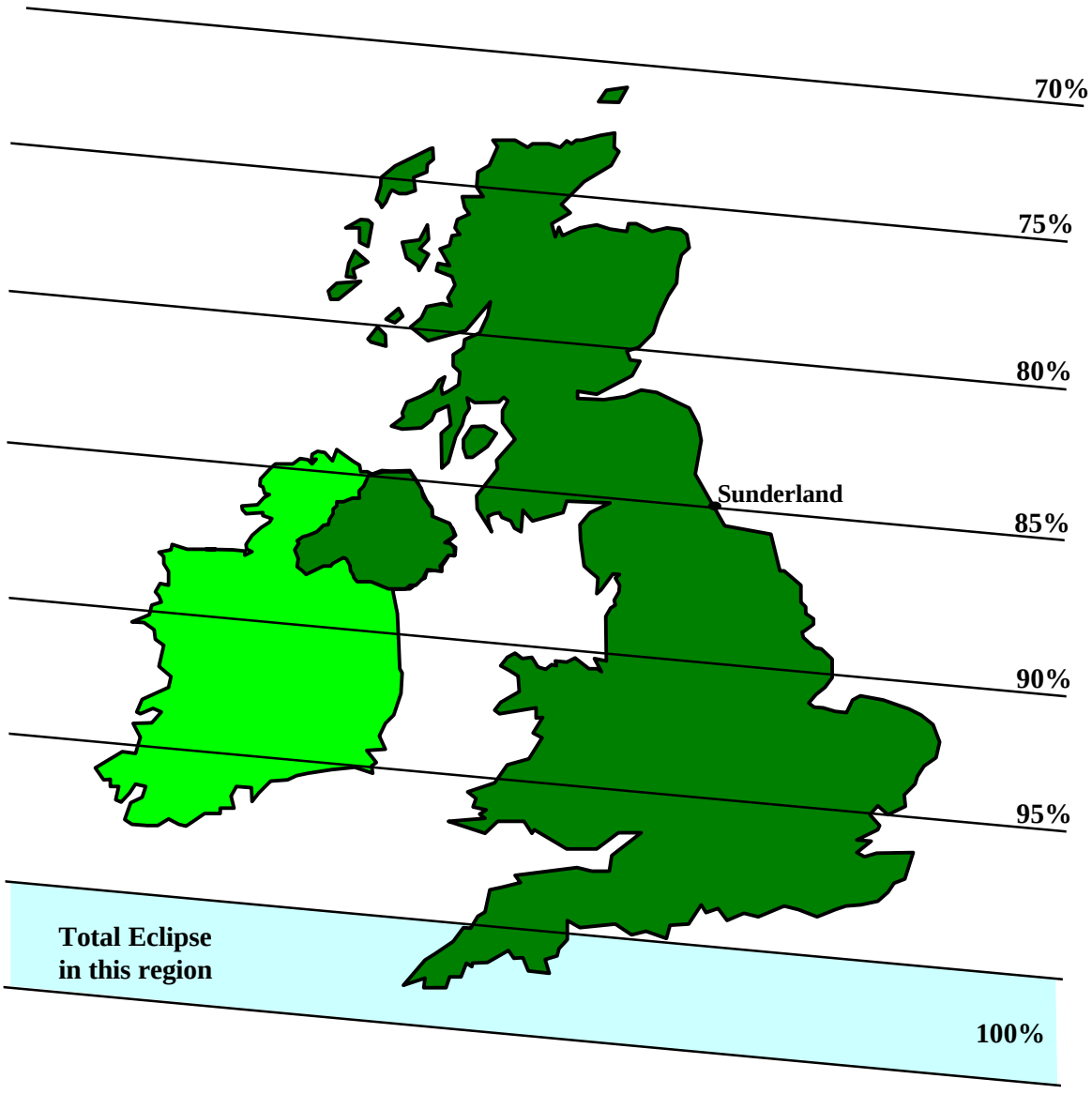
ECLIPSE

Data Sheet 1

11th August 1999

Did you see the eclipse? The map shows approximately how much of the sun was eclipsed by the moon in regions of the U.K.



The eclipse occurred in Europe and Asia, with a total eclipse in the following countries: England, France, Germany, Switzerland, Austria, Hungary, Romania, Turkey, Iraq, Iran, Pakistan and India.

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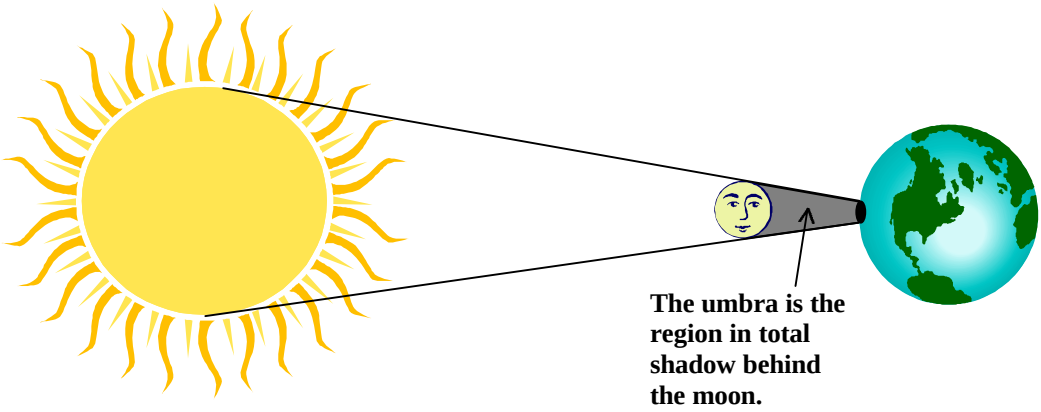
Data Sheet 2

What happens during a solar eclipse



The shadow of the moon falls on the surface of the earth as shown in the sketch. This shadow moves at a speed of more than 1000 mph from west to east across the surface of the earth.

Types of Solar Eclipse

Total

The sun is about 400 times as big as the moon, but because it is about 400 times as far away, they appear to be roughly the same size. In a total eclipse the moon appears to move across the sun until it completely covers it. This happens at places crossed by the shadow where the umbra meets the earth. The whole process can take a few hours, but the period of totality lasts only a few minutes. In a wide area around the shadow the sun is only partly eclipsed by the sun.

Partial

The orbit of the moon is at an angle to the orbit of the sun. This means that sometimes the umbra passes the earth without touching it, but is near enough to give a partial eclipse in some places.

Annular

The shape of the moon's orbit means that the distance between the moon and earth varies. If the umbra comes to a point before it reaches the earth, the eclipse is annular. This means that the moon is too small to completely eclipse the sun. When this happens the part of the sun surrounding the earth looks like a very bright doughnut.

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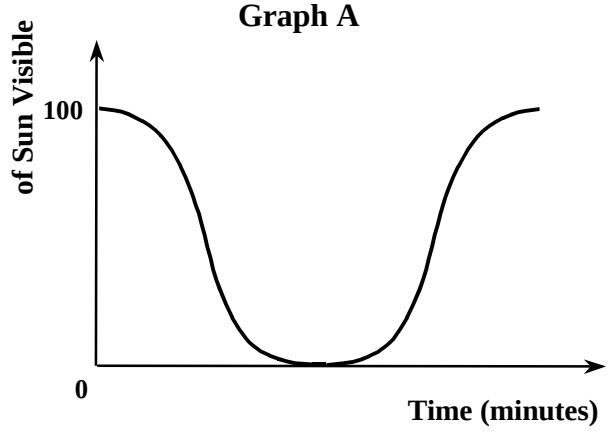
Discussion Sheet

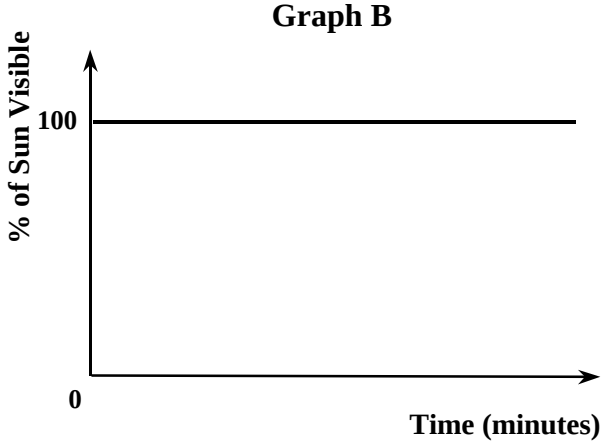
I saw a partial eclipse in Sunderland on 11th August 1999.
The sky was blue, the sun shone, but it was strangely dim and chilly.
One of these graphs shows what I saw. Which one is it?

Where were you? What did you see?
Do any of the graphs show what you saw?

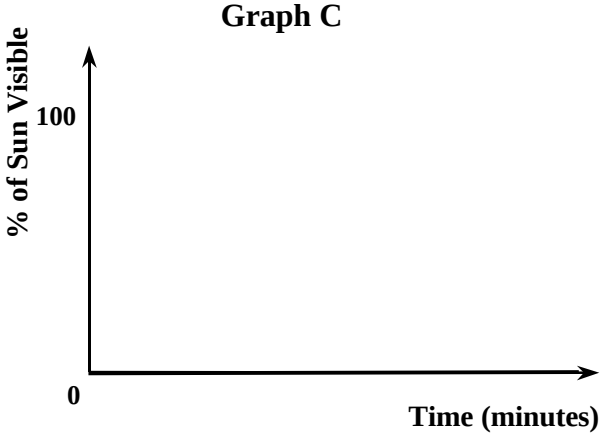
Graph A



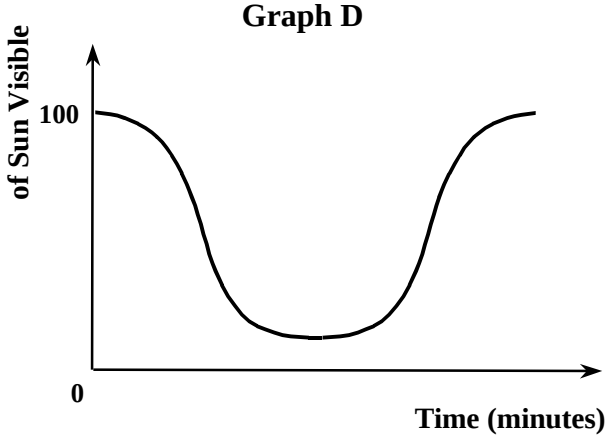
Graph B



Graph C



Graph D



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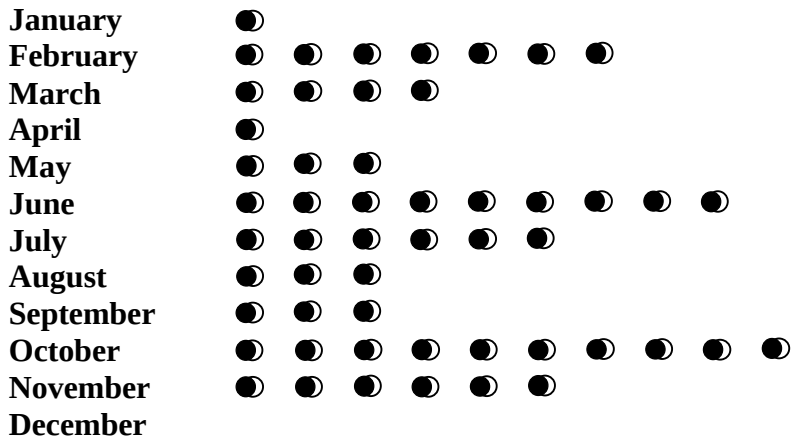
1 The pictogram below shows how many of the solar eclipses since 1930 have occurred in each month of the year.



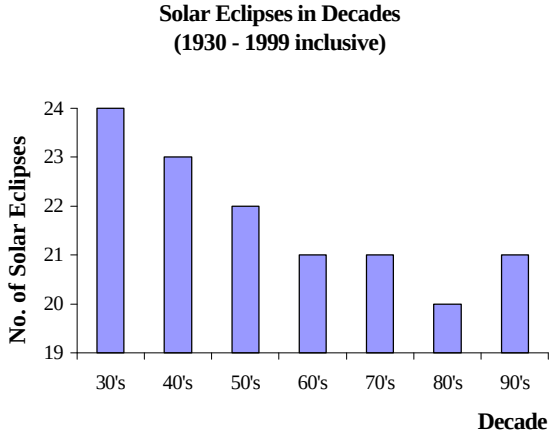
Key
● represents one solar eclipse of any type

Which of the following statements are true and which are false?

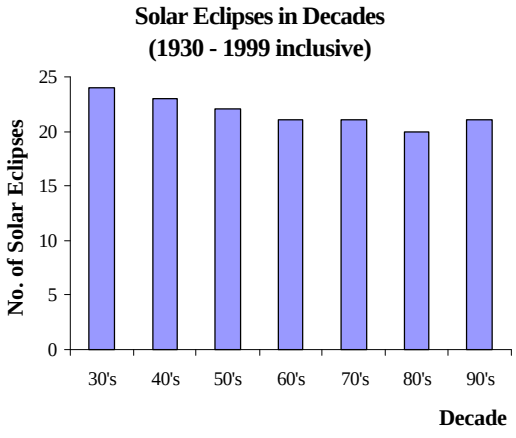
a No solar eclipses occurred in December.
b There were the same number of solar eclipses in February and November.
c There were altogether 53 solar eclipses.
d The average number of solar eclipses per month is 3.
e There were more solar eclipses in October than in all the other months.

2 The bar charts below illustrate the same information.

Bar Chart A



Bar Chart B



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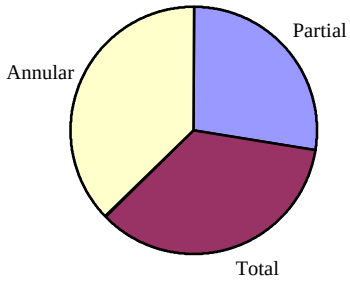
Each of the following statements is true.
For each statement say which of the two bar charts shows the information more clearly.

i There were 23 solar eclipses in the forties.
ii There were more solar eclipses in the thirties than in any of the other decades.
iii There are roughly the same number of solar eclipses in each decade.
iv During a decade there are usually between 20 and 25 solar eclipses.
v The smallest number of solar eclipses occurred in the eighties.
vi The number of solar eclipses that occur does not change much as time goes by.

3. The pie chart shows the types of solar eclipses that occurred between 1970 and 1999.

Types of Eclipse 1970 - 1999 (inclusive)

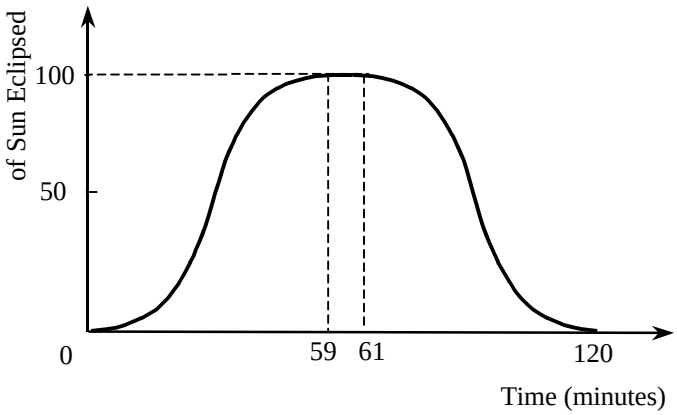


Some statements are given below.
The pie chart can be used to decide whether some of the statements are true or false. Sometimes the pie chart does not give enough information.

For each of the statements say true, false or don't know.

a There were more total than partial eclipses.
b Sixteen of the eclipses were annular.
c There was one less total than partial eclipse.
d Roughly a third of the eclipses were total.
e There were a total of 50 eclipses.
f There were roughly the same number of annular, partial and total eclipses.

4. The line graph shows the percentage of the sun that is eclipsed by the moon during one solar eclipse. For each statement say which of **i** or **ii** is true.



a The sun is totally eclipsed for
i 120 minutes **ii** 2 minutes

b Half of the sun has disappeared after approximately
i 30 minutes **ii** 60 minutes

c The sun is disappearing most quickly when
i about half of it is covered
ii nearly all of it is covered.

d The area of the sun was covered
i quickly at first, then more slowly then quickly again
ii slowly at first, then more quickly then slowly again

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Teacher Notes

Unit Foundation Level, Making sense of data

Skills used in this activity:
Interpretation of statistical diagrams, including:
- pictogram
- bar chart
- pie chart
- line graph

Preparation
For the class you need:
- a copy of the data sheets for each student or copies on OHP (optional)
- a copy of the discussion sheet for each student (page 3)
  or a copy of the graphs on OHP or the board
- a copy of the exercise (pages 4 and 5) for each student

Notes on the Activity
It is intended that this activity should take place when students are already familiar with statistical diagrams and averages.
The data sheets and discussion sheet can be used to introduce the topic.
Graph A shows a total eclipse (seen in Alderney, Hungary, India etc).
Graph B would apply in a sunny place outside the influence of the eclipse (eg S. Africa).
Graph C where it was very cloudy or night (Cornwall, New Zealand).
Graph D shows a partial eclipse (what I saw in Sunderland).
After talking about eclipses, the discussion could be extended in a variety of ways if time allows. (eg What might the graph look like on a normal sunny day when there are a few clouds in the sky? What if the vertical axis is used to represent the intensity of light rather than % of sun visible?).
Before attempting the exercise students need to understand that sometimes an eclipse is total, sometimes only partial and sometimes annular.
Some of the questions in the exercise are very straightforward, but some are a lot trickier. It is important to spend some time discussing the results.

Answers to Exercise

1 a true b false c true
d depends which average is used mode = 3, median = 3.5, mean = 4.4 (3 sf)
e The wording of the question is unclear – it can be taken to mean:
'There were more solar eclipses in October than in any of the other months.' (true)
'The number of solar eclipses in October was greater than the total number of solar eclipses in all of the other months.' (false)

2 i A ii A iii B iv B v A vi B

3 a true b don't know c false d true e don't know f true

4 a ii b i c i d ii

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