Weighted index numbers

Grade 7 | Worked solutions

GCSE Statistics topic practice

1 Niamh is a student. The table shows index numbers for her two main costs in 2026, using 2024 as the base year. The weights are the percentages of her money that she spends on each cost.

Cost	Index number (2024 = 100)	Weight
Rent	110	70
Food	125	30

a. Calculate the weighted index number for Niamh's costs in 2026. (2)

b. Explain why rent is given a bigger weight than food. (1)

(3 marks)

a) Multiply each index number by its weight

$110 \times 70 = 7700$

$125 \times 30 = 3750$

$7700 + 3750 = 11450$

Add the weights

$70 + 30 = 100$

$$\text{weighted index} = \frac{\text{sum of (index} \times \text{weight)}}{\text{sum of weights}}$$

$$\text{weighted index} = \frac{11450}{100}$$

weighted index = 114.5

b)

She spends more of her money on rent than on food

a) 114.5 b) more is spent on rent

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2 A council works out index numbers for the costs of running a leisure centre in 2025, using 2020 as the base year.

Cost	Index number (2020 = 100)	Weight
Staff	112	6
Energy	135	3
Maintenance	94	1

a. Calculate the weighted index number for the costs of running the leisure centre in 2025. (3)

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

(4 marks)

a) Multiply each index number by its weight

$112 \times 6 = 672$

$135 \times 3 = 405$

$94 \times 1 = 94$

$672 + 405 + 94 = 1171$

Add the weights

$6 + 3 + 1 = 10$

$$\text{weighted index} = \frac{\text{sum of (index} \times \text{weight)}}{\text{sum of weights}}$$

$$\text{weighted index} = \frac{1171}{10}$$

weighted index = 117.1

b)

$117.1 - 100 = 17.1$

Overall, running costs rose by 17.1%

between 2020 and 2025

a) 117.1 b) costs up 17.1% since 2020

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3 A bakery compares the prices of its two main ingredients in 2023 and in 2026.

Ingredient	Price in 2023	Price in 2026	Weight
Flour (per kg)	£0.80	£1.00	3
Butter (per kg)	£6.00	£6.60	2

a. Using 2023 as the base year, work out the index number for the price of each ingredient in 2026. (2)

b. Calculate the weighted index number for the ingredients in 2026. (2)

(4 marks)

a) index number = $\frac{\text{price in 2026}}{\text{price in 2023}} \times 100$

$\text{flour} = \frac{1.00}{0.80} \times 100$

$\text{flour} = 125$

$\text{butter} = \frac{6.60}{6.00} \times 100$

$\text{butter} = 110$

b) Multiply each index number by its weight

$125 \times 3 = 375$

$110 \times 2 = 220$

$375 + 220 = 595$

Add the weights

$3 + 2 = 5$

$\text{weighted index} = \frac{595}{5}$

$\text{weighted index} = 119$

a) flour 125, butter 110 b) 119

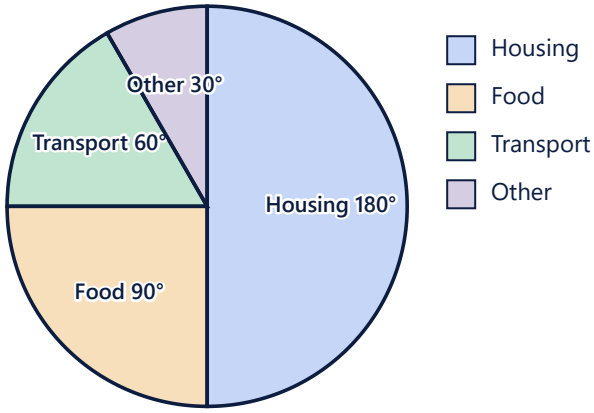
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4 The pie chart shows how a household's monthly spending was shared between four types of cost in 2022. The table shows the index numbers for these costs in 2026, using 2022 as the base year.

Cost	Housing	Food	Transport	Other
Index number (2022 = 100)	106	112	125	98

a. Using the angles in the pie chart as the weights, calculate the weighted index number for the household in 2026. (3)

b. The household spent £2400 a month in 2022. Use your answer to part (a) to estimate how much it spends each month in 2026. (2)



(5 marks)

a) Use the angles as the weights

$106 \times 180 = 19080$

$112 \times 90 = 10080$

$125 \times 60 = 7500$

$98 \times 30 = 2940$

$19080 + 10080 + 7500 + 2940 = 39600$

The angles add up to 360

$$\text{weighted index} = \frac{39600}{360}$$

weighted index = 110

b) An index number of 110 is a rise of 10%

$$2400 \times \frac{110}{100} = 2640$$

About £2640 a month

a) 110 b) £2640

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5 A building firm works out index numbers for its costs in 2026, using 2023 as the base year. The weighted index number for the firm's costs in 2026 is 118.6

Cost	Index number (2023 = 100)	Weight
Wages	116	5
Materials		3
Transport	108	2

a. Work out the index number for materials. (3)

b. The firm decides to change the weight for wages from 5 to 6 and the weight for materials from 3 to 2. The index numbers stay the same. Without calculating it, state whether the weighted index number will go up or go down. Give a reason for your answer. (2)

(5 marks)

a) Add the weights

$$5 + 3 + 2 = 10$$

$$\text{weighted index} = \frac{\text{sum of (index} \times \text{weight)}}{\text{sum of weights}}$$

$$118.6 = \frac{\text{sum of (index} \times \text{weight)}}{10}$$

$$\text{sum of (index} \times \text{weight)} = 1186$$

Wages and transport

$$116 \times 5 = 580$$

$$108 \times 2 = 216$$

$$580 + 216 = 796$$

What is left is materials index x 3

$$1186 - 796 = 390$$

$$\text{materials index} = 390 \div 3$$

materials index = 130

b)

The weighted index number goes down

116 is lower than 130

More weight is put on the lower index number

and less weight on the higher one

a) 130 b) goes down

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