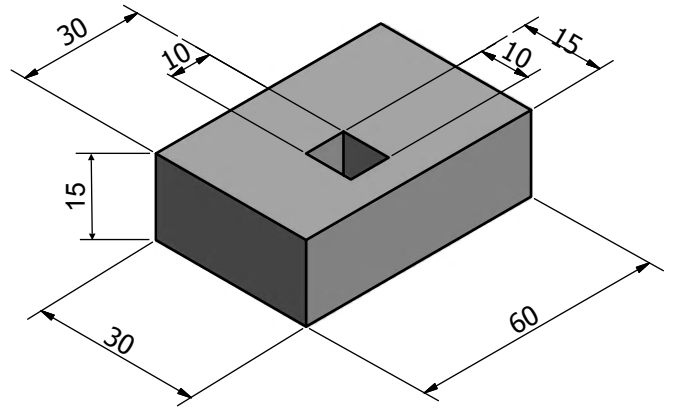Green ☐   Amber ☐   Red ☐

Task

Create the shapes below using the sizes provided. Your teacher will give you a little reminder on how to get started. Some shapes have hints on how to make the model faster!
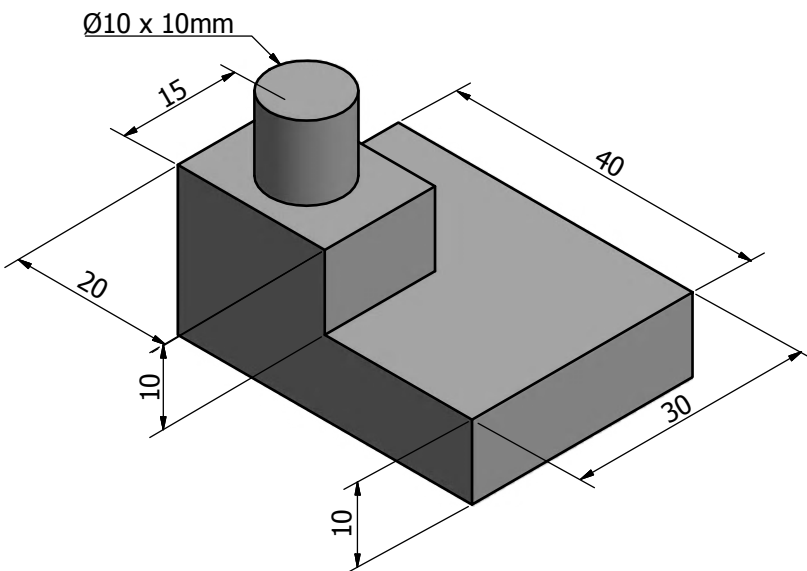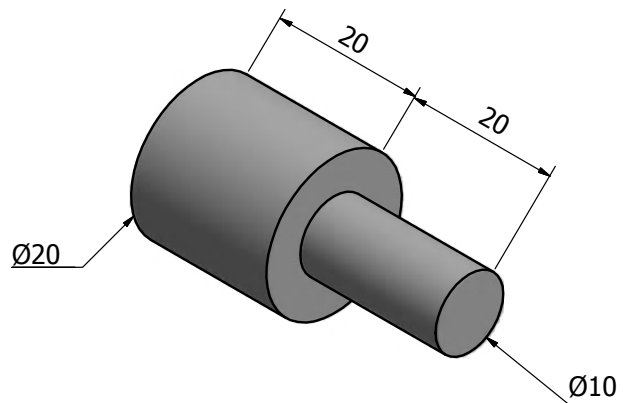
Shape 1

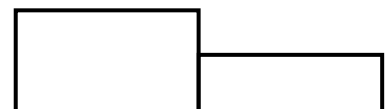Hint - Sketch and dimension the shape then you only need to extrude once!

Shape 2

Ø10 x 10mm

Shape 3

Shape 4

Hint - Try sketching this profile (adding the correct dimensions) and using the 3D modelling command revolve.

Green ☐   Amber ☐   Red ☐

Mobile phone assignment

Using **AUTODESK INVENTOR** we will make a computer model of a mobile phone and create an advert using **DTP**.

The follow pages give you all the information you will need to;

- make each part,
- assemble your CAD model,
- produce working drawings,
- design and make the advert.

Parts

There are four separate parts to make and then assemble.

- The casing
- The Insert
- The screen
- The home button

For each part you will need to start a new standard(mm).Ipt, (just as you have done on the previous tasks), and choose a workplane to sketch on.

Task 1

- Pages 1 to 3 show the complete assembly and an exploded view (with hints on sketching and modelling) and give the dimensional information for the parts.

  Remember to change the materials and colour of each part to make it more realistic.

Task 2

- Pages 4 to 8 give information on how to assemble your CAD model, adding an image (**DECAL**), and making a basic '**scene**' to make it look more realistic.

Task 3

- Pages 9 to 13 give you the information so that you can replicate (make your own copy) of the production drawings you used on pages 1 to 3.

Task 4

- Pages 14 to 15 are a reminder on how to use DTP to make an advert with visual impact.
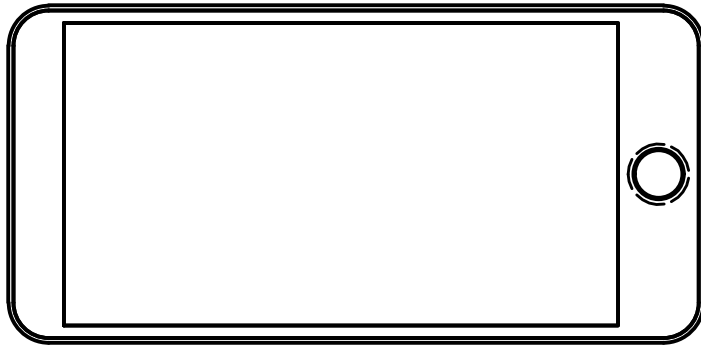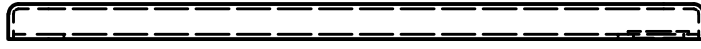
Green ☐   Amber ☐   Red ☐

Extrude rectangle,
Fillet corners,

Extrude (subtract) for
home button

Extrude rectangle,
Fillet corners and edges,
Shell to hollow out.

Extrude (subtract) for
placement of the screen
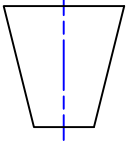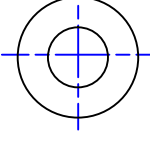
Draw profile,
Revolve to shape

Extrude rectangle

Plan

End Elevation

Elevation

Mobile Phone

Teacher_____

Date_____

Name_____

Class_____

0.25 X 45°

1

Home Button

Plan

Ø12

Ø10

Elevation

R2

1

7

138
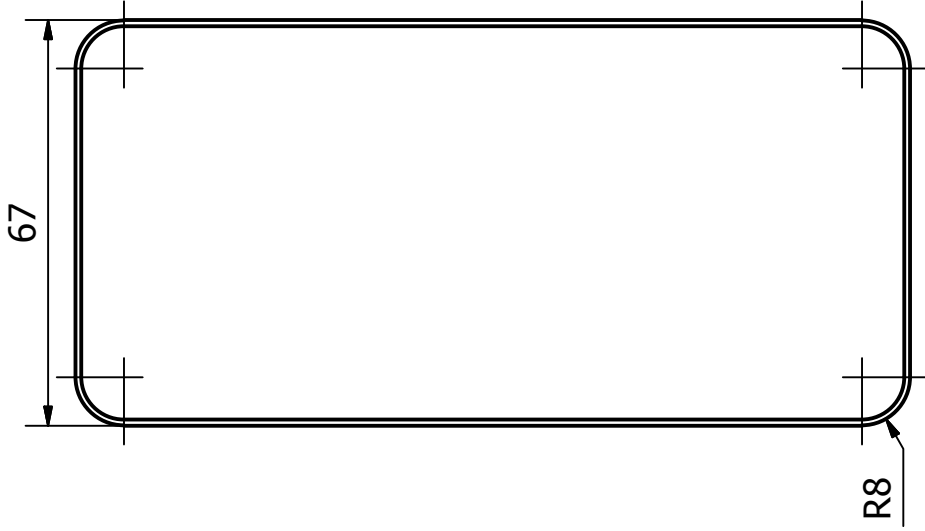
End Elevation

Casing
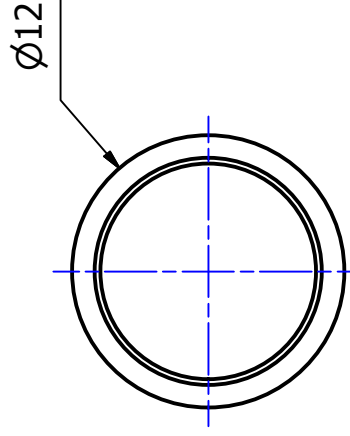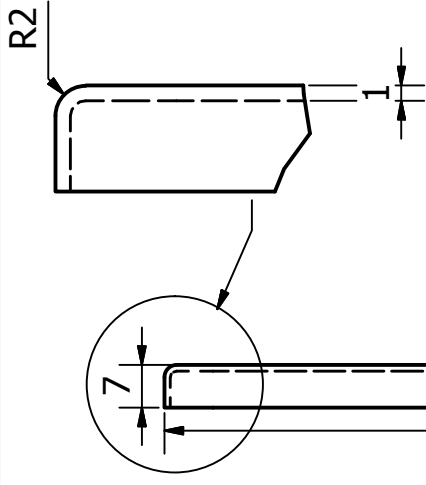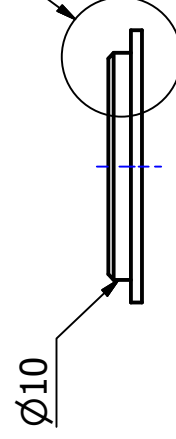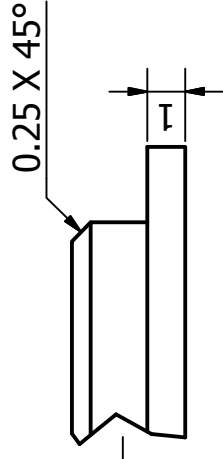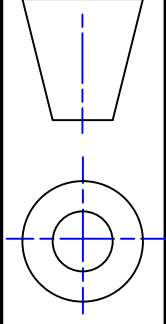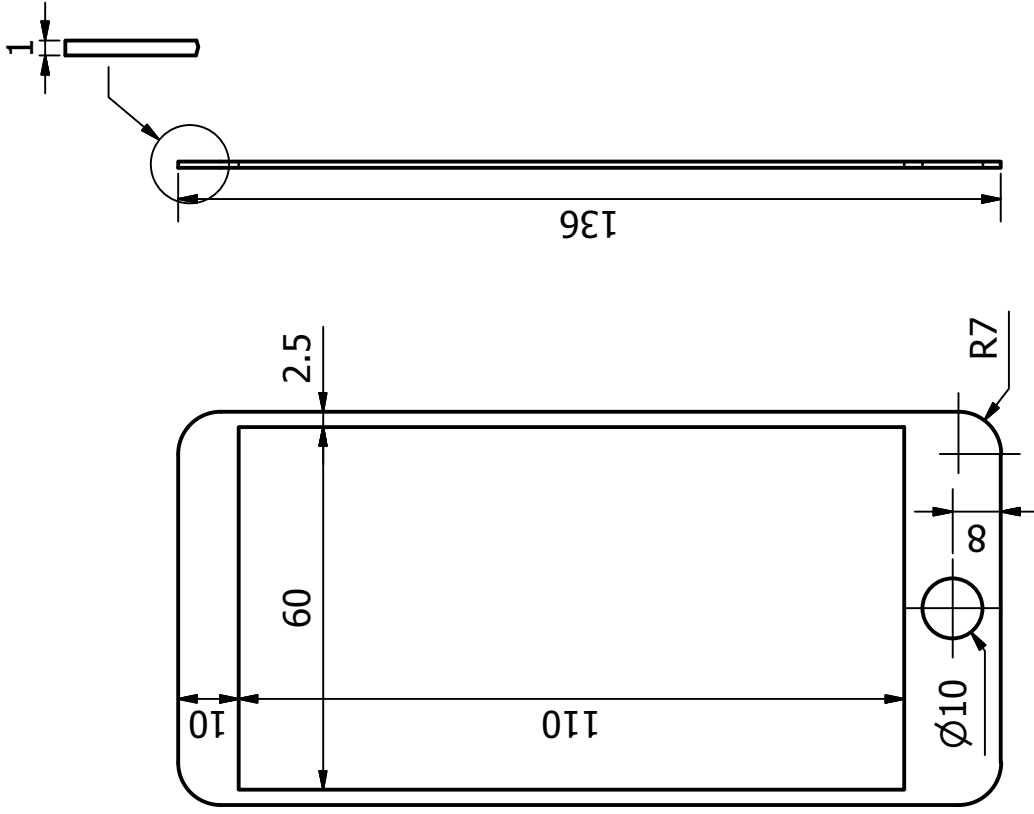
67

R8

Elevation

Mobile Phone

Teacher

Date

Name

Class

End Elevation

1

Elevation
Screen

60

110

End Elevation

136

1

Elevation
Insert

2.5

60

110

10

R7

∞

Ø10
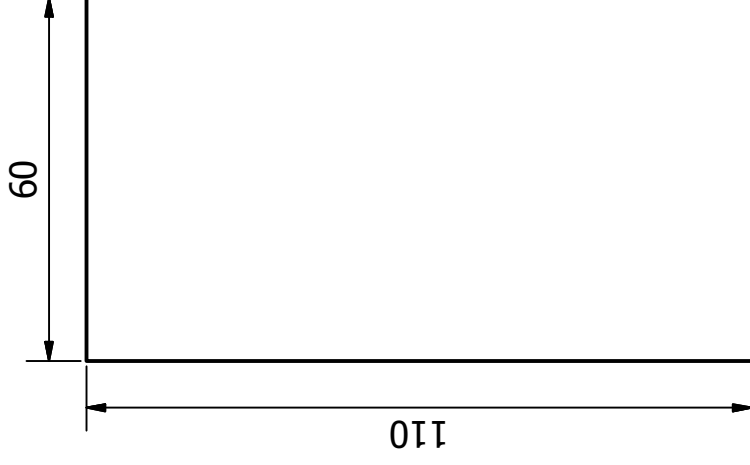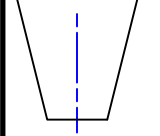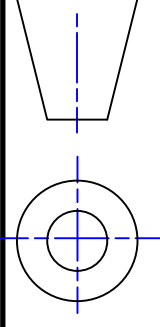
To join all the parts together we make an **ASSEMBLY**.

Follow these basic set up guides to begin a new **ASSEMBLY**.

Select the METRIC template

Start a new standard(mm).iam

To create an **ASSEMBLY** we constantly repeat 2 basic steps.
1. **Place components** (parts).
2. Add **Constraints** to the components (stick parts together).

Click on [Place] and select the casing of the phone.

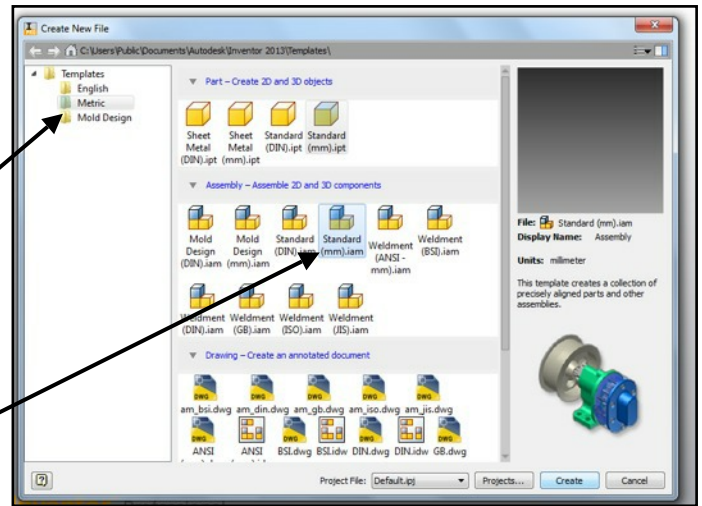The computer does not know how many you want, so it gives you the option to **PLACE** as many as you would like. To stop placing parts press the **ESCAPE** key on the keyboard (top left corner).

You will need to place all four components.
- The casing
- The insert
- The screen
- The home button
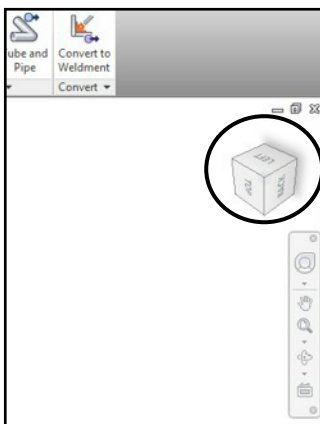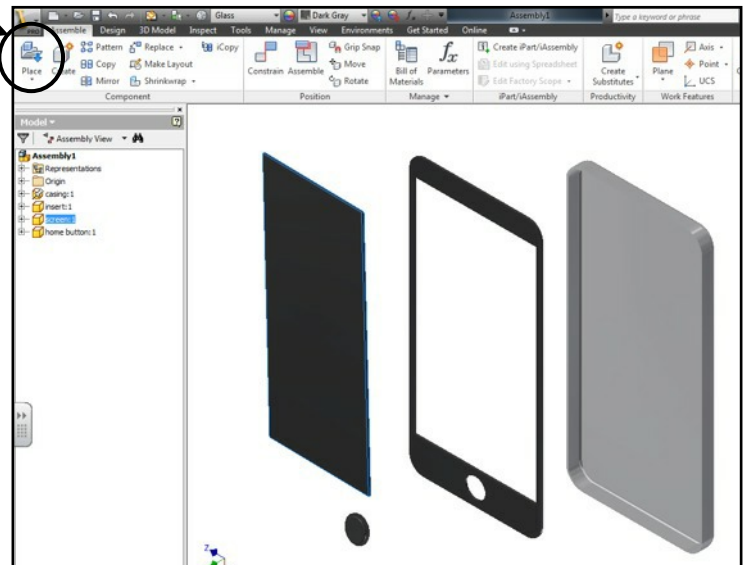
You might need to **ROTATE** the view to get the parts the right way up.

This is done by clicking on either the; *faces*, *edges* or *corners* of the **VIEWCUBE**.

Green ☐   Amber ☐   Red ☐

We are now ready to constrain the parts together. A **CONSTRAINT** will stop something moving, in other words it will stick something in place.

To complete our **ASSEMBLY** we will use 2 different **CONSTRAINTS**.

MATE sticks one face or edge to another face or edge.

FLUSH makes one face level with another face.
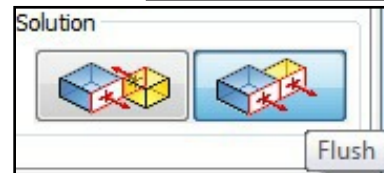
Your teacher will show you how this can be done. Here are some hints….

- Assemble the home button and screen to the insert first.
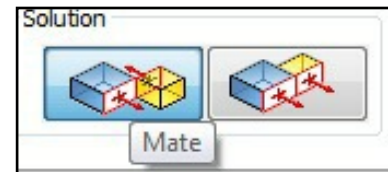- Use the flush command after using the mate command. In other words stick the parts together before making them level.

If you want to add an image to the screen you will need to have the image saved in your files!

To start, **RIGHT** click on the screen in your assembly and select **EDIT**.
(make sure the only file open in inventor is your assembly file)
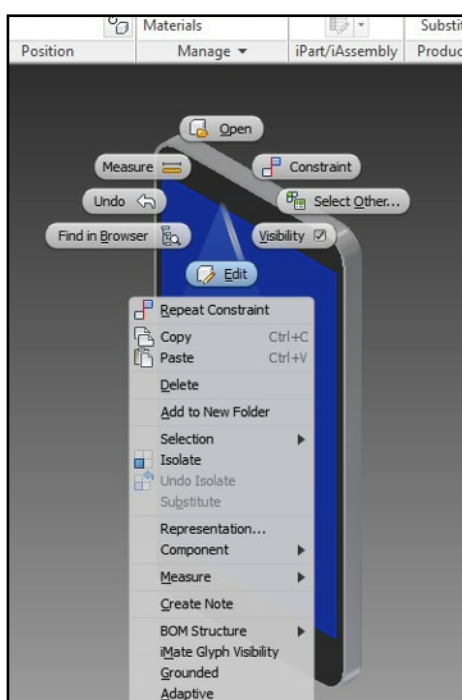
When you click edit the other parts to your assembly will go transparent. We can now make changes to the part, such as adding an image or changing the shape etc..
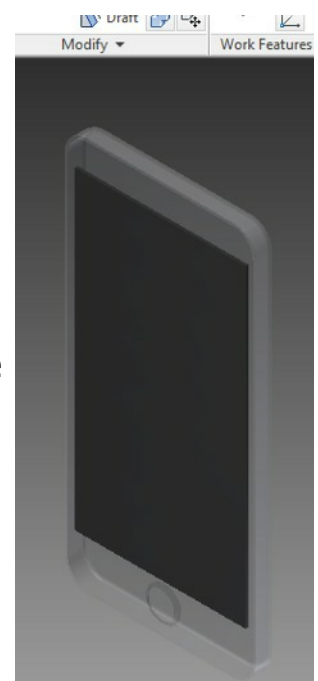
Green [ ]   Amber [ ]   Red [ ]

Select a new 2D sketch then using **INSERT IMAGE** place your picture on the screen.

Insert Image
Inserts an image file into a sketch.

Press F1 for more help

Clicking and dragging the corner will allow you to rotate the image.
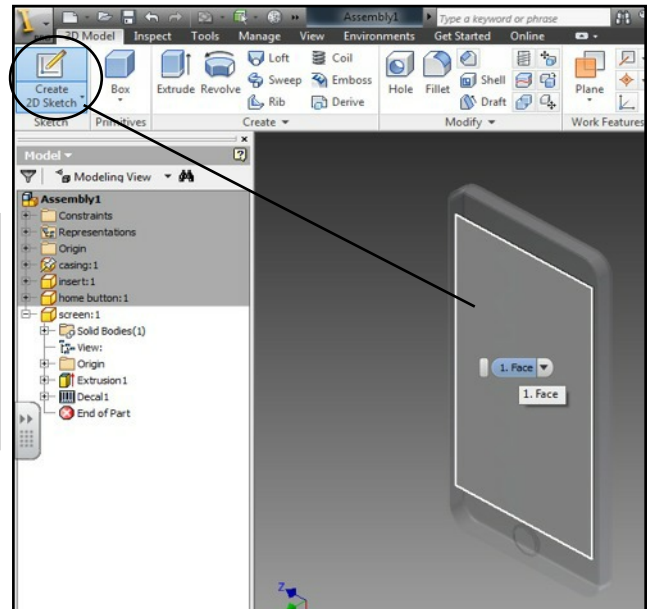
You can click and drag the image into position. You can also rotate and change the size of the image.
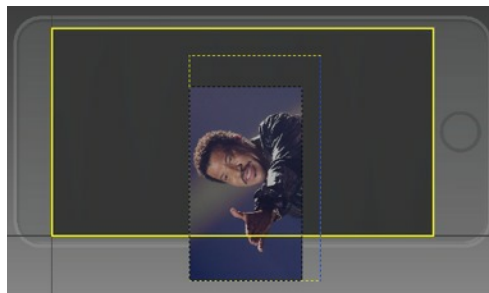
Clicking and draging an edge will alter the size of the image

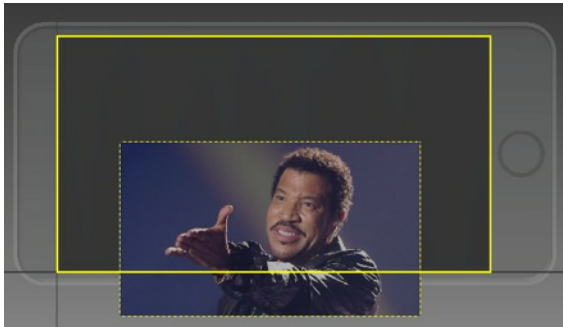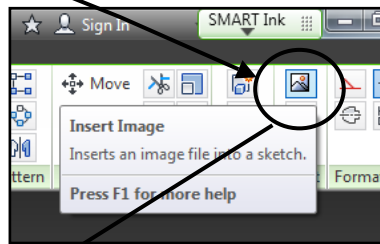We need to project the image onto the screen to make the image permanent. We do this with the **DECAL** command. Click on the little down arrow next to **Create** and the decal command appears. We now select the image and the face we want to project the image onto.

Decal
Image   Wrap to Face
Face   Chain Faces
OK   Cancel

Decal
Image   Wrap to Face
Face   Chain Faces
OK   Cancel
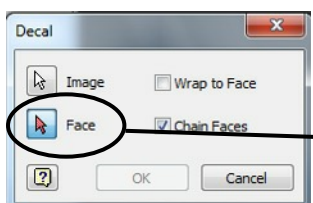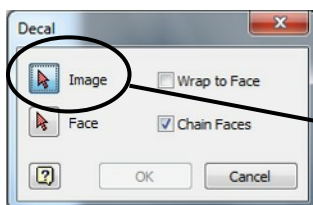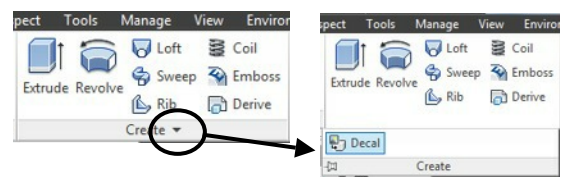
Once you have added the decal, **RIGHT** click on the surrounding grey area and choose finish edit.

Fillet
Measure   Extrude
Undo   Revolve
Work Plane   Hole
Finish Edit
Repeat Decal
New Sketch
New 3D Sketch
Dimension Display
Measure
Create Mate   Q
Move EOP to Top

Green ☐   Amber ☐   Red ☐

Lets get a **RENDERED IMAGE** of our phone. This is a picture with lights and shadows making the model 'look' realistic. We will also add our phone into a 'scene' which will help give our CAD model **CONTEXT**.

First, we will create an image of your phone model.

We will do this using the exact same method as creating the image of the noughts & crosses game you made in S1 using CAD modelling.

Open the **ASSEMBLY** file for your phone model.

Now cick on the **ENVIRONMENTS** tab and then select **INVENTOR STUDIO**.
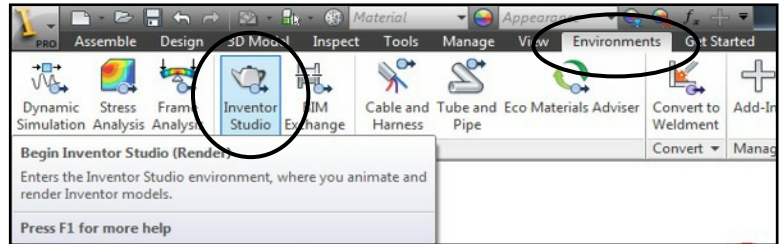
Next, click on **RENDER IMAGE** and select the **RENDER** button at the bottom.
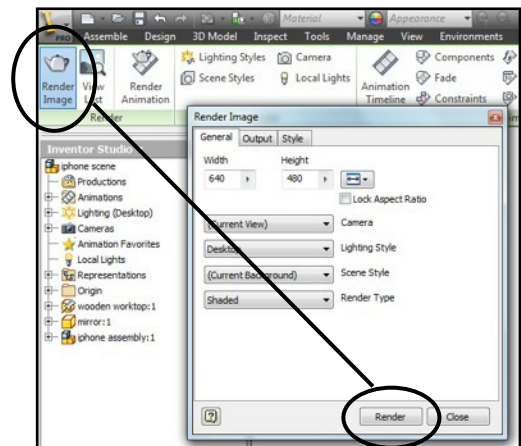
The **RENDERED OUTPUT** shows us a more realistic view of our game with highlights and shadows.
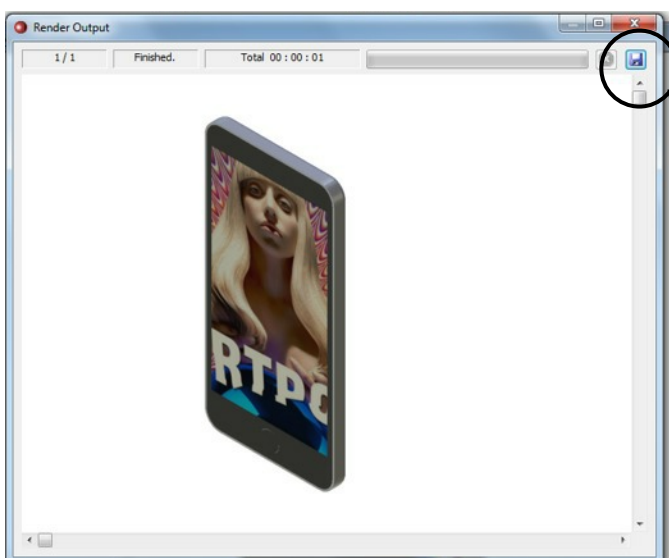
Click the little disc icon to save your picture.

Remember to save your picture in the correct folder with a recognisable name. We will use this picture later in the Graphics course.

Green ☐   Amber ☐   Red ☐

Lets add **CONTEXT** to our phone by adding it into a 'scene'.

We need to exit the inventor studio program by clicking [Finish Inventor Studio / Exit] .

We need to make the parts and an assembly for the scene. Your teacher will show you how to do this, following the steps below.

1. Make a *new part*.
2. An extruded rectangle 300mm X 200mm X 5mm.
3. Change the material to a type of wood.
4. Save this as "table top".
5. Change the material to silver then save as "mirror".
6. Start a *new assembly* file
7. Place the table top and the mirror as shown opposite.
8. Place your phone assembly into the scene (onto the table top in front of the mirror)
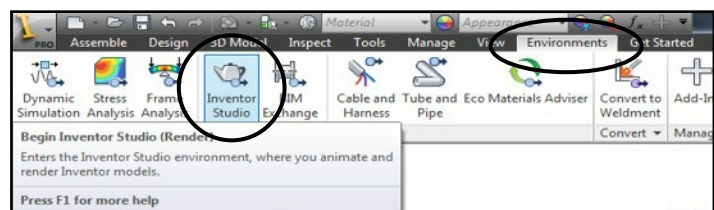9. **Save your scene!**

Now click on the **ENVIRONMENTS** tab and then select **INVENTOR STUDIO**.

Next, click on **RENDER IMAGE** and select the **RENDER** button at the bottom.

The **RENDERED OUTPUT** shows us a more realistic view of our game with highlights and shadows.
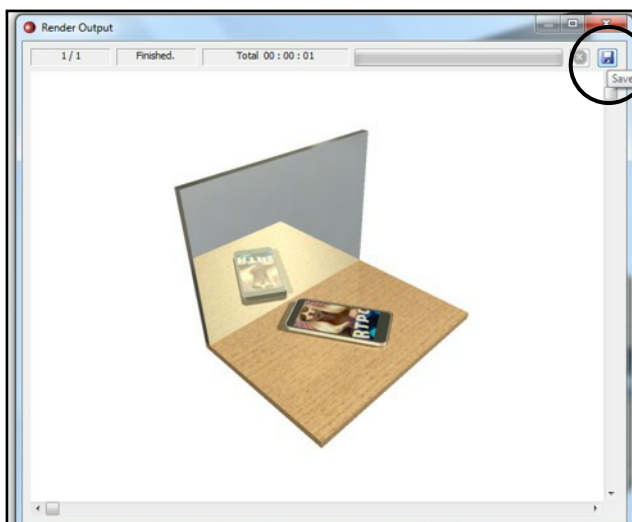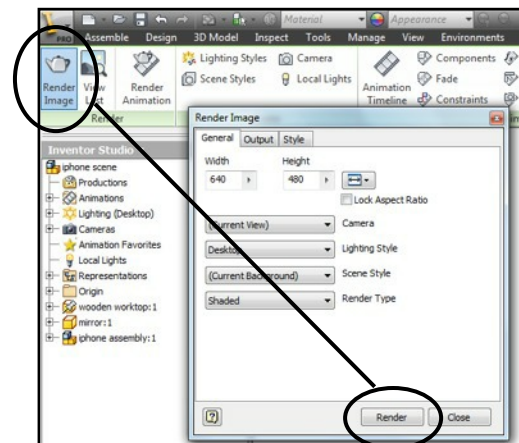
Click the little disc icon to save your picture.

Remember to save your picture in the correct folder with a recognisable name. We will use this picture later in the Graphics course.

| Green | | Amber | | Red | |

For someone to make the phone we need to give them **PRODUCTION DRAWINGS**. This gives the manufacturer (the person making the game) all the **TECHNICAL DETAILS** he/she needs.

E.g.   **2D** drawings showing sizes (**ORTHOGRAPHICS**) and
        3D drawings showing how it goes together (**PICTORIALS**)

On the first page we have 2 assembly views and then we have a further 2 pages with orthographic detail views of the parts.
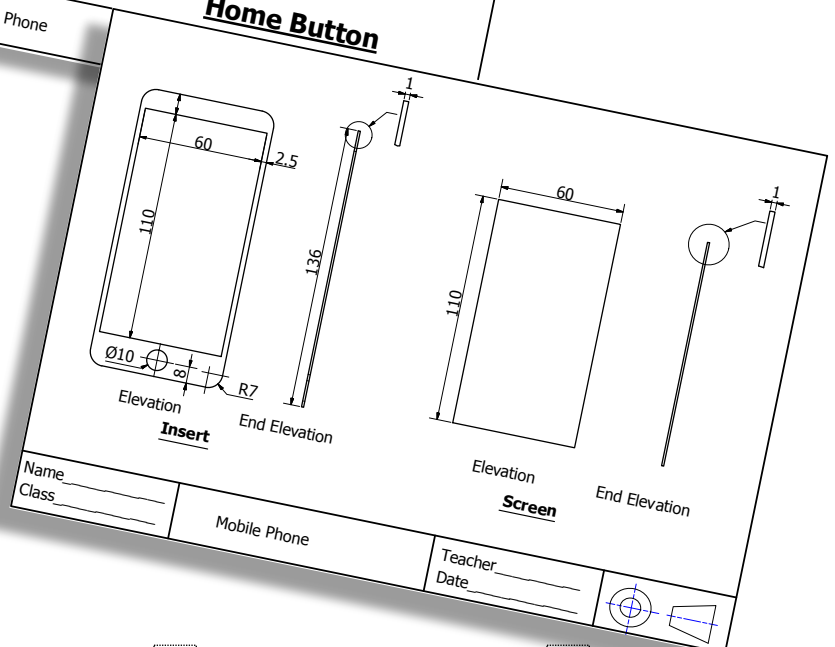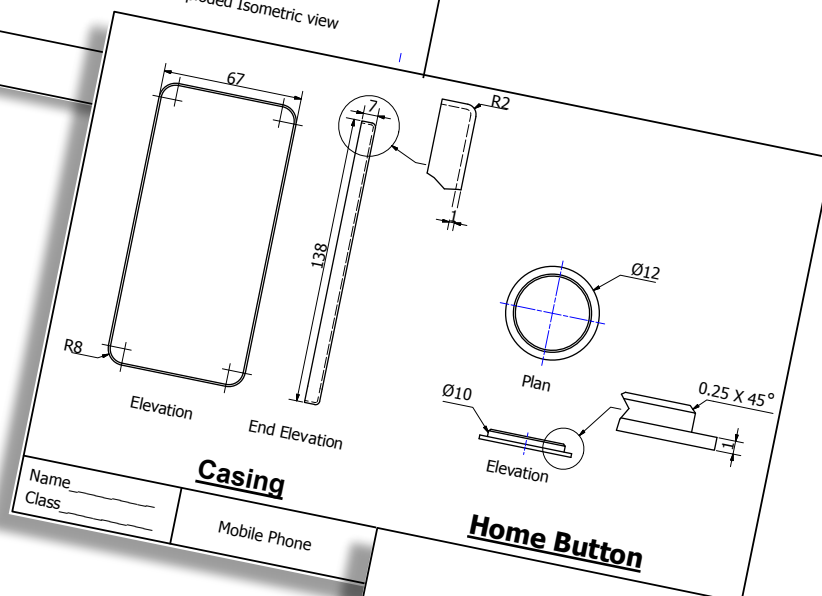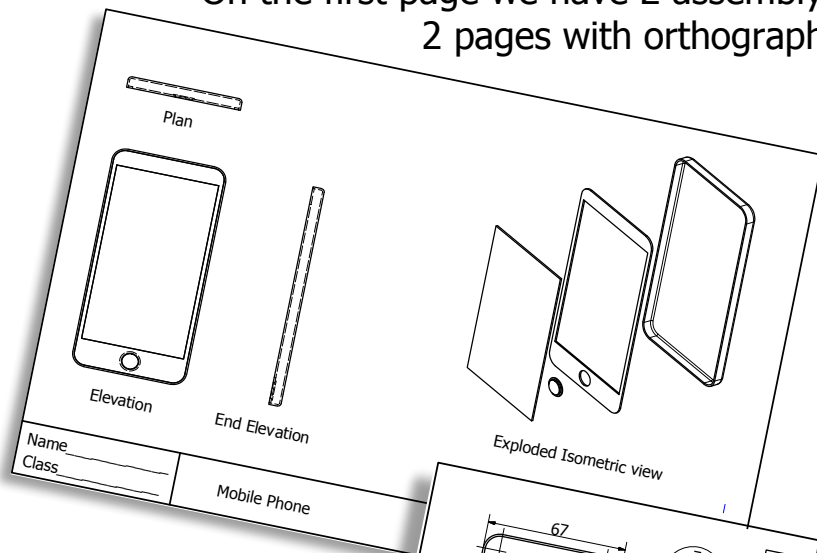
Green ☐   Amber ☐   Red ☐

On the first page there is a new view you have not used before. It's called an *exploded view*. This type of view shows how the parts go together. To do this type of view we need to create a **PRESENTATION FILE (Ipn)**.

Select to start a new inventor file and choose **STANDARD (MM).Ipn**.

Select to create a view Create View then open your phone assembly file.
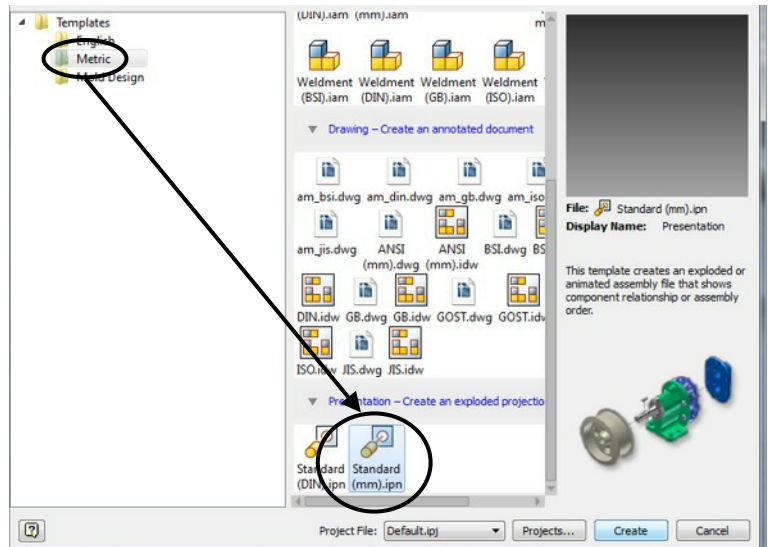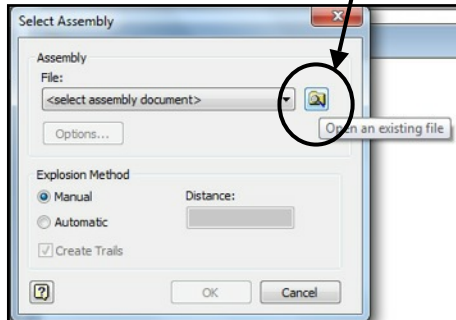
Use the corners of the VIEWCUBE to rotate your model correctly.

Your teacher will show you how to 'tweak' the component parts to make the exploded view.

When you have completed this, save the file.
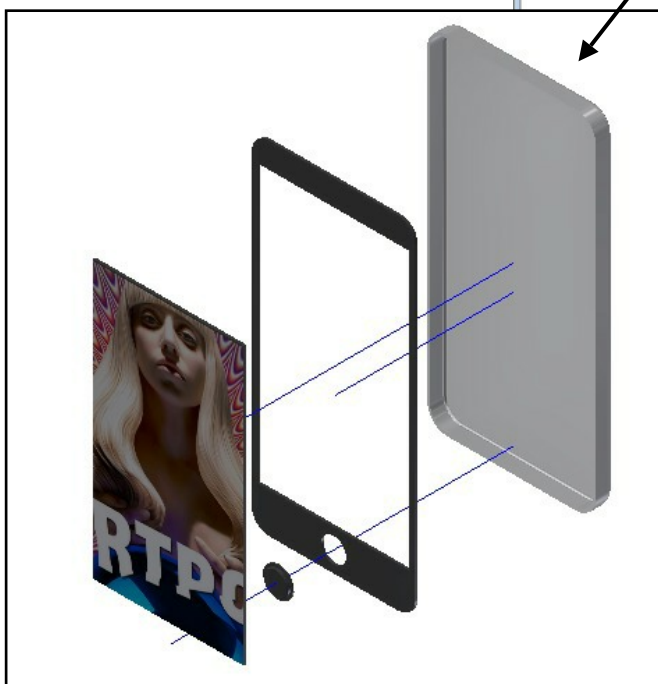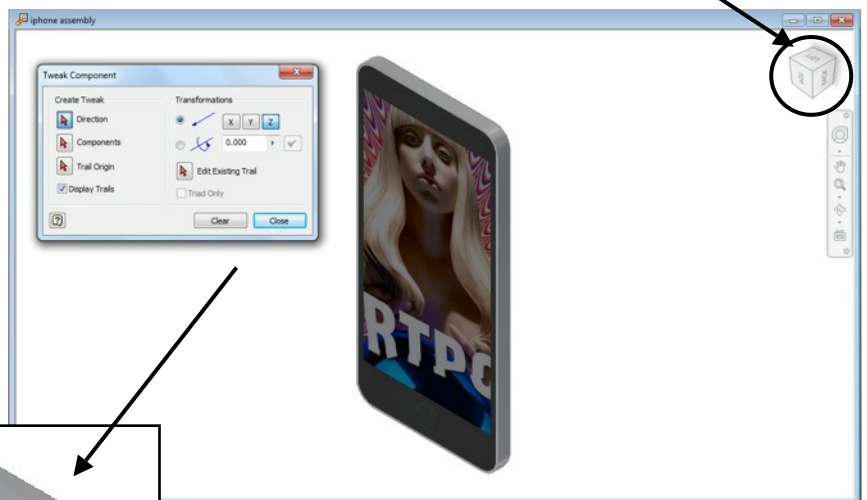
Green ☐   Amber ☐   Red ☐

Now that we have all the parts and assemblies we can start creating the production drawings.

Just as in S1 we begin with a **DRAWING TEMPLATE**.

Click to open a file then navigate to the **TECHNICAL SHEET** template.
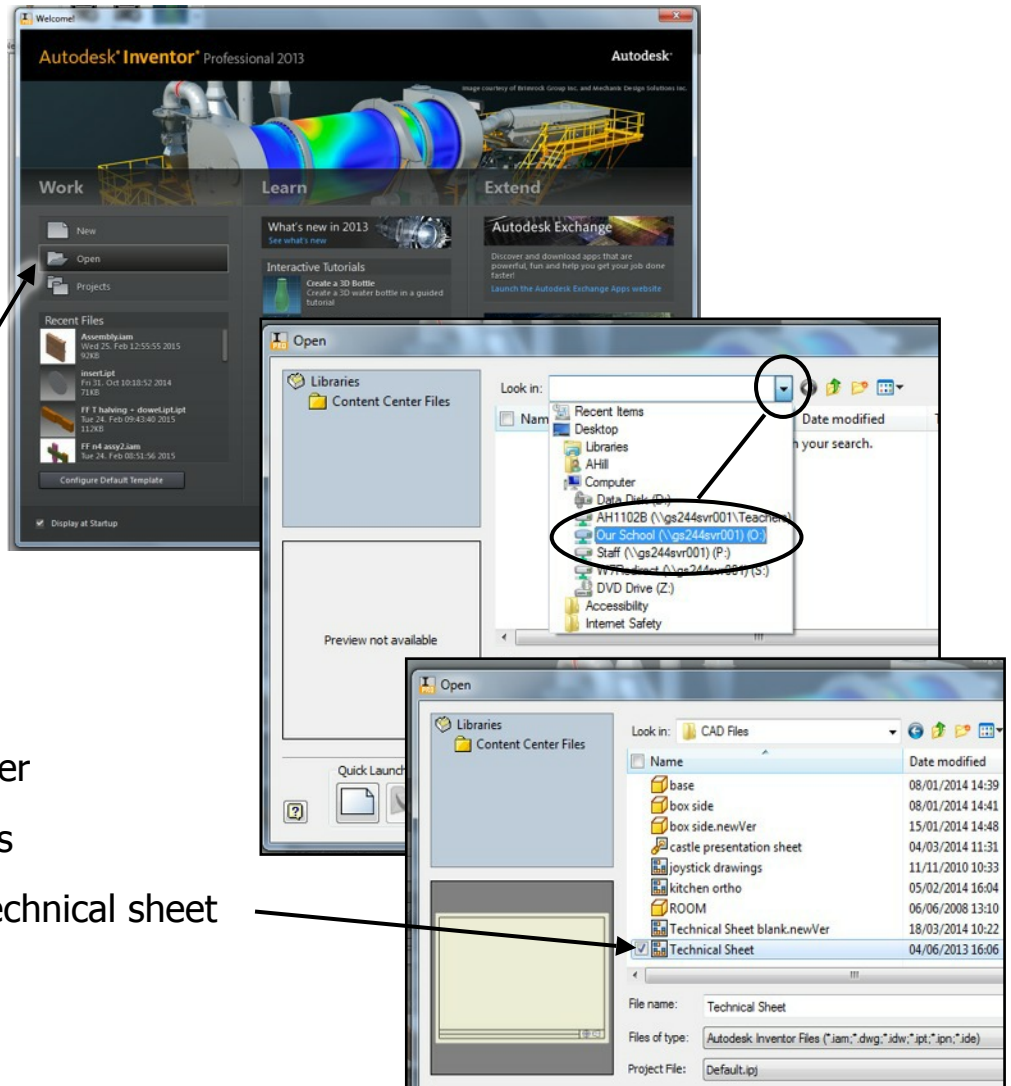
Open

⤷ Our school

  ⤷ Technical folder

    ⤷ CAD files

      ⤷ Technical sheet

To add a VIEW of our phone we click on **BASE VIEW**
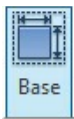
Then select the file you want views of.

Lets start with your exploded view.
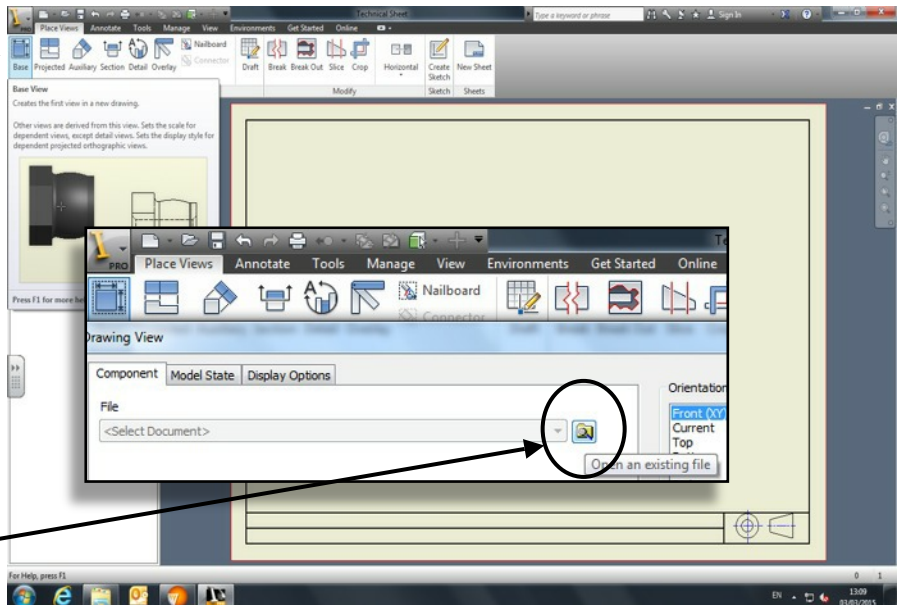
Click here to select your file.

Green ☐   Amber ☐   Red ☐

Once you have selected your presentation file you need to place it on the page.

Remember that once you select your view we can use this button 🔍 to rotate it correctly.

The **SCALE** of the view is also very important. If the scale is too big the overall 'look' of the page is effected. If the scale is too small we won't be able to see enough detail.

Try changing the scale and choose one that looks to be in good proportion to the page.
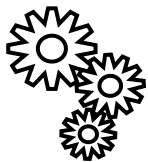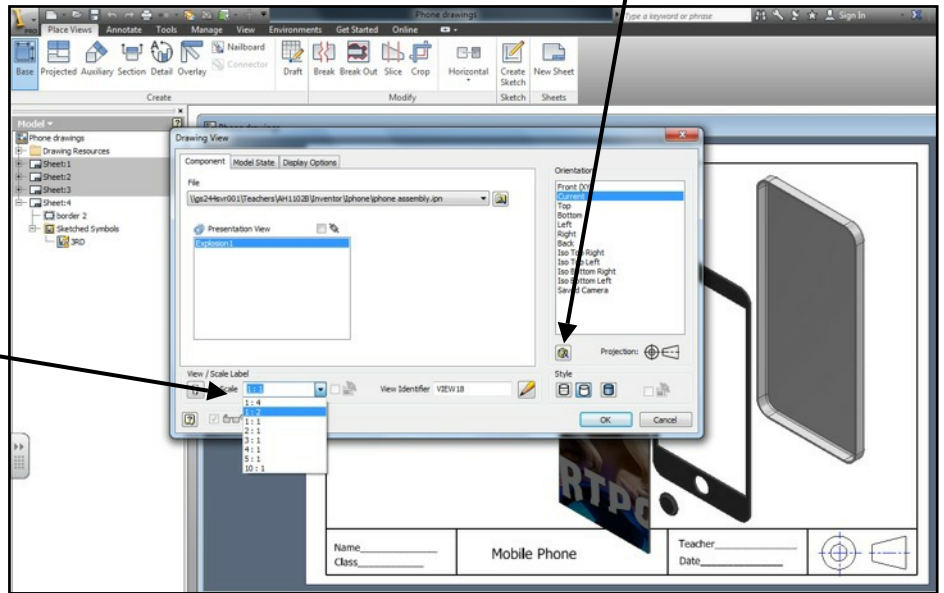
A scale of 2:1 means the model will be twice its original size. Whereas a scale of 3:4 means the model will be ¾ (75%) its original size.
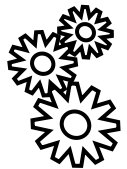
Next we need the Elevation, End Elevation and Plan. As before click on BASE VIEW, this time select your assembly file.

The first **VIEW** that you need is an **ELEVATION** (front view).

Remember that you can use the rotate button to turn the model to the correct view.
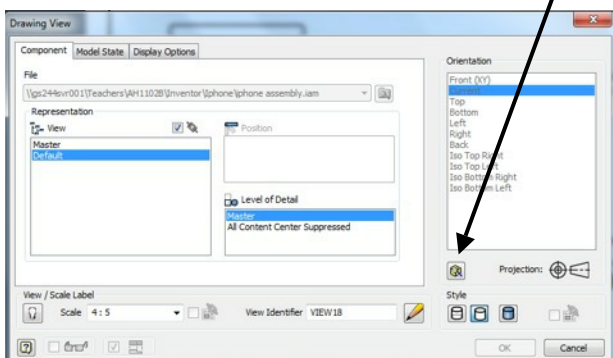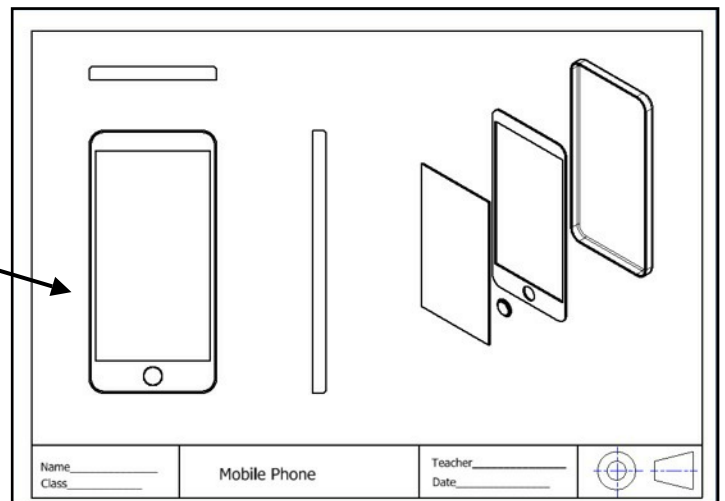
After placing the **ELEVATION** view the computer will automatically allow you to place the other **PROJECTED** views (**PLAN, END ELEVATION**).

Green [ ]   Amber [ ]   Red [ ]

Once you have placed your views, type in the correct view title in the **VIEW IDENTIFIER** box, (**PLAN, ELEVATION, END ELEVATION**).

Right click on one of your views and select **EDIT VIEW**.

You must make sure that the little 'light bulb' is on for this information to be displayed!
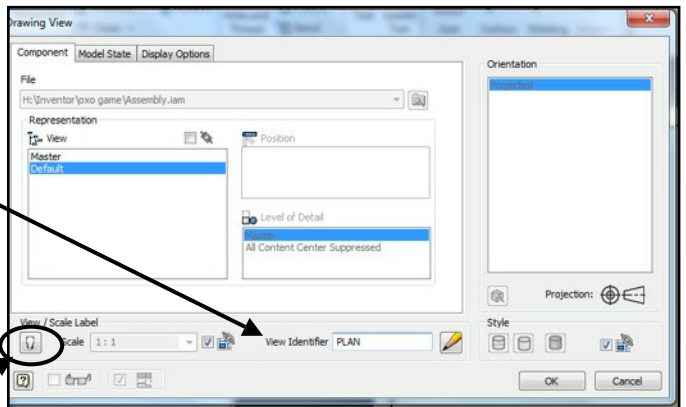
After placing the views we need to add some **TECHNICAL DETAIL**. Your teacher will remind you how to add **DIMENSIONS, TEXT** and **CENTRE LINES** to your views.

DIMENSIONS, **TEXT** and **CENTRE LINES** are part of the **ANNOTATE** options tab.
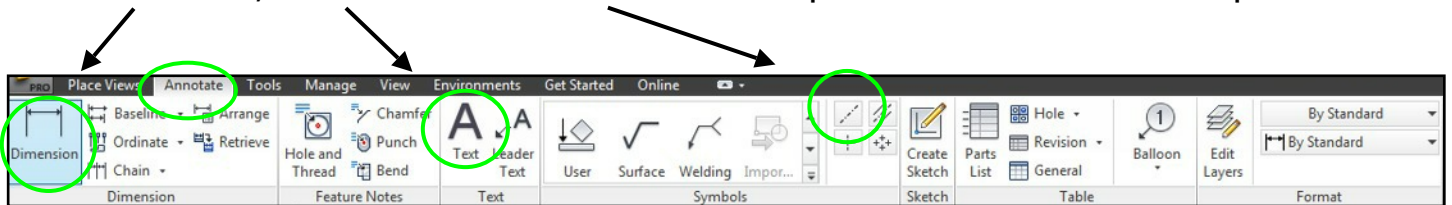
Insert **TEXT** in the Title box at the bottom of the page. You need your **NAME, CLASS** and **DRAWING TITLE**.

You can add **DETAIL VIEWS** of areas that are too small to see clearly. This is a 'zoomed in view' can allow us to add more dimensional information etc…

R2

7

1
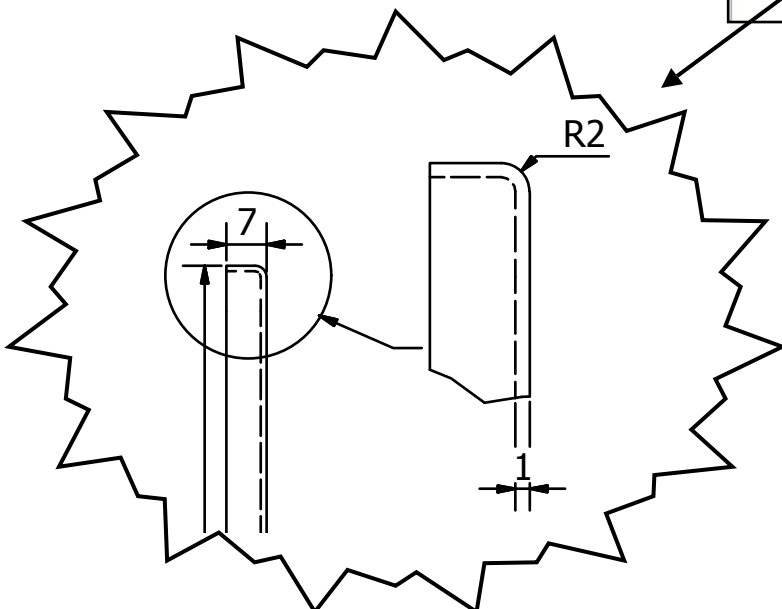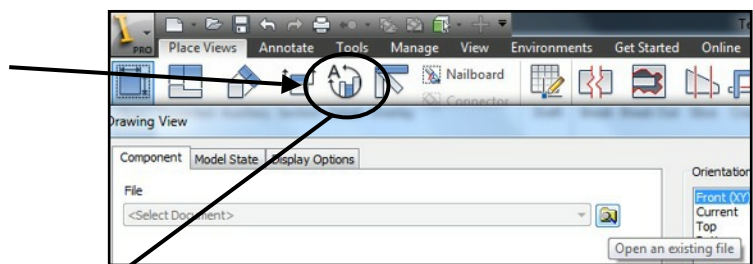
You should now have all the skills needed to reproduce al three production drawing sheets.

Good Luck!

Green ☐   Amber ☐   Red ☐

Next we will use DTP to create an advert for your phone. Your teacher will remind you how to start a **DTP** document in Pageplus. You will then add a background and text. Finally you can *import* images and your Inventor picture.

Start a new **DTP** document

It should be **A4** size.
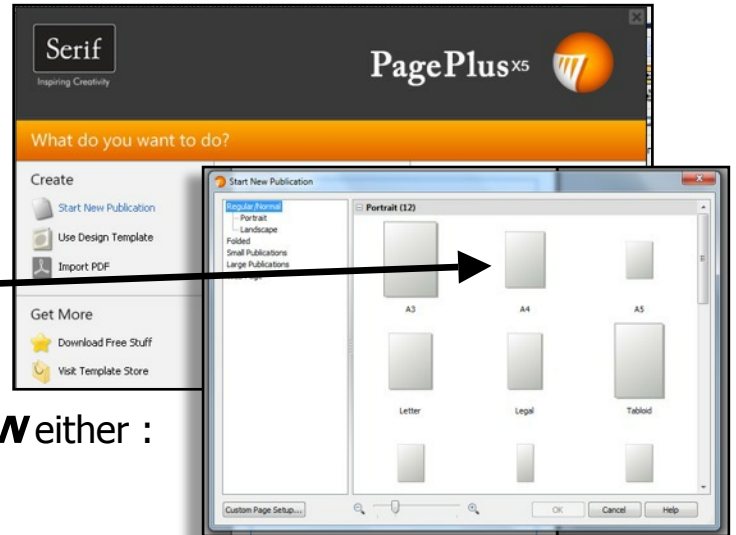
You can choose your **PAGE ORIENTATION** either :
PORTRAIT ☐ or **LANDSCAPE** ☐

Using **QUICKSHAPES** drag a rectangle shape for the background. Add colour to your background using the **SWATCHES** tab. You can use **COLOUR PALLETS** or blending colours together as a **COLOUR GRADIENT**.

Gradient Colours

Colour Pallets
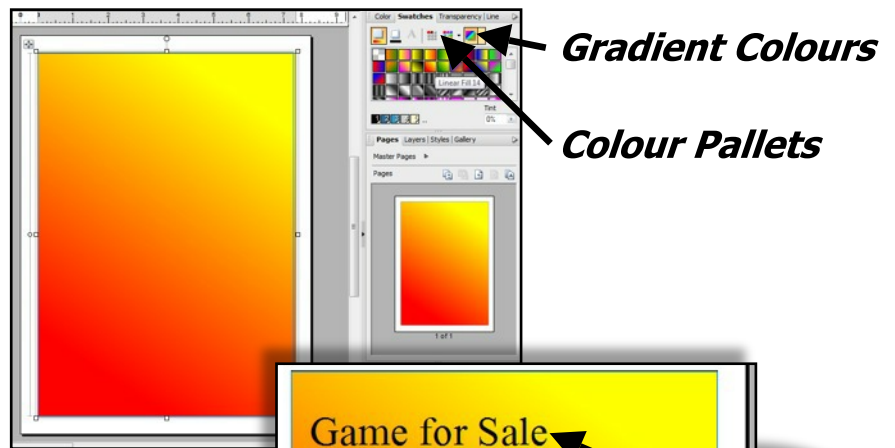
Add **TEXT** and alter the **FONT STYLE, SIZE and COLOUR.** Your teacher will remind you how to do this. They may also show you how to add an **OUTLINE**, add **EFFECTS (fx)**, or **WARP** the text shape.

Boring!
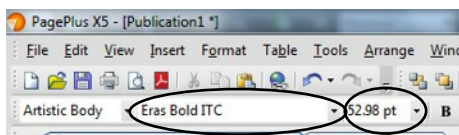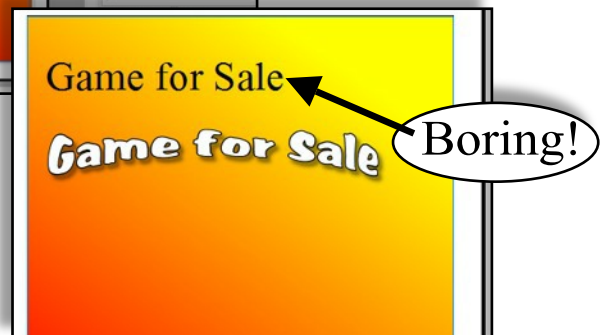
Change **FONT STYLE** and **SIZE**
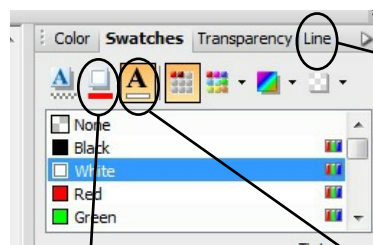
Change thickness of the Outline.

Add **OUTLINES** and Change **COLOUR** of outline.

Change **COLOUR** of text.

Try adding other text to your advert like a slogan or an endorsement.

Eg   Slogan - "It won't change your life. It will become your life!"
            Endorsement - "My little monsters will love it - *Lady GaGa*"

Green ☐   Amber ☐   Red ☐

Now we will **IMPORT** and **MANIPULATE IMAGES** to improve the **VISUAL IMPACT** of your poster. In S1 you used the DTP editing feature **CROP**. You can use this again to remove unwanted backgrounds or parts of images.

'CUT-OUT STUDIO' has been used to remove the background from the inventor model image. Your teacher will remind you how to use this again.

This image has been imported using a shaped **FRAME**.
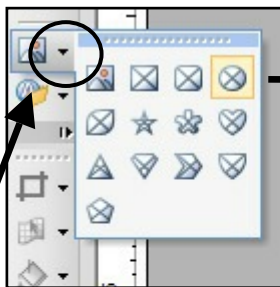
Click on the little arrow next to the **IMPORT IMAGE** icon.

Once you have selected the shape of frame you want. Place it onto your page by clicking & dragging until you get the size you want (You can alter the size afterwards too).

By clicking on the 'replace picture' icon at the bottom right corner you can select the image you want.
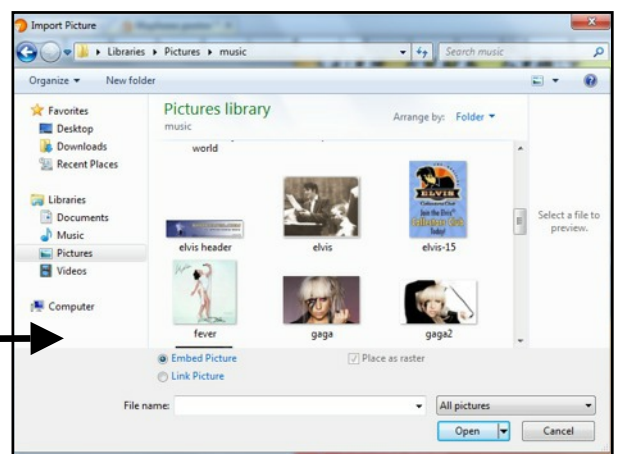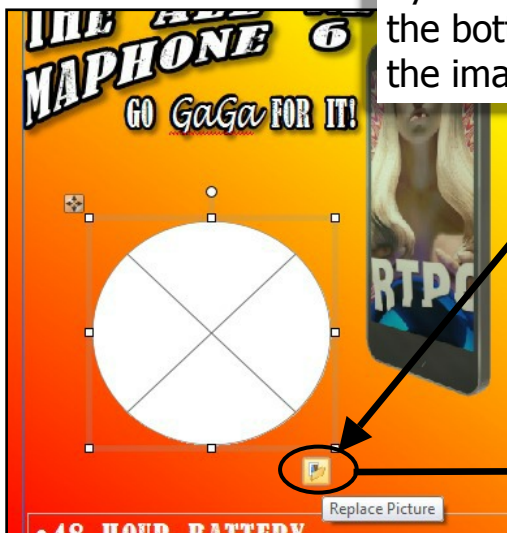
Green ☐   Amber ☐   Red ☐

DTP Magazine page Task --------------------

Using the skills you have just learned to complete your phone advert we will now design and make a magazine page.

Your magazine page can be on any topic or hobby that interests you (as long as it's appropriate for school!). The example we will run through is about the city of Glasgow.

The first stage is to design the magazine page. This is called a **THUMBNAIL**. Good graphics designers will produce several thumbnails which will use different features. This allows the designer to choose the best idea and then they can improve it. Usually including features they thought of in their other ideas.

A thumbnail is a **quick** sketch of the idea with notes on features and colour.
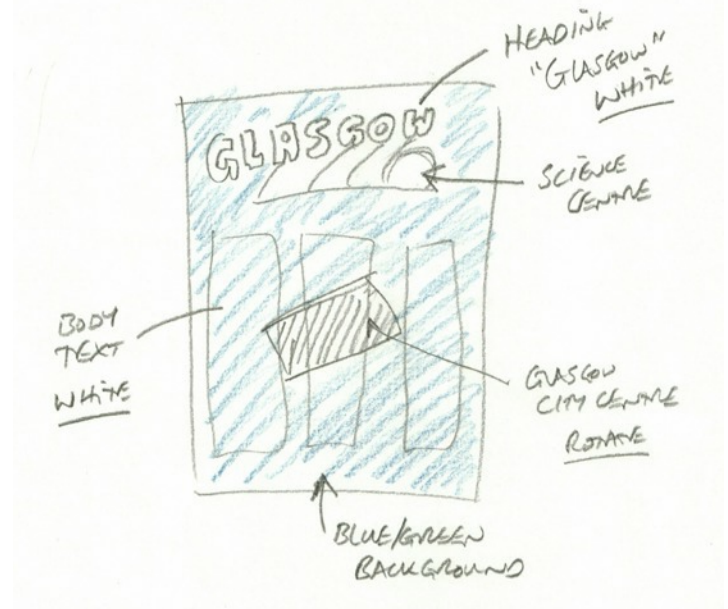
Once you have your plan (Thumbnail) you need to find the images and text you want to use in your magazine page.

Right click on the image and save into your *My Pictures*


Size of Image
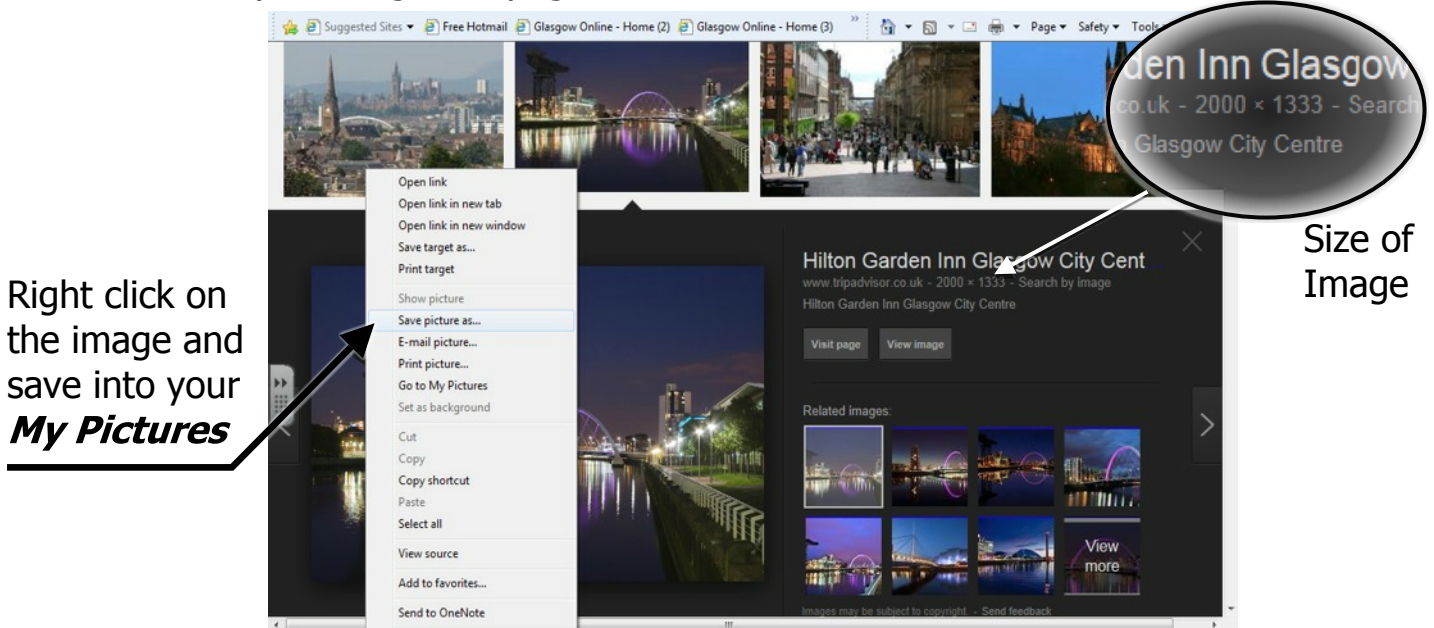
When searching for an image to use you <u>must</u> consider the size. If the image is too small it will **PIXELATE** (look blurry). A good rule is to only use images bigger than 500 x 500. But even this size may not be good enough if you want to use the image over half your page size (A4).

Green ☐   Amber ☐   Red ☐

The next component we need is **BODY TEXT**. This is all the writing in the article (apart from any **HEADINGS** or **SUB-HEADINGS**).

You may have written about your topic/hobby as part of another subject (maybe in English). If so you can use this as part of your article. Otherwise, as this is about graphic design and <u>not</u> about article writing, we will download our body text from the internet.
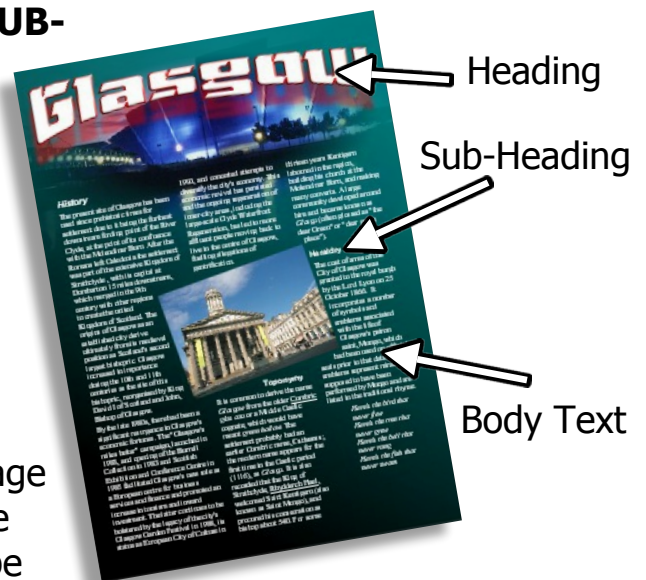
To download text we first need to find a webpage with suitable information. We need to copy the text into *Microsoft Office - Word* so that it can be edited easily.

Heading

Sub-Heading

Body Text

Word is a word processing program. Its main task is editing text. Whereas *Serif Pageplus* is a Desk Top Publishing program which is not as good at editing text, but far better at combining text and images (like a magazine or advert).

Select all the text you think you need. Then right click and choose **COPY**.

A quick way of doing this is holding down CTRL and pressing C.
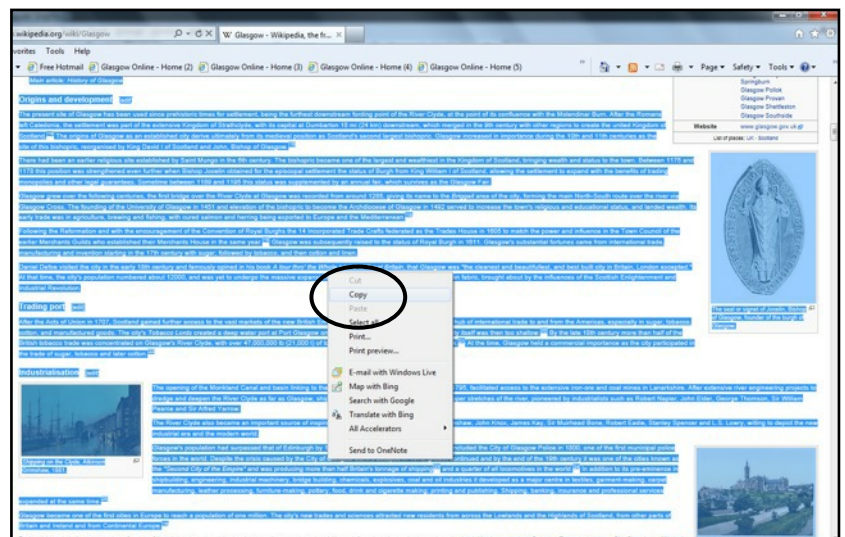
Open up *Word*.

Right click and choose **PASTE**.

A quick way of doing this is holding down CTRL and pressing V.
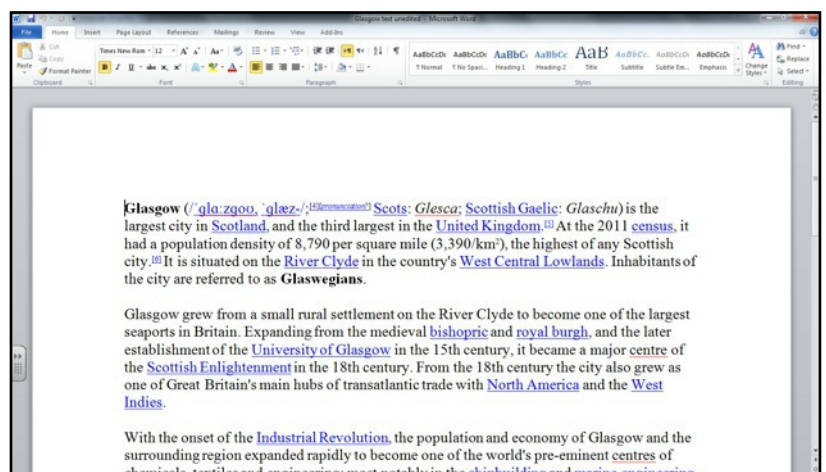
Tip: You will probably need a full A4 page of text!

Green ☐   Amber ☐   Red ☐

Using *Word*, edit the text to what you want. You can also change the FONT STYLE and SIZE. **Body Text** is usually either 11pt or 12pt size , but in children's books it may be as big as 14pt or 16pt.

You will also need to remove HYPERLINKS (these are usually blue text, underlined). To do this, highlight the hyperlink and right click. Choose the option to remove hyperlink.

Some hyperlink are false and do not connect to anything. All you need to do is change the colour of the text to black and remove the underline!

Once you have your text edited (hopefully around a page worth) we will be able to **copy and paste** this into our *Pageplus* magazine page.
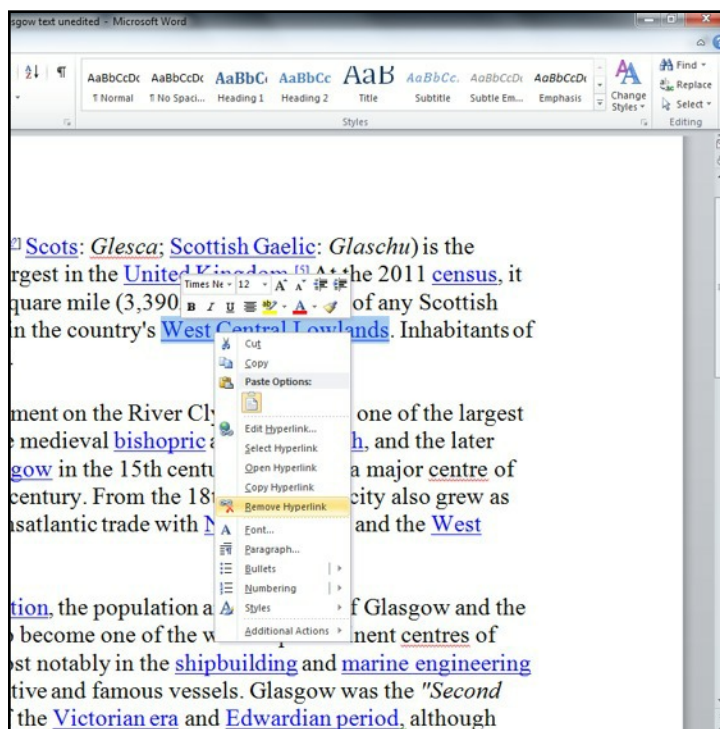
Now that we have our plan, text and images we can produce our magazine.

Start a new **DTP** document

It should be **A4** size (Portrait)

Use **Quickshapes** to design the background (look at your plan for reference) and add the **Heading**.

Green ☐   Amber ☐   Red ☐

Now lets add your text to the magazine page.

First - Drag 3 **TEXT BOXES** to make the columns for the **BODY TEXT**.

Text Frame flyout
Click the down arrow to display shaped text frames.

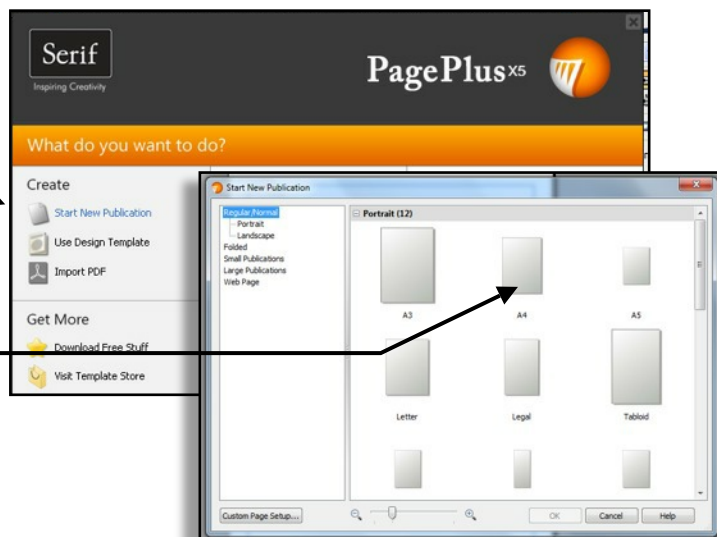Next **COPY & PASTE** your text from the *word* document into the **FIRST** text box.

At the bottom of the text box a little square symbol appears. If it is red it means that there is too much text for the size of box.

(It should be red if everything is going to plan!)

If you click on the red square the cursor will change to a little 'bucket' with words pouring out. Now click in the next text box to 'pour the words into it.

You will need to repeat this again to fill the third text box.

Once you have filled the text boxes you may want to change the colour of your text so that it is easy to read.

Overflow

Continued
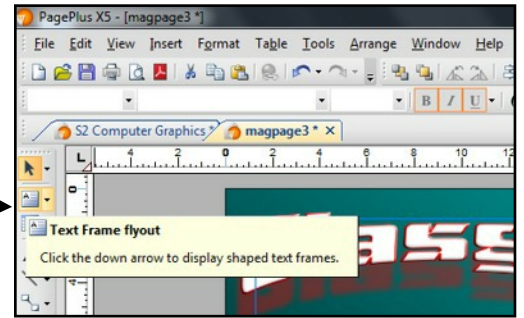
Now lets add the images………

Green ☐   Amber ☐   Red ☐

The first image we will add is in the centre of the page. To make sure the text 'flows' around the picture we can use TEXT WRAP. Your teacher will show how this is done.

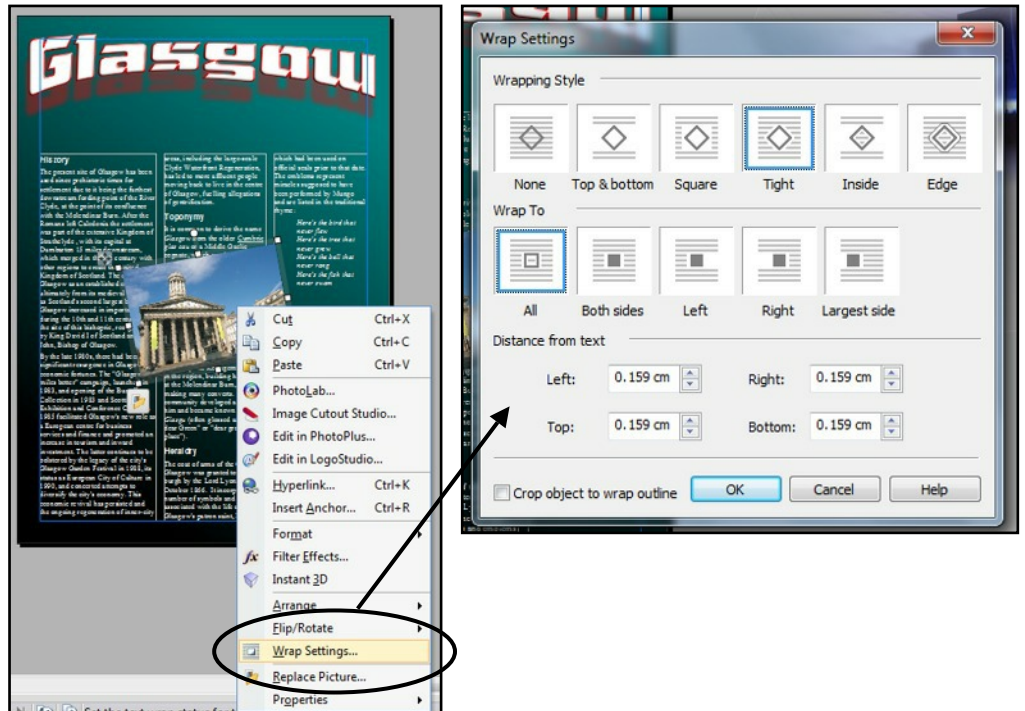Right click on the picture and choose **Wrap settings**. Select the wrap style and the area you want to wrap to. You can also change the spacing around your picture.

Next we will add a picture into the background. To do this we will be using **TRANSPARENCY**. Your teacher will show how this is done.

Below is an example using an elliptical picture frame and using a gradient ellipse transparency.

Draw a picture frame and import the image.

Select the TRANSPARENCY tab and choose gradient transparency.

Choose the transparency style.
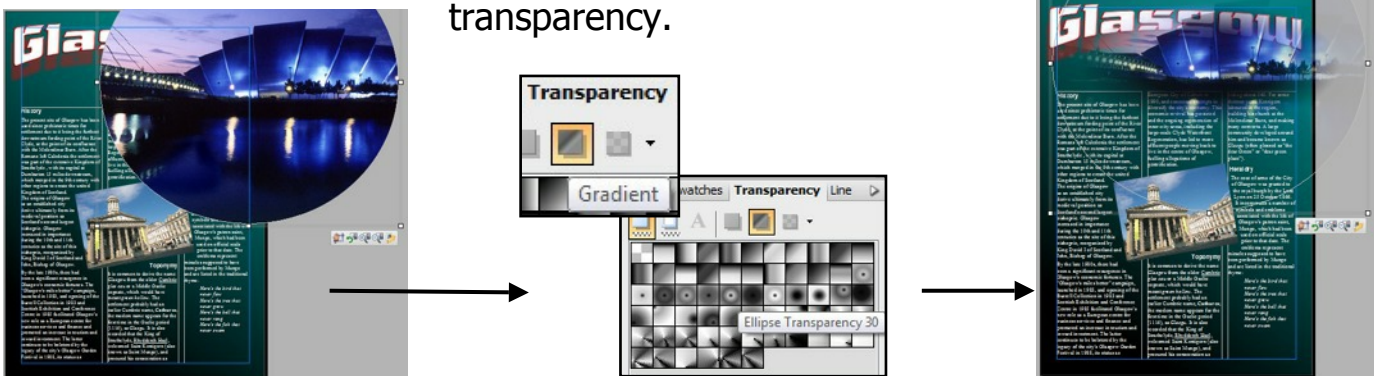
You may have to **ARRANGE** your image behind the text.

Green ☐   Amber ☐   Red ☐

S2 Computer Graphics Course

SELF ASSESSMENT SHEET

Name .... Class ....

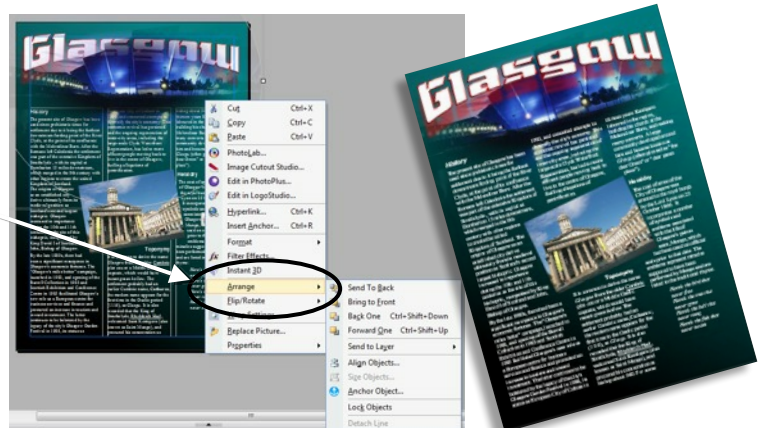How successful were you in each of the following lessons?

		Green	Amber	Red	Comment
1.	CAD Basic shapes with Dimensions.	☐	☐	☐	....
2.	CAD making the parts for your phone.	☐	☐	☐	....
3.	Using CAD assembly tools Eg. Mate, Flush.	☐	☐	☐	....
4.	Using Inventor Studio to create an image.	☐	☐	☐	....
5.	Using Inventor Studio to create a scene.	☐	☐	☐	....
6.	Creating an exploded view.	☐	☐	☐	....
7.	CAD production Drawings	☐	☐	☐	....
8.	Making an Advert using pageplus.	☐	☐	☐	....
9.	Designing and researching text & images for a DTP magazine	☐	☐	☐	....
10.	Adding text columns to a DTP magazine.	☐	☐	☐	....
11.	Adding images to your DTP magazine using text wrap and transparency.	☐	☐	☐	....