

Teacher Notes

Introduction

Pupils can work on this problem individually or with others.

- They can discuss how to approach the problem and identify what mathematics is required.
- They can share their responses and compare approaches.

This problem deals with a pupil's ability to choose the most appropriate method for comparing variables and interpreting their results.

They can discuss with the class as a whole what variables affect life expectancy, and draw on knowledge from other Areas of Learning.

Pupils can use software to produce the required scatter diagrams, or they can produce the scatter diagrams using graph paper.

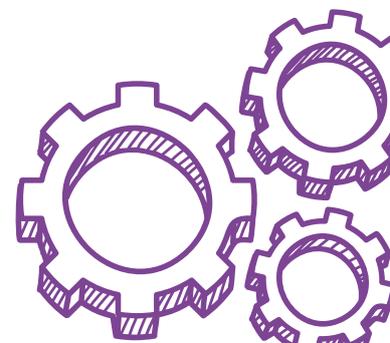
What I know (think)

- Pupils should know from the given problem:
- The statement tells them that *only* the wealth of a country will affect average life expectancy.
- There is a table displaying data for the ten largest countries. This includes data on:
 - the size of a country (km²);
 - the average life expectancy of a country (years);
 - the Gross National Income (GNI) per capita (\$) of a country; and
 - the CO₂ emission per capita (tons) of a country.
- They have been asked if they think the statement is true.

What I need to know (identify)

Pupils need to identify:

- what mathematics is needed to check to see if the statement is true; and
- whether any of the other variables will affect life expectancy.



Life Expectancy (Continued)

What I need to do (employ)

It is intended that pupils challenge the given statement:

- They should first look at the relationship between life expectancy and GNI per capita. They should use a scatter diagram to identify the relationship and comment on the correlation.
- They should then look at the relationship which life expectancy has with CO₂ emissions. They should first discuss what relationship they should expect for life expectancy and CO₂ emissions: less pollution could result in people living longer. Again, they should use a scatter diagram and discuss the correlations.
- They should see that while a country with a higher GNI per capita will have a higher life expectancy, countries with higher CO₂ emissions also have higher life expectancies. This suggests that the statement is untrue: there must be other variables that affect how long people live.
- Pupils should discuss the limitations of the original data.

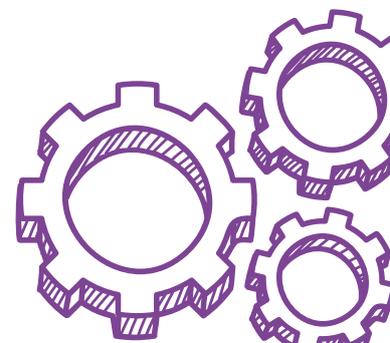
What I did (review)

Pupils will use self-assessment, peer assessment or teacher feedback to decide whether they have approached the problem as intended.

- Did they draw the appropriate graphs?
- Did they look at the relationship between other variables?
- Did their approach allow them to decide whether the statement was true or not?

While it is not required, pupils could also consider what other variables might affect life expectancy as part of their review:

- They could look at both Russia and Kazakhstan and how they are anomalies to a degree – something else must be affecting life expectancy more in these countries. What could it be?
- They could discuss how a country that is producing a lot of CO₂ emissions will also be heavily industrialised, therefore producing many jobs and wealth for the population. This could lead them to look at the relationship between 'GNI Per Capita' and 'CO₂ Emissions' and see if the relationship is stronger.



Life Expectancy (Continued)

Curriculum Objectives

This problem should enable pupils to demonstrate their knowledge, understanding and skills through:

Developing pupils as individuals

Explore issues related to Personal Health

- Pupils will investigate what impacts life expectancy.

Thinking Skills and Personal Capabilities

This problem can provide an opportunity for pupils to demonstrate a variety of the following Thinking Skills and Personal Capabilities:

Managing Information

- Ask focused questions
- Select, classify, compare and evaluate information
- Select the most appropriate method for a task
- Communicate with a sense of audience and purpose

Thinking, Problem-Solving and Decision Making

- Sequence, order, classify and make comparisons
- Make links between cause and effect
- Make predictions, examine evidence and distinguish fact from opinion
- Make connections between learning in different contexts

Being Creative

- Experiment with ideas and questions
- Make new connections between ideas/information
- Learn from and value other people's ideas
- Challenge the routine method

Working with Others

- Listen actively and share opinions
- Respect the views and opinions of others and reach agreements using negotiation and compromise

Self-Management

- Seek advice when necessary
- Review learning and some aspect that might be improved
- Organise and plan how to go about a task

Cross-Curricular Skills

This problem should enable pupils to demonstrate a variety of the following Cross-Curriculum Skills:



Using Mathematics

