Geometric mean

Grade 7 | Worked solutions

GCSE Statistics topic practice

1 The number of subscribers to a video channel was multiplied by 1.25 in its first year and by 1.8 in its second year.

a. Calculate the geometric mean of the two multipliers. (2)

b. Interpret your answer to part (a) in context. (1)

(3 marks)

a) Multiply the two multipliers

$1.25 \times 1.8 = 2.25$

2 values, so take the square root

geometric mean $= \sqrt{2.25}$

geometric mean = 1.5

b)

A multiplier of 1.5 is a rise of 50%

On average, the number of subscribers went up by 50% each year

a) 1.5 b) average rise of 50% a year

2 The number of members of a climbing club went up by 50% in 2023, by 20% in 2024 and by 8% in 2025.

a. Calculate the geometric mean of the three yearly multipliers. Give your answer correct to 3 significant figures. (3)

b. Interpret your answer to part (a) in context. (1)

(4 marks)

a) Write each change as a multiplier

1.5, 1.2, 1.08

Multiply them together

$1.5 \times 1.2 \times 1.08 = 1.944$

3 values, so take the cube root

geometric mean = cube root of 1.944

geometric mean = 1.2480...

geometric mean = 1.25 (3 sf)

b)

A multiplier of 1.248 is a rise of 24.8%

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On average, the number of members went up by about 25% each year

a) 1.25 b) average rise of about 25% a year

3 The table shows the percentage change in the average price of a flat in a town in each of four years.

Year	2022	2023	2024	2025
Percentage change	10% increase	20% decrease	25% increase	10% increase

a. Calculate the geometric mean of the four yearly multipliers. Give your answer correct to 3 significant figures. (3)

b. Write down the average percentage change in the price of a flat each year. (1)

(4 marks)

a) Write each change as a multiplier

1.1, 0.8, 1.25, 1.1

Multiply them together

$1.1 \times 0.8 \times 1.25 \times 1.1 = 1.21$

4 values, so take the fourth root

geometric mean = fourth root of 1.21

geometric mean = 1.0488...

geometric mean = 1.05 (3 sf)

b)

A multiplier of 1.0488 is a rise of 4.88%

On average, the price went up by about 5% each year

a) 1.05 b) average rise of about 5% a year

4 The value of an investment went up by 50% in its first year and then went down by 50% in its second year.

Kai says, "The mean of +50% and −50% is 0%, so on average the value of the investment did not change."

a. Calculate the geometric mean of the two yearly multipliers. Give your answer correct to 3 significant figures. (2)

b. Use your answer to part (a) to explain whether Kai is right. (2)

(4 marks)

a) Write each change as a multiplier

1.5, 0.5

$1.5 \times 0.5 = 0.75$

2 values, so take the square root

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geometric mean = $\sqrt{0.75}$

geometric mean = 0.8660...

geometric mean = 0.866 (3 sf)

b)

Kai is not right

0.866 is less than 1

1 − 0.866 = 0.134

On average the value fell by about 13.4% a year

a) 0.866 b) no, it fell about 13.4% a year

5 The number of visitors to a museum went up by 60% in 2023 and went up by 35% in 2024. It then changed again in 2025.

The geometric mean of the three yearly multipliers is 1.2

a. Work out the percentage change in the number of visitors in 2025. (3)

b. The museum had 2500 visitors in 2022. Work out the number of visitors in 2025. (2)

(5 marks)

a) geometric mean = cube root of the product

so product = geometric mean cubed

$$\text{product} = 1.2^3$$

$$\text{product} = 1.728$$

Multipliers for 2023 and 2024

$$1.6 \times 1.35 = 2.16$$

$$\text{multiplier for 2025} = \frac{1.728}{2.16}$$

$$\text{multiplier for 2025} = 0.8$$

$$1 - 0.8 = 0.2$$

A decrease of 20%

b) Multiply by all three multipliers

2500 × 1.728 = 4320

4320 visitors

a) 20% decrease b) 4320

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