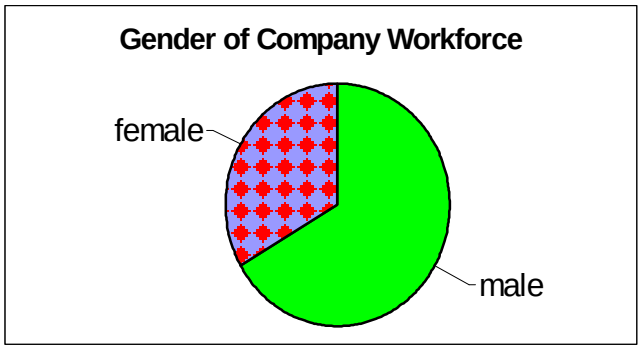
KEYSKILLS

PIE CHARTS

Pie charts, like other graphs and charts, are a way of representing number based information so that it is easier to understand and analyse. A very important aspect of pie charts is that they should only be used to show how something is divided up into different parts, and to show how much of the whole each part represents.

A pie chart is a circle split into sections. A whole circle is 360 degrees, (360°), so the sectors of a pie chart will all be fractions of the 360.

Example 1.



Of the employees in a company 80 are male and 40 female. Since there are a total of 120 employees, (80+40 = 120) each employee will be represented by 3°, (360°/120 = 3°). There are 80 males, so they will be represented by 80 x 3° = 240°. There are 40 females, so they will be represented by 40 x 3° = 120°. To check that this is correct add the values for the male and female together; they should total 360°.

So the process of calculating the angles in a pie chart is;

- Add up the sectors which are to make up your pie chart, this will give you the total to be represented by the pie chart.
- Divide the total number into 360, this will give you the angle represented by each individual.
- Multiply each sector by the result of the previous calculation, this will give you the angle for the sector.
- Add up all the sectors together to check that they total 360°. If numbers have been rounded then you may get a total of slightly more or less than 360.

Example 2.

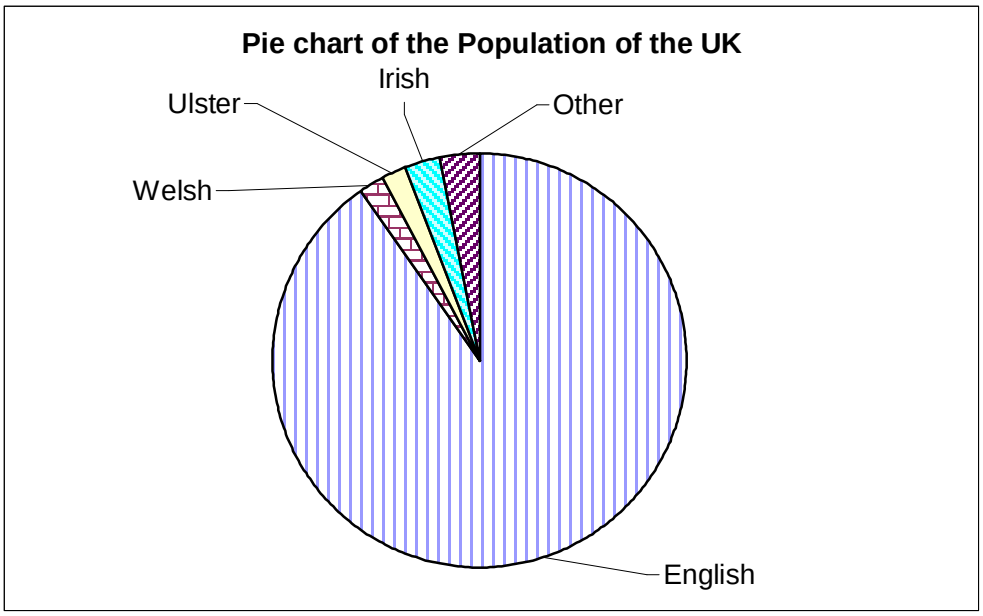
If the population of the United Kingdom is broken down by ethnic group then the following results are obtained, (these are estimations for 1999).

English	Welsh	Scottish	Ulster	Irish	Other
48,177,453	1,123,155	5,674,890	1,064,042	1,418,723	1,655,176

To construct a pie chart of this data the total of all the groups has to be calculated, (i.e. English + Welsh + Scottish + Ulster + Irish + Other). The total

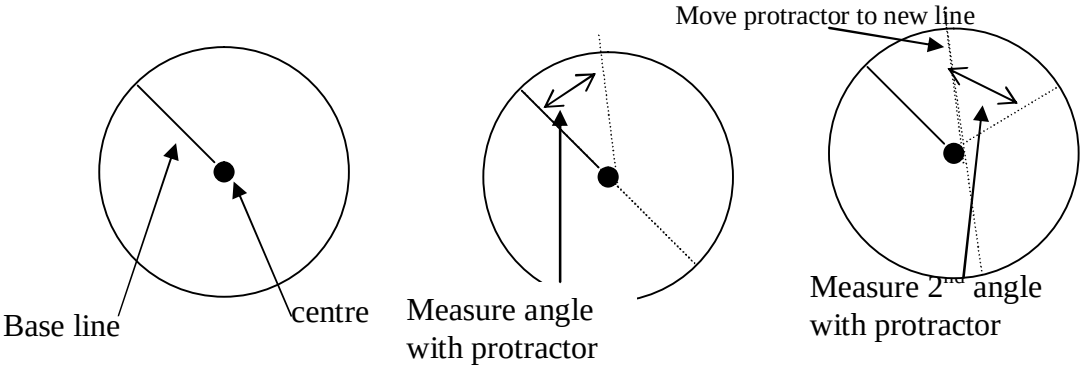
population has to be divided into 360 to calculate what is the angle represented by each individual in the country. The result of this is multiplied by the numbers of each ethnic group to calculate what part of the pie chart they represent.
360 / 59,113,439 gives a value of 0.0000060900°.
0.0000060900° x 48,177,453 = 293.4° (English)
0.0000060900° x 1,123,155 = 6.8° (Welsh).
The rest of the results are shown below.

Ethnic group	English	Welsh	Scottish	Ulster	Irish	Other	Total
Number	48,177,453	1,123,155	5,674,890	1,064,042	1,418,723	1,655,176	59,113,439
° in the pie chart	293.4	6.8	34.6	6.5	8.6	10.1	360.0



CONSTRUCTING A PIE CHART

- Draw a circle of an appropriate size
- Find the centre of the circle and mark its position
- Draw a line from the centre to the outside edge
- Use a protractor to measure the required number of degrees from the line you have already drawn, and mark its position
- Construct a line from the position above to the centre of the circle. You now have the first sector of your pie chart.
- Move the protractor round so that it is based on the second line you drew, and use this as the base line for drawing your second sector.
- Continue with the same process for all the sectors of the pie chart.



EXERCISE 1

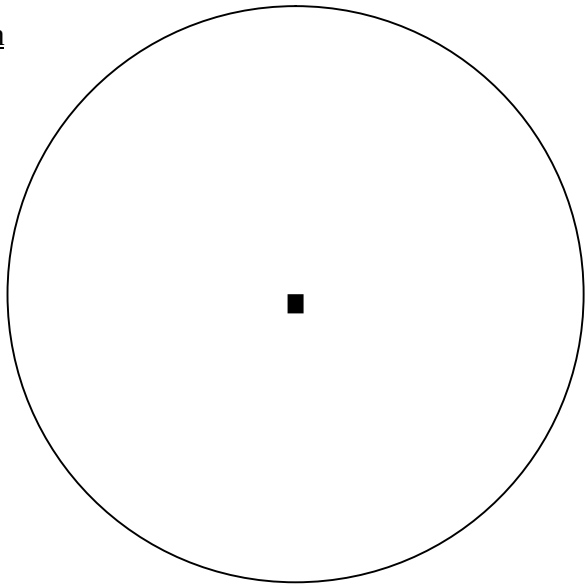
1. A leisure centre runs the following activities each week, and wants to represent them in the form of a pie chart. Complete the following table to find the angles of the sectors.

ACTIVITY	TIME IN HOURS	FRACTION OF TOTAL USE	ANGLE ON PIE CHART
FOOTBALL	25	25 / 80 = 0.3125	0.3125 X 360 = 112.5°
BADMINTON	10		
SQUASH	5		
BASKETBALL	15		
VOLLEYBALL	10		
AEROBICS	15		
TOTAL	80	1	360

2. A travel agency is investigating its use of IT for a report on possible efficiency savings. The length of time that computers are used for different tasks each week is shown in the table below. Complete the table and fill in the blank pie chart.

ACTIVITY	TIME IN HOURS	FRACTION OF TOTAL USE	ANGLE ON PIE CHART
Checking times and costs of services	11		
Booking tickets and making reservations	8		
Word processing standard letters	6		
E mail	2		
Other use	3		
Idle (not being used)	20		

Pie Chart of Computer Use in Skyways Travel Agency

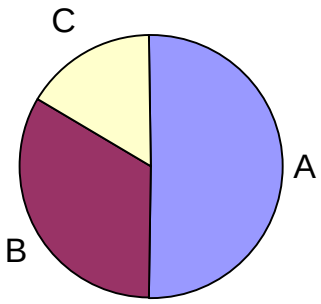


INTERPRETING PIE CHARTS

Interpreting pie charts is often a case of approximating the values of the different sectors. You should be able to estimate whether a sector of a graph takes up roughly a half, quarter, three-quarters, third, two-thirds etc. of the whole circle. You should then be able to turn these fractions into percentages.

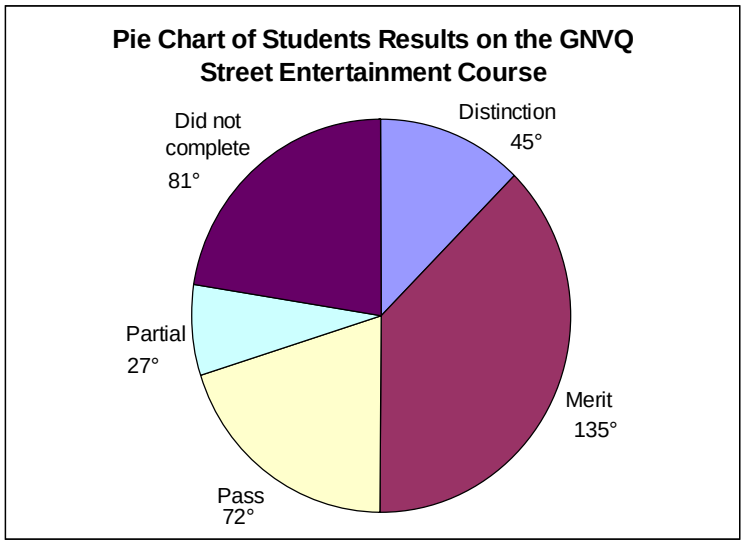
Example 3

This pie chart is divided into three sectors.
A makes up half of the pie, and therefore is 1/2 x 100 = 50%.
B makes up a third of the pie, and therefore is 1/3 x 100 = 33.33%
C is about half the size of B, and so is one sixth of the pie, and therefore is 1/6 x 100 = 16.67%.
The total of the three sectors is 50 + 33.33 + 16.67 = 100%.



Sometimes a more accurate measure of the pie chart is required. Some pie charts might indicate the angles that make up the pie chart, or in other cases you must measure them yourself.
The angle of each sector can be turned into a fraction by placing it over 360, (since there are 360° in a circle). To turn the angle into a percentage you must change the fraction from being divided by 360 to being divided by 100. This is done by dividing the angle by 3.6, (360/100).

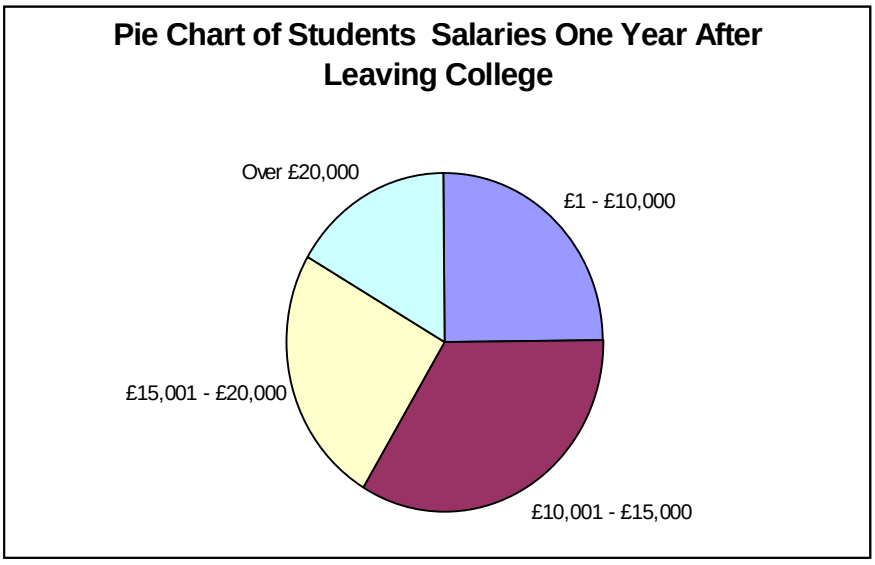
Example 4



The pie chart on the left shows the results of students on an Intermediate Diploma in Street Entertainment course.
Distinctions are represented by 45°, and this represents 45/3.6 = 12.5% of the total.
Merits are 135°, and 135/3.6 = 37.5% of the total.
Passes are 72°, and 72/3.6 = 20% of the total.
Partials are 27°, and 27/360 = 7.5%. **Did not complete** are 81°, and 81/360 = 22.5%.

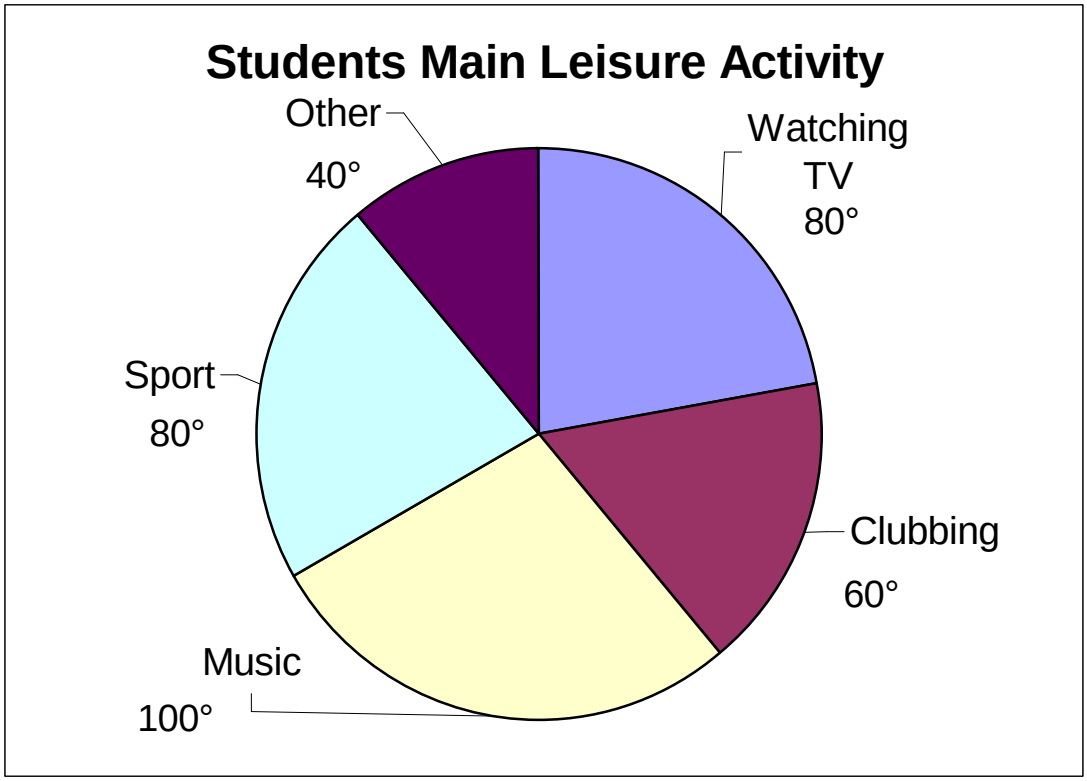
EXERCISE 2

1. Estimate the fraction of the pie chart of salaries taken up by each sector, and represent your estimation both as an angle and as a percentage.

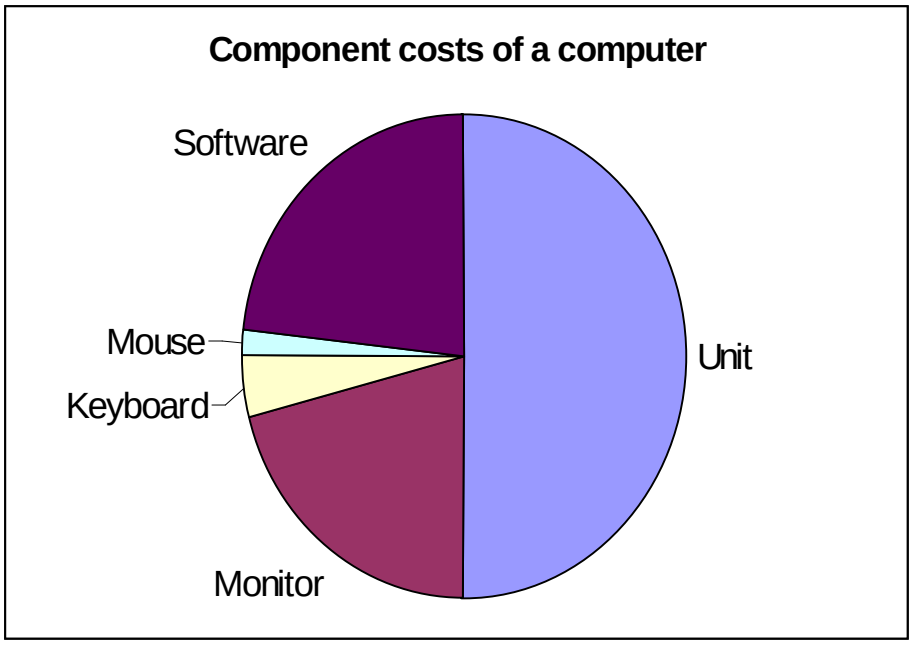


SECTOR	FRACTION	PERCENT	ANGLE
£1 - £10,000			
£10,001 - £15,000			
£15,001 - £20,000			
Over £20,000			

2. From the pie chart below use the angles indicated to work out the percentage represented by each sector, and the value of each sector if the total number of students questioned was 400. Include your working out with your answers. .



Sector	Percentage	Number
Watching TV		
Clubbing		
Music		
Sport		
Other		



3. Measure the angles of the pie chart and calculate the percentage each sector represents.

If the computer cost £1,200, how much did each of the components cost?