L.O. To become familiar with the types of graphs you may be asked to use or analyse in the skills exam
Graphs you need to be familiar with

- Here’s a checklist for you to print off
- Line graphs
- Bar Graphs
- Scattergraphs
- Pie Charts/ proportional divided circles
- Triangular graphs
- Radial diagrams
- Logarithmic scales
- Dispersion diagrams

Useful Revision website
EXAM NOTE

• Make sure you take a sharp pencil and ruler into the exam. Many students lose marks because they draw freehand or their pencil is too thick to show accurate plots.

• Also bring a protractor and a calculator!
Bar Graphs

- Simple Bar Graphs
- Used to show discrete data (categories)
- The visual cue for value is **bar height**.
- Bar width and spacing DO NOT represent values.
- The Y axis should start at 0.
- A set of data is said to be discrete if the values / observations belonging to it are distinct and separate, i.e. they can be **counted** (1, 2, 3, ....). Examples might include the number of kittens in a litter; the number of patients in a doctors surgery; the number of flaws in one metre of cloth; gender (male, female)
Bar Chart components

Bar WIDTH

BAR SPACING

BAR HEIGHT

Represents values of each month

TIME AXIS

Values displayed by month, in chronological order

2011

Comparative bar graphs

- These show 2 or more sets of data on same bar graph and are useful if you want to compare sets of data.
Compound Bar Graphs – aka ‘stacked’ bar charts

• Like this ......

Clear key, title and labels

Values of individual components can easily be read from the scale

Easy comparison of each component making up the total

Environmental Quality Scores

Penalty Points

High Street  City Walls Rd  Broad Street  Foregate St

Location
Or like this.....

Example: Component bar chart in vertical format

Proportion of customers by age group and flavour at ACME Ice Cream

Time for some practice questions...
Study Figure 4 which shows the number of properties at risk from flooding in selected settlements in Cumbria in 2010 and 2030.

Figure 4

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Key</th>
<th>2010</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allonby</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bassenthwaite</td>
<td></td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>Cockermouth</td>
<td></td>
<td>175</td>
<td></td>
</tr>
<tr>
<td>Flimby</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grange</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keswick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lorton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wigton</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 (d) (i) Complete Figure 4 by adding the following data.

1 (d) (ii) Describe the variations shown in Figure 4 and comment on them.
1 (c) Study Figure 4 which shows birth rates and death rates for selected countries.

Figure 4

<table>
<thead>
<tr>
<th></th>
<th>Brazil</th>
<th>Russia</th>
<th>India</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth rate</td>
<td>17.8</td>
<td>11.1</td>
<td>21.0</td>
<td>12.3</td>
</tr>
<tr>
<td>(per 1000 per year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death rate</td>
<td>6.4</td>
<td>16.0</td>
<td>7.5</td>
<td>7.0</td>
</tr>
<tr>
<td>(per 1000 per year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 (c) (i) Choose an appropriate technique and display the data shown in Figure 4, using the axes provided on the graph paper below.

1 (c) (ii) With reference to one or more countries in Figure 4, discuss social and economic implications of the birth rates and death rates.
The most likely technique will be a comparative bar chart. Alternative techniques can be credited if the data is presented appropriately e.g. scatter graph. Pie charts and line graphs are not appropriate.

Accurate and complete data displayed (2 marks)
Appropriate scale (1 mark)
Both axes labelled correctly (1 mark)
Use of key (1 mark)
Lose 1 mark per inaccuracy or omission (Max -2 for inaccurate data presented)
No data presented – No credit awarded
Inappropriate technique e.g. line graph – no credit.
Divergent bar graphs

- A divergent bar graph shows values either side of an X axis or a Y axis. However the best known are where values are spread across the Y axis as you have with a population pyramid.

- Examples on the next slide.
This graph shows values either side of the X axis.

A population pyramid—values across the Y axis.
Bar graphs – Good & Bad

**Good**
- show relationships between 2 or more variables
- show proportions
- visually attractive
- bars used combinations of qualitative and quantitative variables
- Can show positive and negative values
- Simple to construct and read

**Bad**
- Plotting too many bars makes it appear cluttered - less easy to interpret
- If wide range of data impact lost as it is difficult to read accurately
- Become more complicated if uneven class intervals
- Using too many or too few classes can mask important patterns in the data
• Unlike Bar graphs line graphs show continuous data and in Geography are used to show change over time or change over distance.

• Just like bar graphs they can be simple, compound, comparative or divergent.
Identify each of these line graphs as simple, compound, comparative, or divergent.
Compound ‘stacked’ line graph

**VALUE AXIS**
Indicates scale of the graph with values starting at zero. Often normalized to show proportions

**STACK HEIGHT**
Shows total of all categories during given time

**WITHIN STACK HEIGHT**
Values within a category during given time

**TIME AXIS**
Months represented on a continuous scale

*Figure 5-20 Stacked area chart generalized*
Describe the trends shown in Figure 4.
Suggest implications of these trends for the UK.
Triangular graphs are graphs with three axes instead of two, taking the form of an equilateral triangle. The important features are that each axis is divided into 100, representing percentage. From each axis lines are drawn at an angle of 60 degrees to carry the values across the graph. The data used must be in the form of three components.
Triangular graphs

- Useful for showing the relative proportions of 3 variables.
- Read them with 100% as the tip (point) and 0% as the base (side)
Triangular graphs – good & bad

**Good**
- Very useful if three components are to be compared
- Varying proportions can be seen indicating the relative importance of each
- After plotting, clusters emerge enabling classification/identifying trends

**Bad**
- Hard to interpret
- Limited range of data—percentage plus three variables
Study Figure 2 which shows population age structures in ten Super Output Areas in Merseyside.

1 (b) (i) Data for two additional Super Output Areas are shown below. Complete Figure 2 by adding these data.

<table>
<thead>
<tr>
<th>Super Output Area 1</th>
<th>% population 0-15 years</th>
<th>% population 16-64 years</th>
<th>% population 65 years and over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super Output Area 2</td>
<td>13</td>
<td>75</td>
<td>12</td>
</tr>
</tbody>
</table>

(2 marks)

1 (b) (ii) Compare the pattern now shown in Figure 2 with the national average data and suggest implications for the provision of services in these areas.

(8 marks)
Scattergraphs

**Y AXIS**
Values displayed for a single variable, usually dependent

**X AXIS**
Values displayed for a single variable

**Y-COORDINATE**
Each dot has an X- and Y-coordinate that matches the axes.

**X-COORDINATE**

*Figure 6.1* Scatterplot framework, comparing two variables
Scattergraphs – line of best fit
• Try to have the line as close as possible to all dots and have as many points above the line as below.

• You may want to exclude anomalies/outliers as these may be due to errors in the data.
Pie Charts/Proportional Divided Circles

• Pie charts are used to compare categories within a data set. A pie chart displays segments of data according to the share of the total value of the data.

• Proportional divided circles show segments but the size of the circle is in proportion to the total value of the data set so data sets can be compared.

• Pie charts/ Proportional divided circles are even more effective when plotted on maps at the location of where the data set was gathered.

• Pie charts/ Proportional divided circles are visually effective but it can be difficult to work out the percentages needed and some segments are too small to see. Proportional divided circles can over-emphasise large values.
Pie Charts

**Parts of a Whole**
Sum of all wedges represent a whole, or 100 percent

**Wedge**
Each portion of the pie represents a category or value

**Wedge Angle**
Value is proportionate to angle of wedge out of 360 degrees

*Figure 5-1 Pie chart generalized*
Pie Charts – Good & bad

**Good**
- visually attractive
- shows proportion of components
- shows scale

**Bad**
- Less than 3 segments look simplistic
- If many segments a similar size; it is hard to interpret
Pie Charts – Right 😊 and Wrong 😞

**Right**
- 80%
- 20%
- Adds up to 100%

**Wrong**
- 90%
- 40%
- Adds up to greater than 100%

**Figure 1-14** The right and wrong way to make a pie chart
Proportional circles
Proportional circles – Good and Bad

**Good**
- visually attractive
- location shown
- provide context
- show scale
- show proportions

**Bad**
- Very hard to calculate
- Size may obscure location or mean less accurate positioning on maps, i.e. in cities
When you size the circles by area, circle A is half the size of circle B.
However, when you size the circles by diameter, circle A is actually only one-fourth the size of circle B.

**FIGURE 1-16** The wrong way to size bubbles
How to draw a pie chart #1

Traffic Survey 31 January 2008

<table>
<thead>
<tr>
<th>Type of vehicle</th>
<th>Number of vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>140</td>
</tr>
<tr>
<td>Motorbikes</td>
<td>70</td>
</tr>
<tr>
<td>Vans</td>
<td>55</td>
</tr>
<tr>
<td>Buses</td>
<td>5</td>
</tr>
<tr>
<td>Total vehicles</td>
<td>270</td>
</tr>
</tbody>
</table>

To draw a pie chart, we need to represent each part of the data as a proportion of 360, because there are 360 degrees in a circle.

For example, if 55 out of 270 vehicles are vans, we will represent this on the circle as a segment with an angle of: \((\frac{55}{270}) \times 360 = 73\) degrees.
## Traffic Survey 31 January 2008

<table>
<thead>
<tr>
<th>Type of Vehicle</th>
<th>Number of Vehicles</th>
<th>Calculation</th>
<th>Degrees of a circle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>140</td>
<td>((\frac{140}{270}) \times 360)</td>
<td>= 187</td>
</tr>
<tr>
<td>Motorbikes</td>
<td>70</td>
<td>((\frac{70}{270}) \times 360)</td>
<td>= 93</td>
</tr>
<tr>
<td>Vans</td>
<td>55</td>
<td>((\frac{55}{270}) \times 360)</td>
<td>= 73</td>
</tr>
<tr>
<td>Buses</td>
<td>5</td>
<td>((\frac{5}{270}) \times 360)</td>
<td>= 7</td>
</tr>
</tbody>
</table>
How to draw a pie chart #3

This data is represented on the pie chart below.

- Cars: 140
- Motorbikes: 70
- Vans: 55
- Buses: 5
Using the information provided, describe the changes to India’s population total and structure.
Linear Vs logarithmic scales

Linear scale

Logarithmic scale

[ Youtube video ] – explains both scales
Linear Vs logarithmic scales

Linear scales
- Useful for showing a narrow range of data.
- Cannot show both very large and very small numbers.

Logarithmic scales
- Useful for showing a much wider range of data (Both very large numbers and very small numbers).
- Displays exponential data (data which increases on a power scale).
- Useful for visualising data more clearly to help spot relationships between variables.
- Zero cannot be plotted.
- Negative and positive numbers cannot be displayed on the same graph
- Easy to make plotting errors. Scientific calculator needed.
Linear vs logarithmic scales

Chart A: This Gapminder ‘Bubble chart’ is using a linear scale for both axes.
Linear Vs logarithmic scales

Chart B: This Gapminder ‘Bubble chart’ is using a logarithmic scale for both axes.
Linear Vs logarithmic scales

Chart C: This Gapminder ‘Bubble chart’ is using both linear and logarithmic scales.
Which scales did Hans Rosling’s Gapminder foundation use for his **Bubble Chart axes** and why?

A. Linear scale on both axes.
B. Logarithmic scale on both axes.
C. Semi-log plot: Linear vertical axis and logarithmic horizontal axis.

For more info on using log scales click [here](#)