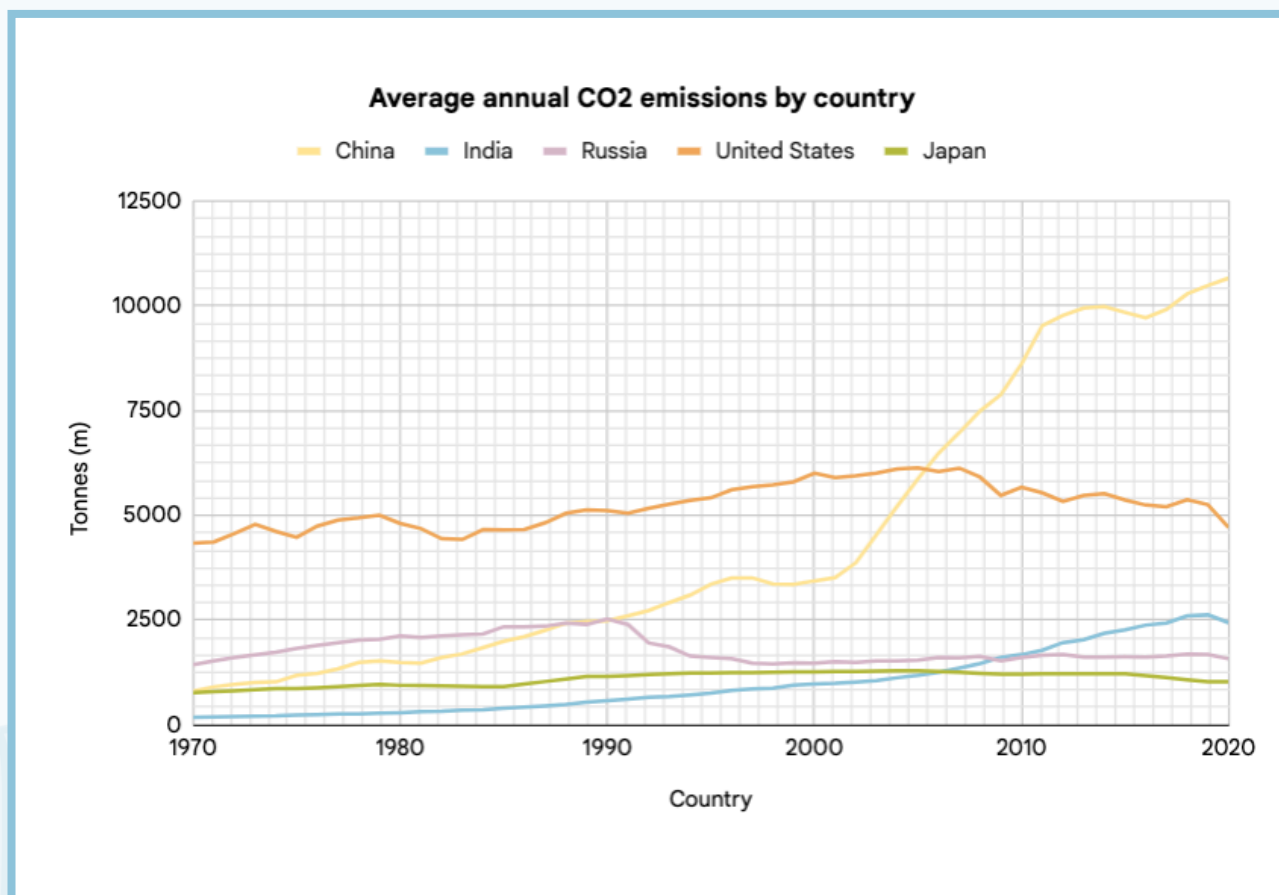


# 17. Statistics and Algebra

As climate change continues to cause concern in countries across the globe, there is increased pressure on the world's biggest economies – and emitters of CO<sub>2</sub> – to curb their emissions. You decide to find out more about the world's largest CO<sub>2</sub> emitters to understand what trends might be causing them to increase – or decrease – their total emissions.

The below graph shows CO<sub>2</sub> emissions in millions of tonnes per year per country.



1. Which country was the largest emitter of CO<sub>2</sub> in 2007?

China.

2. Comment on the CO<sub>2</sub> emissions produced by each country in 2020. What trends do you notice?

Any reasonable observations are valid. Example commentary:  
The USA and Russia have seen a gradual decline. The USA has relatively volatile emissions compared to the lower emitting countries. India's emissions have increased significantly in the last decade however they dipped in 2020 which was a common theme due to COVID restrictions. China's emissions dipped in 2015 and 2016 before rising again year on year.

3. What were the approximate total CO<sub>2</sub> emissions of the four countries in 2010?

c. 17,500m tonnes

4. What proportion of the total CO<sub>2</sub> emissions of the four countries in 2010 did each country contribute?

Note answers will vary slightly based on students' estimates when reading from the graph. Total emissions are 17,583.

Chinese emissions are 8,617. Therefore,  $8,617 / 17,583 = 49\%$

Indian emissions are 1,678. Therefore,  $1,678 / 17,583 = 10\%$

Russian emissions are 1,613. Therefore,  $1,613 / 17,583 = 9\%$

United States are 5,676.  $5,676 / 17,583 = 32\%$

5. What type of graph would you need to use to best visualise the proportion of emissions each country produced in a certain year?

A pie chart. Pie charts show a parts-to-whole relationship so are a useful way to visualise proportions.

6. Draw an approximate line of best fit on the graph on page 1 to demonstrate the growth in emissions from China between 2003 and 2007.
7. What is the gradient of your line of best fit that you drew on the graph on page 1?

Answers will vary based on students graph readings

2007: 6,979

2003: 4,545

$$(6,979 - 4,545)/4 = 608$$

8. Discuss the trend in India's CO<sub>2</sub> emissions over the period displayed in the graph on page 1. What do you think might be causing the overall increase in emissions over the period from 2010 to 2020?

Any valid observations or comments regarding India's economic development or population growth are valid. Example commentary:

India's total emissions increased steadily over the period from 2010 to 2020. Total emissions likely rose because India became a more developed economy. Areas may have transitioned from agriculture to manufacturing for example. Additionally, India's population grew substantially which would contribute to higher total emissions.

9. By how much (in tonnes and as a percentage) did emissions increase from 1970 to 1990 in Russia?

Answers will vary slightly depending on estimates from reading from the graph.

1970 emissions were 1,438 and 1990 emissions were 2,526. Therefore:

$$2,526 - 1,438 = 1,088 \text{ tonnes}$$

$$1,088 / 1,438 = 75.6\%$$

10. The table below shows Japan's emissions over the same time period. Plot this line onto the graph on page 1. **Answer:** A line for Japan is shown on the graph above on page 1.

Year	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
CO2 emissions (millions of tonnes)	768	869	945	912	1,158	1,240	1,264	1,290	1,215	1,223	1,031