

GCSE Maths: Percentage problems: choosing the method and comparing (Higher): answers

GCSE Maths - Percentages - Higher - Lesson 5.9

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch05-percentages/higher/percentage-problems-choosing-the-method-and-comparing/

Exercise 50 Mixed percentage problems (non-calculator) Non-calculator

1 Say which method you would use for each problem (you do **not** need to work out the answer): percentage of an amount, increase or decrease with a multiplier, percentage change, or reverse percentage.

(a) A bike costs £250. It is reduced by 12%. Find the sale price.

Answer: Increase or decrease: multiplier 0.88

(b) A rent rises from £40 to £46. Find the percentage rise.

Answer: Percentage change: $6 \div 40 \times 100$

(c) After a 20% rise the rent is £600. Find the old rent.

Answer: Reverse percentage: $600 \div 1.2$

(d) There are 120 pupils. 35% of them play football. How many play?

Answer: Percentage of an amount: 35% of 120

2 A price is changed twice. Work out the final price in each case.

(a) £200: up 10%, then down 10%

Answer: £198

(b) £500: down 20%, then up 20%

Answer: £480

(c) £80: up 50%, then down 50%

Answer: £60

(d) £1,000: up 10%, then up 10%

Answer: £1,210

3 Laptop Shop A takes 12% off a £600 laptop. Shop B takes £70 off the same laptop. Which shop is cheaper, and by how much? Do not use a calculator.

Answer: Shop A, by £2

4 A jacket costs £120. Shop A has 25% off. Shop B has one third off. Which shop gives the bigger discount? By how much? Do not use a calculator.

Answer: Shop B, by £10

5 A tank holds 600 litres. It is $\frac{2}{5}$ full. Then 30% of the water in the tank is used. How many litres of water are left in the tank?

Answer: 168

- 6** In a class of 30 students, 40% are boys. Of the boys, 25% wear glasses.

(a) How many boys wear glasses?

Answer: 3

(b) What percentage of the whole class is this?

Answer: 10%

- 7** Dan has a £20 shirt. It is reduced by 10%. Then the sale price is reduced by a further 10%. Dan says, "So altogether the shirt is 20% off, and costs £16." Is he right? Show how you know.

Answer: No. It costs £16.20

- 8** A pair of shoes costs £90. The price is reduced by 20% in a sale. Jess then uses a voucher that takes a further 10% off the sale price. How much does Jess pay?

Answer: £64.80

- 9** Anna earns £30,000 a year and gets a 4% pay rise. Ben earns £28,000 a year and gets an 8% pay rise. Who earns more after the rises, and by how much? Do not use a calculator.

Answer: Anna, by £960

- 10** A test has 40 questions. 30% of the questions are on algebra and 25% are on geometry. The rest are on number. How many questions are on number?

Answer: 18

- 11** Show that an increase of 20% followed by a decrease of 20% is equivalent to an overall decrease of 4%.

Answer: 4% decrease

- 12** The price of a ticket is increased by $x\%$ and then decreased by $x\%$. Show that the overall multiplier is $1 - \frac{x^2}{10\,000}$.

Answer: $1 - \frac{x^2}{10\,000}$

- 13** A price is increased by 20% and then the new price is decreased by 10%. The final price is £216. Work out the original price.

Answer: £200

- 14** A is 20% more than B. B is 20% less than C. Is A more than C, less than C, or equal to C? Explain.

Answer: A is 4% less than C

Exercise 5P Mixed percentage problems (calculator) Calculator allowed

- 1** A holiday for a family costs £1,250. The family pays a 15% deposit, then pays the rest in 5 equal payments.

(a) Work out the deposit.

Answer: £187.50

(b) Work out the amount of each of the 5 payments.

Answer: £212.50

- 2** A boiler costs £480 before VAT. VAT at 20% is added. Gabi then gets a 5% discount on the price including VAT for paying early. How much does Gabi pay?
- Answer:** £547.20
- 3** Ravi invests £4,000 in Account A, which pays 3% simple interest per year for 5 years. Sam invests £4,000 in Account B, which pays 2.5% compound interest per year for 5 years. Who has more money at the end, and how much more?
- Answer:** Ravi, by £74.37
- 4** 360 people are asked how they travel to work. 35% walk, $\frac{3}{8}$ drive, and the rest cycle. How many people cycle?
- Answer:** 99
- 5** A shop buys a lamp for £25. It wants to make a profit of 36% on the cost price. Work out the selling price of the lamp.
- Answer:** £34
- 6** A coat is reduced by 15% in a sale. The sale price is £51. What would the sale price have been if the coat had been reduced by 25% instead?
- Answer:** £45
- 7** In a country, income tax is 20% on the first £37,700 of taxable income and 40% on all taxable income above £37,700. Work out the tax on a taxable income of £50,000.
- Answer:** £12,460
- 8** A share price rises by 12% one week and falls by 12% the next week. Hannah says, "It is back to where it started." Is she right? Work out the overall percentage change.
- Answer:** No. 1.44% decrease
- 9** A paint mix is 40% blue paint and the rest is yellow paint. There are 12 litres of blue paint in the mix.
- (a) How many litres of paint are in the mix altogether?
- Answer:** 30 litres
- (b) How many litres of yellow paint are there?
- Answer:** 18 litres
- 10** A machine costs £25,000. It loses 20% of its value in the first year and then 12% of its value in each year after that. Work out its value after 4 years.
- Answer:** £13,629.44
- 11** The population of a town is 80,000. It grows by the same percentage each year and reaches 100,000 after 6 years. Work out the yearly percentage growth, correct to 1 decimal place.
- Answer:** 3.8%
- 12** The price of a games console is increased by 25%. The shop wants to bring the price back to the original price. Show that it needs a decrease of 20%.
- Answer:** 20% decrease

