Key Vocab

Pie Chart - a graph using a divided circle where each section represents a percentage of the total

Frequency - How 'frequent' something is. The mathematical word for the total

Angle - the amount of turning between two rays

Proportion - being in proportion means that two ratios or fractions are of equal value.

Population - Everything or everybody that could possibly be involved in an investigation

Comparative - To be able to judge the similarities and differences between two data sets

Area - the total space taken up by a flat 2D shape of an object

Key Knowledge

Pie charts show the *proportion* of each category represented on it

When comparing pie charts, without a total, we can only compare the *proportion* of each category

Comparative pie charts are used to show 2 or more sets of data and allow us to compare totals without values.

To do this accurately you must ensure that the *areas* of the circles are in the same proportion as the totals displayed on each chart

The larger the area of the pie chart / segment, the large the frequency of the pie chart / segment

Area of a Circle: πr^2

Area of comparative pie charts method:
1. Calculate the area of pie chart (a)
2. Work out the proportion difference between the frequency total of pie chart (a) & (b)
3. Multiply the area of pie chart (a) by the proportion difference to give you the area of pie chart (b)
4. *You may then want to work backwards using the formula for the area of a circle to find the radius of pie chart (b)*

Comparative Pie Chart

Example – I DO

Hilary and Mika are investigating the distribution of bees in a nature reserve.

Hilary and Mika are producing a report about the nature reserve.

They want to include information about the types of small mammals recorded in the nature reserve in one week in 2008 and in one week in 2018

Hilary thinks that they should use pie charts.

Mika thinks that they should use comparative pie charts.

(a) What advice would you give to Hilary and to Mika on their choice of diagram?

....
....
....
....

(2)

Mika is drawing his comparative pie charts.

He has the following information about the total number of small mammals recorded in one week in 2008 and in one week in 2018 in the nature reserve.

	2008	2018
Total number of small mammals	236	349

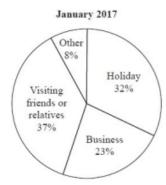Mika is going to use a circle of radius of 5 cm for his pie chart for 2008

(b) Calculate the radius of the circle that Mika should use for his comparative pie chart for 2018 Give your answer correct to 1 decimal place.
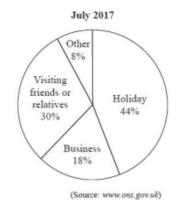
.... cm

(2)

Example – WE DO

The pie charts show information about the departure country of the overseas visitors to the UK in January 2016 and in July 2016

January 2016   July 2016

Key:
North America
Europe
Other

(Source: *International Passenger Survey*)

Based on the two pie charts, Raul makes these two conclusions.

1. There are more visitors from Europe than from North America in both months.
2. There are more visitors from Europe in January than in July.

(a) Assess the validity of each of Raul's conclusions.

1 ....
....

2 ....
....

(2)

Judith decides to replace the pie charts with comparative pie charts.

(b) Explain how comparative pie charts are more appropriate than pie charts to compare the number of visitors in each month.

....
....

(1)

The total number of overseas visitors to the UK in January 2016 was 2 599 000

The total number of overseas visitors to the UK in July 2016 was 3 786 000

Judith's comparative pie chart for January 2016 has radius 3 cm.

(c) Calculate the radius of Judith's comparative pie chart for July 2016
Give your answer correct to 1 decimal place.

.... cm

(2)

The pie charts show information about the numbers of visitors to the UK for the given reasons in January 2017 and in July 2017

January 2017

Other 8%
Holiday 32%
Visiting friends or relatives 37%
Business 23%

July 2017

Other 8%
Visiting friends or relatives 30%
Holiday 44%
Business 18%

(Source: www.ons.gov.uk)

(a) The pie charts do **not** show that there were more visitors to the UK on business in January 2017 than in July 2017
Explain why.

....

....

....

(1)

The number of visitors to the UK in January 2017 in order to visit friends or relatives is 1 080 733

(b) Work out the number of visitors to the UK in January 2017 to have a holiday.

....

(2)

The table gives information about the total number of visitors to the UK in January 2017 and in July 2017

Month	Total number of visitors (thousands)
January 2017	2931
July 2017	4020

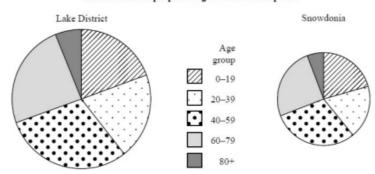Ruth thinks there is a more appropriate way to draw pie charts now that she knows the information in the table.

(c) Explain, giving reasons, how she should do this.
You must refer to the information in the table in your explanation.

....

....

....

....

....

....

....

....

....

....

....

(5)

The comparative pie charts give information about the numbers of people living in two national parks.

They also show the age groups of the people.

The numbers of people living in two national parks

Lake District   Snowdonia

Age group
0–19
20–39
40–59
60–79
80+

(Source: ons.gov.uk)

(a) Compare the total number of people living in the Lake District with the total number of people living in Snowdonia.
Explain how you reach your conclusion.

....

....

....

....

....

....

....

(2)

The angles at the centres of the circles for the 40–59 age group sectors are the same for both pie charts.

(b) Describe how the number of people aged 40–59 years in the Lake District compares with the number of people aged 40–59 years in Snowdonia.
Explain how you reach your conclusion.

....

....

....

....

....

....

(2)

Gill is going to display these comparative pie charts in a report. The members of her target audience are not statisticians.

(c) What additional information could Gill include with the pie charts to help her target audience interpret the pie charts?

....

....

(1)

Gill wants to draw a third comparative pie chart for Exmoor.

The number of people living in the Lake District is 3.9 times the number of people living in Exmoor.

The radius of the pie chart for the Lake District is 3 cm.

(d) Show that the radius of the pie chart for Exmoor is 1.52 cm, correct to 2 decimal places.

.... cm

(1)

The table shows the number, in millions, of visitors to each of four tourist attractions in 2005 and in 2018

Attraction	Number of visitors in 2005 (millions)	Number of visitors in 2018 (millions)
British Museum	4.5	5.8
Tower of London	1.9	2.9
Edinburgh Castle	1.2	2.1
St Paul's Cathedral	0.7	1.7
Total	8.3	12.5

(Source: www.alva.org.uk)

Jill draws two comparative pie charts for the information in the table.

(a) Describe an advantage of using comparative pie charts for this information rather than using ordinary pie charts.

....

....

(1)

(b) (i) Compare the angles for the sectors in the pie charts representing the British Museum in Jill's comparative pie charts for 2005 and for 2018

....

....

(1)

(ii) Compare the areas for the sectors in the pie charts representing the British Museum in Jill's comparative pie charts for 2005 and for 2018

....

....

(1)

Jill's comparative pie chart for 2005 has radius 5 cm.

(c) Calculate the radius of Jill's comparative pie chart for 2018
Give your answer correct to one decimal place.

.... cm

(2)