

Percentage Increase and Decrease

Solutions

For AQA GCSE Mathematics (8300) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (2 marks)

Work out 115% of 60

$$115\% = 100\% + 10\% + 5\%$$

$$100\% \text{ of } 60 = 60$$

$$10\% \text{ of } 60 = 6$$

$$5\% \text{ is half of } 10\%: 6 \div 2 = 3$$

$$115\% = 60 + 6 + 3 = 69$$

Answer: 69

Marks: 1 mark for a correct method, e.g. $60 + 6 + 3$ or 1.15×60 . 1 mark for 69.

2 (1 mark)

Circle the number you multiply by to decrease an amount by 15%

Options: 0.15, 0.85, 1.15, 1.5

After a 15% decrease you have $100\% - 15\% = 85\%$ left.

$$85\% = 0.85$$

Answer: 0.85

3 (1 mark)

Which calculation increases 60 by 5%?

Circle your answer.

Options: 60×0.05 , 60×1.5 , 60×1.05 , $60 + 5$

After a 5% increase you have $100\% + 5\% = 105\%$

$105\% = 1.05$

So multiply by 1.05

Answer: 60×1.05

Tip: 5% is 0.05, so the multiplier is 1.05, not 1.5 (1.5 would be a 50% increase).

4 (2 marks)

Increase £65 by 12%

Find 12% of £65:

$10\% = 65 \div 10 = 6.50$

$1\% = 65 \div 100 = 0.65$, so $2\% = 1.30$

$12\% = 6.50 + 1.30 = 7.80$

It is an increase, so add: $65 + 7.80 = 72.80$

Answer: £72.80

Marks: 1 mark for 7.80 or 65×1.12 . 1 mark for 72.80.

5 (2 marks)

The price of a car is £14 500

The price is reduced by 8%

Work out the new price of the car.

Find 8% of £14 500:

$1\% = 14\,500 \div 100 = 145$

$$8\% = 8 \times 145 = 1160$$

It is a reduction, so subtract: $14\,500 - 1160 = 13\,340$

(Or use a multiplier: $14\,500 \times 0.92 = 13\,340$)

Answer: £13 340

Marks: 1 mark for $14\,500 \times 0.92$ or $14\,500 - 1160$. 1 mark for 13 340.

6 (2 marks)

A gym membership costs £32 per month.

From January, the monthly cost goes up by 5%

Work out the new monthly cost.

$$10\% \text{ of } 32 = 3.20$$

$$5\% = 3.20 \div 2 = 1.60$$

$$\text{Add the increase: } 32 + 1.60 = 33.60$$

(Or use a multiplier: $32 \times 1.05 = 33.60$)

Answer: £33.60

Tip: Write money with two decimal places: £33.60, not £33.6

Marks: 1 mark for 1.60 or 32×1.05 . 1 mark for 33.60.

7 (4 marks)

Leah runs 12 km each week.

Next week, she will increase this distance by 15%

Omar runs 15 km each week.

Next week, he will decrease this distance by 10%

Who will run further next week?

You must show your working.

$$\text{Leah: } 10\% \text{ of } 12 = 1.2 \text{ and } 5\% = 0.6, \text{ so } 15\% = 1.8$$

$$\text{Leah next week: } 12 + 1.8 = 13.8 \text{ km}$$

Omar: 10% of $15 = 1.5$

Omar next week: $15 - 1.5 = 13.5$ km

13.8 km is more than 13.5 km

Answer: Leah (13.8 km compared with 13.5 km)

Tip: Omar runs further now, and 10% sounds smaller than 15%, so check with numbers. Work out both new distances before you decide.

Marks: 1 mark for 1.8. 1 mark for 1.5. 1 mark for 13.8 and 13.5. 1 mark for Leah, with both distances.

8 (2 marks)

Six members leave a choir.

This decreases the number of members of the choir by 15%

How many members are in the choir now?

The 6 members who left are the decrease.

So 6 members is 15% of the number before.

$15\% \div 3 = 5\%$, so 5% is $6 \div 3 = 2$ members.

$5\% \times 20 = 100\%$, so the number before is $2 \times 20 = 40$ members.

Now there are $40 - 6 = 34$ members.

Answer: 34

Tip: The 15% is of the number **before** the members left, so 6 is 15% of the original. 40 is the number before; remember to take the 6 away.

Marks: 1 mark for 40. 1 mark for 34.

9 (2 marks)

Last year, Ruby paid £16 a month for her phone and £90 a month for energy.

This year, her phone bill has gone up by 25%

Her energy bill has gone down by 5%

Ruby says,

‘The rise is the bigger percentage, so my total bill has gone up.’

Is Ruby correct?

Tick a box.

Show calculations to support your answer.

Last year: $16 + 90 = 106$ pounds per month

Phone: 25% of 16 = 4, so $16 + 4 = 20$

Energy: 5% of 90 = 4.50, so $90 - 4.50 = 85.50$

This year: $20 + 85.50 = 105.50$ pounds per month

£105.50 is less than £106

So her total monthly bill has gone down. Ruby is not correct.

Answer: No, it is now £105.50 a month, down from £106

Tip: The percentages are of different amounts. 5% of £90 (£4.50) is more money than 25% of £16 (£4).

Marks: 1 mark for 20 or 85.50 (or the changes 4 and 4.50). 1 mark for No, with 105.50 and 106 (or 4 and 4.50 compared).

10 (2 marks)

The price of a jumper is £40

The price is increased by 10%

The new price is then decreased by 10%

Jo says,

‘The price is now £40 again.’

Is Jo correct? Tick a box.

Show working to support your answer.

Increase by 10%: $40 \times 1.1 = 44$

Then decrease by 10%: $44 \times 0.9 = 39.60$

The final price is £39.60, not £40

The 10% decrease is 10% of £44, which is more than the £4 that was added.

Answer: No, it is £39.60

Tip: The second percentage is of the **new** price, not the original price. A worked example with numbers is the clearest way to explain.

Marks: 1 mark for 44 and then multiplying by 0.9 (or finding 10% of 44). 1 mark for No, with 39.60.

11 (4 marks)

A plumber charges £60 per hour.

A job takes 3 hours and the parts cost £75

VAT of 20% is added to the total cost of labour and parts.

The customer then gets a 5% discount on this amount for paying on the day.

Work out the amount the customer pays.

Labour: $3 \times 60 = 180$ pounds

Labour and parts: $180 + 75 = 255$ pounds

VAT: 20% of 255 = 51

Price with VAT: $255 + 51 = 306$ pounds

Discount: 5% of 306 = 15.30

Amount paid: $306 - 15.30 = 290.70$

Answer: £290.70

Tip: Do not just add 15% (20% – 5%) to £255. The 5% discount is taken off the price **after** VAT has been added (£306).

Marks: 1 mark for 255. 1 mark for 306. 1 mark for 5% of your 306. 1 mark for 290.70.
