

LAND AND SEA STATISTICS

The surface of the Earth	Surface area km ²	Percentage Surface Area
Saltwater	352,103,700	69.03
Freshwater	9,028,300	1.77
Good land for farming	44,682,307	8.76
Mountains	29,788,205	5.84
Land covered by snow	29,788,205	5.84
Dry land	29,788,205	5.84
Land with no topsoil	14,894,102	2.92

The table gives data on the land and sea covering the Earth's surface.

(1) Explain how the percentage 69.03% of saltwater that makes up the Earth's surface is calculated from these figures.

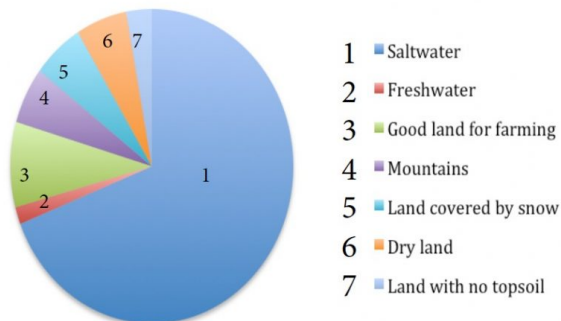
(2) How would you use this percentage to find the angle for saltwater for drawing a pie chart?

A pie chart and a frequency bar chart are given below.

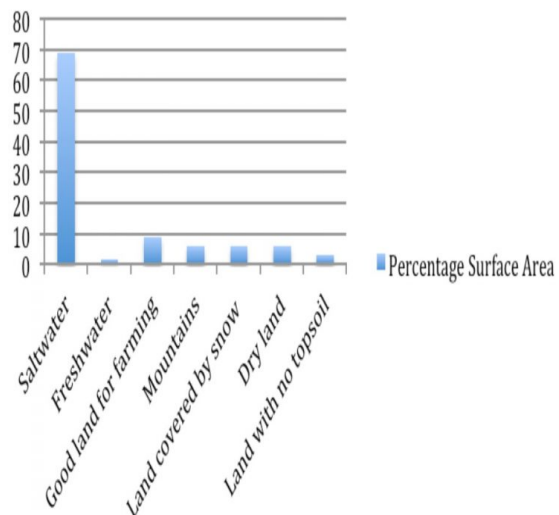
(3) Which of the charts gives the best representation of the information in the table? Why?

(4) What can we learn from these statistics?

Percentage Surface Area



The Surface of the Earth



(5) What is the land like around where you live? What is it like in the rest of your country?

How does it affect your lives?

How does it affect economic development in your country?

This was originally a lesson option organised by the [Bubbly Maths](https://www.bubblymaths.com/) team for the Biggest Ever Maths and Science Lesson attempt to break the Guinness World Record.

HELP

First work out the actual total surface area.

To find the percentage of the earth's surface covered by saltwater:

divide 352 103 700 sq km by the total surface area of the earth and multiply by 100.

(Note: the question does not ask anyone to do the calculation, just to say how it should be done.)

The next question is about the angle for the pie chart. The angles for the 7 sectors must add up to 360° and the angles must correspond to the percentages of each type of land.

NEXT

The table shows the percentages of land area, and percentages of total world population. Draw a double frequency bar chart to compare the two sets of figures.

Continent	Percentage of Total Land Area	Percentage of Total Population	Most populous city (disputed)
Africa	20.4%	15%	Lagos, Nigeria
Antarctica	9.2%	0%	McMurdo Station, US
Asia	29.5%	60%	Shanghai, China
Australia	5.9%	0.4%	Sydney, Australia
Europe	6.8%	11%	Moscow, Russia
North America	16.5%	8%	Mexico City, Mexico
South America	12.0%	6%	São Paulo, Brazil

The statistics for the world's biggest city are disputed (see Wikipedia references). Which of the following do you think best defines 'biggest city' and why?

- biggest land area;
- biggest population;
- biggest conurbation including other districts in the immediate area;
- another interpretation.

NOTES FOR TEACHERS

Why do this activity?

This activity gives learners the experience of reading and interpreting data given in different forms. The data is given in a simple form and relevant to the real world so that learners can have the experience of discussing the significance of the data, and relating it to other school subjects and to issues that affect society.

Learning objectives

In doing this activity students will have an opportunity to:

- practise reading and interpreting data;
- gain a better understanding of pie charts and bar charts, and their uses.

Generic competences

In doing this activity students will have an opportunity to :

- learn more about land use, land area and population statistics for the whole planet;
- experience relating school mathematics to the real world and to other school subjects.

Suggestions for teaching

Start with the diagnostic question. You will need to give learners a few minutes to do the calculations. Write the question on the board so that they can re-read it several times if necessary and also read the question aloud to the class. After the first round of voting, ask learners who gave each of the answers A, B, C and D to come to the board and write down how they did their calculation. Don't say whether they are right or wrong, just thank them for their answers. Then have the second round of voting.

Then introduce the question on page 1. You could give learners time to answer questions 1, 2, 3 and 4 working in pairs. Remind the learners that they are asked **HOW** to do the calculations and they don't actually need to do them. Then manage a class discussion of the answers.

You could use question 5 for class discussion or ask the learners to research some answers for homework then have a class discussion in the next lesson.

Key questions

- What is a percentage?
You are asked *how* to calculate a percentage, how do you usually do that?
- You are asked *how* to calculate an angle for a pie chart, how do you usually do that?
- What do you notice when you look at this pie chart?
- What do you notice when you look at this bar chart?

SOLUTION

(1) To find the percentage of the earth's surface covered by saltwater divide the actual surface area 352 103 700 sq km by the total surface area of the earth and multiply by 100. (*Note: the question does not ask anyone to do the calculation, just to say how it should be done.*)

(2) To find the angle for drawing a pie chart work out $69.3 \times 360/100$ to give 249.5° . (*Again the question does not ask anyone to do the calculation.*)

(3) *Which of the charts gives the best representation of the information in the table? Why?*

The answer depends on what information is important to you.

The pie chart makes it easier to compare areas, to see at a glance which are larger and which are smaller areas and to compare the sizes

The bar chart makes it easier to read off the approximate areas in sq km, although in this case, because the saltwater area is so very much larger than anything else the readings cannot be very accurate.

(4) *What can we learn from these statistics?*

This is a question for class discussion.

(5) *What is the land like around where you live?*

What is it like in the rest of your country?

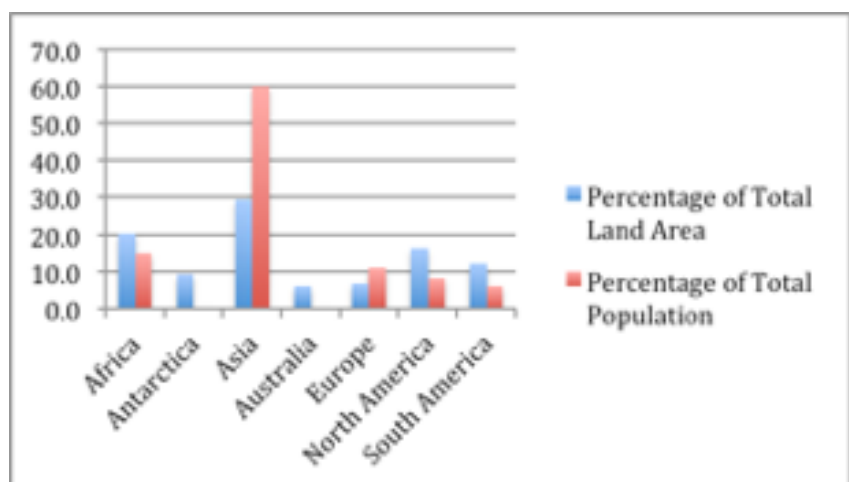
How does it affect economic development in your country?

How does it affect your lives?

These questions are for class discussion and perhaps as a basis for learners to look up information about their own country online.

The questions also link the mathematics they learn with other school subjects such as geography, science and economics and prepare them for adult life and citizenship.

NEXT SOLUTION



DIAGNOSTIC ASSESSMENT

This should take about 5–10 minutes.

Write the question on the board, say to the class:

“Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 fingers for D”.

1. Notice how the learners respond. Ask a learner who gave answer A to explain why he or she gave that answer. **DO NOT** say whether it is right or wrong but simply thank the learner for giving the answer.

2. It is important for learners to explain the reasons for their answers. Putting thoughts into words may help them to gain better understanding and improve their communication skills.

3. Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.

4. Ask the class to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers.

The correct answer is: **A** - In Town B between 4000 and 5000 travel to work by bike. The number is 1000 in Town A.

Common Misconceptions

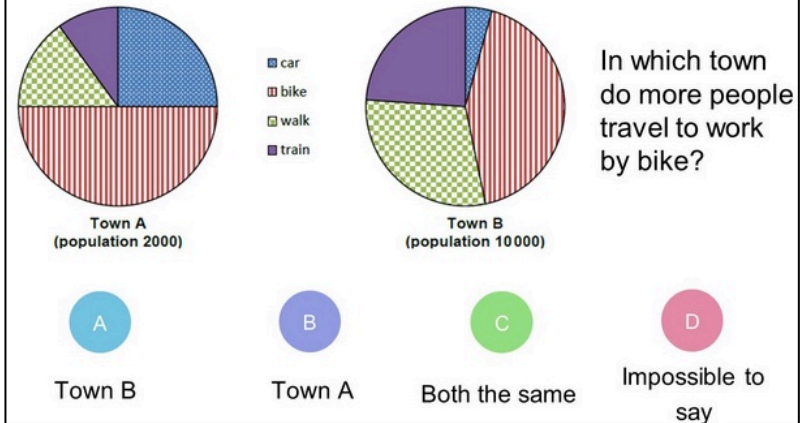
B. Learners have chosen the larger piece of the pie chart and not thought about the population represented.

C. The numbers shown are not the same. No understanding of pie charts.

D. Again a poor understanding of pie charts.

<https://diagnosticquestions.com>

These pie charts show how people travel to work in two towns. The populations of the towns are given.



Follow up

Drinking Water <https://aiminghigh.aimssec.ac.za/years-6-10-drinking-water/>

A Richer World <https://aiminghigh.aimssec.ac.za/years-9-12-a-richer-world/>

Go to the **AIMSSEC AIMING HIGH** website for lesson ideas, solutions and curriculum

MATHS

links: <http://aiminghigh.aimssec.ac.za>



Subscribe to the **MATHS TOYS YouTube Channel**

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Note: The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and school years up to Secondary 5 in East Africa.

New material will be added for Secondary 6.

For resources for teaching A level mathematics (Years 12 and 13) see <https://nrich.maths.org/12339>

Mathematics taught in Year 13 (UK) & Secondary 6 (East Africa) is beyond the SA CAPS curriculum for Grade 12

	Lower Primary Approx. Age 5 to 8	Upper Primary Age 8 to 11	Lower Secondary Age 11 to 15	Upper Secondary Age 15+
South Africa	Grades R and 1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
East Africa	Nursery and Primary 1 to 3	Primary 4 to 6	Secondary 1 to 3	Secondary 4 to 6
USA	Kindergarten and G1 to 3	Grades 4 to 6	Grades 7 to 9	Grades 10 to 12
UK	Reception and Years 1 to 3	Years 4 to 6	Years 7 to 9	Years 10 to 13