

## Teacher Notes

### Introduction

Pupils can work on this problem individually or with others.

- They can discuss how they will use the information provided to double check the values reported in the table and to calculate what the actual Gross Domestic Product (GDP) in US dollars for the UK and India should be.
- They can discuss how they will work with very large numbers, and how degrees of accuracy affect calculations. They can compare their approaches.

This problem deals with a pupil's ability to make calculations involving very large numbers, by using either standard form or decimal numbers, while also recognising how degrees of accuracy can affect calculations.

Pupils who are not familiar with standard form can still attempt the problem by performing their calculations using decimal numbers and then rounding as they see appropriate to represent trillions in decimal notation. Another option pupils have is to use software like a spreadsheet when making calculations involving very large natural numbers.

### What I know (think)

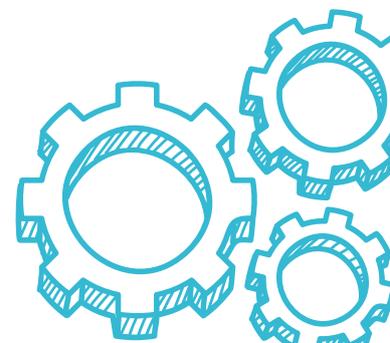
The pupils should know from the given problem:

- There is a headline claiming that India's economy has overtaken the UK's for the first time in over a hundred years.
- There is a table of figures showing what the UK and India GDP is when converted into US dollars.
- There is information explaining what GDP is, what the symbol for the currency of India is, and what a trillion dollars is as a natural number and in standard form.
- It is argued that the report is misleading, as it didn't use the correct exchange rates for the UK and India when converting into US dollars.
- The pupils have to determine whether the headline is correct using all the information, and consider why the degree of accuracy has such an effect.

### What I need to know (identify)

Pupils need to identify:

- how they will approach the use of very large numbers – whether they will use standard form or represent trillions in decimal notation;
- whether the figures given in the table are correct by checking to see what the UK and India GDP should be in US dollars;
- what the UK GDP should be in US dollars using the more accurate exchange rate;
- what the India GDP should be in US dollars using the actual exchange rate;
- how they will use rounding in their calculations;



# Numbers in the Media (Continued)

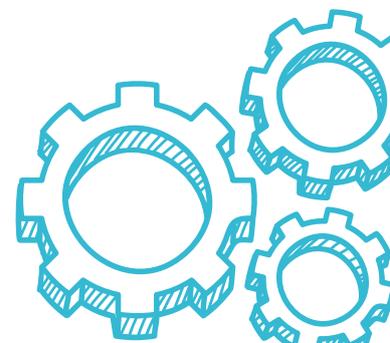
- what the differences are between the corrected values for the UK and India;
- whether their calculations show the headline to be correct or not; and
- the effect degrees of accuracy and rounding have on calculations.

## What I need to do (employ)

Pupils should use the information in the table and reasons 1 and 2 to help determine whether the headline is correct or not. Pupils can choose whether to work with standard form or use decimals to represent parts of trillions (as used in the table) or even work with trillions as natural numbers.

The following approach uses standard form:

- Pupils first check that the US dollars in the table are correct to see if the headline is correct.
- Starting with the UK, they divide  $1.88 \times 10^{12}$  by 0.82 to get the UK GDP in US dollars and round their standard form answer to two decimal places (as used in the table).
- For India, they divide  $1.53 \times 10^{14}$  by 66.58 to get the India GDP in US dollars and again round their answer as before.
- They note whether they think the US dollars in the table are correct.
- They then move on to use the correct exchange rates provided for the UK and India.
- For the UK, they divide  $1.88 \times 10^{12}$  by 0.8151 and round their answer as appropriate to get an approximation in trillions.
- They can also make a more detailed comparison between the corrected calculation and the incorrect calculation for the UK by subtracting the standard form answers and writing the answer in standard form, or as a natural number to see the difference in billions.
- For India they divide  $1.53 \times 10^{14}$  by 66.85 and round their answer as appropriate to get an approximation in trillions.
- They should also compare the corrected US dollars for India with the incorrect and corrected US dollars for the UK.
- Again, they can also make a more detailed comparison between the corrected calculation for India with the incorrect calculation in the table for India and the corrected calculation for the UK by subtracting the standard form answers and writing the answer in standard form or as a natural number to see the difference in billions.
- Throughout all their calculations pupils should round as appropriate, depending on whether they are making approximations or calculating more accurate values in US dollars.
- Pupils should then use all their calculations to determine whether the headline is correct or not. They should also be able to comment on how degrees of accuracy have had an effect on the reported figures.

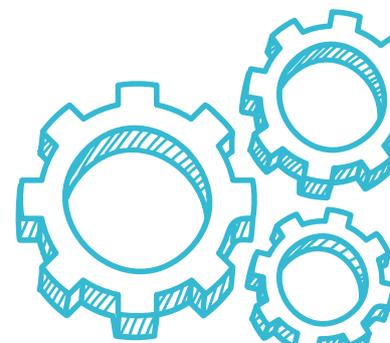


# Numbers in the Media (Continued)

## 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:
  - use standard form or decimals to represent trillions; and/or
  - use very large natural numbers?
- Did they check that the US dollars for UK and India in the table were accurate?
- Did they calculate the US dollars for the UK using the correct exchange rate?
- Did they calculate the US dollars for India using the correct exchange rate?
- Did they round appropriately, depending on the number type they used?
- Did they compare the corrected US dollars with the reported US dollars for the UK and India?
- Did they calculate the difference in the corrected US dollars with more accurate calculations for the reported US dollars?
- Did they recognise why degrees of accuracy had such an effect?



# Numbers in the Media (Continued)

## Curriculum Objectives

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

Developing pupils as Contributors to Society	<p><b>Critically examine the use and misuse of mathematics to justify/support particular attitudes/opinions in different media, and the interpretation of data:</b></p> <p>Pupils will examine how headlines can be misleading if calculations involving very large numbers are not accurate.</p>
Developing pupils as Contributors to the Economy and the Environment	<p><b>Explore how the skills developed through mathematics will be useful to a range of careers</b></p> <p>Pupils will experience how journalists need to be careful to make sure that they are correct when reporting information involving numbers in order to support their article.</p>

## 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	<ul style="list-style-type: none"> <li>• Ask focused questions</li> <li>• Plan and set goals and break a task into sub-tasks</li> <li>• Communicate with a sense of audience and purpose</li> </ul>
Thinking, Problem-Solving and Decision Making	<ul style="list-style-type: none"> <li>• Justify methods, opinions and conclusions</li> <li>• Make connections between learning in different contexts</li> <li>• Generate possible solutions, try out alternative approaches and evaluate outcomes</li> </ul>
Being Creative	<ul style="list-style-type: none"> <li>• Experiment with ideas and questions</li> <li>• Make new connections between ideas/information</li> <li>• Challenge the routine method</li> <li>• See opportunities in mistakes and failures</li> </ul>
Working with Others	<ul style="list-style-type: none"> <li>• Listen actively and share opinions</li> <li>• Suggest ways of improving their approach to working collaboratively</li> </ul>
Self-Management	<ul style="list-style-type: none"> <li>• Seek advice when necessary</li> <li>• Review learning and some aspect that might be improved</li> <li>• Organise and plan how to go about a task</li> <li>• Focus, sustain attention and persist with tasks</li> </ul>

## Cross-Curricular Skills

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



Using Mathematics

