



Repeated and reverse percentages

About 45 minutes Calculator allowed 43 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks]

A tank holds 0.8 litres of water. It is filled up until it holds 840 ml. Find the percentage increase in the volume.

A2 Last lesson [2 marks]

A bus travels at 30 km/h for 0.5 hours. It then travels 150 km at 60 km/h. Work out its average speed for the whole journey.

Answer

Answer

- A3** From chapter 5 [2 marks]

$x : y = 5 : 6$ and $y : z = 4 : 3$. Find $x : z$ in its simplest form.

A4 Key Stage 3 [2 marks]

Simplify $\frac{12x^8y^2}{2x^6y}$.

Answer

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

£3200 is invested at 4% compound interest per year. Work out its value after 3 years.

Hint The multiplier for one year is 1.04. Three years means multiplying by it three times.

- B1** [3 marks]

A boat is worth £26 000. Its value falls by 9% each year. Work out its value after 4 years.

Answer

EXAMPLE 2

After a 15% increase, a train fare is £48.30. Work out the fare before the increase.

Hint The new fare is the old fare times 1.15. Divide to undo it.

- B2** [2 marks]

After a 35% reduction, a sofa costs £520. Work out its price before the reduction.

Answer

C Practice

C1 £1800 is invested at 3% simple interest per year. How much is in the account after 4 years? [2 marks]

Answer

C2 A price goes up by 15% and then down by 20%. Write down one multiplier for the whole change. [2 marks]

Answer

C3 A town of 5000 people grows by 7% each year. After how many whole years is it first over 7000? [2 marks]

Answer

C4 A price including VAT at 20% is £75.60. Work out the price before VAT. [2 marks]

Answer

C5 A house is worth £240 000. Its value rises by 5% in the first year and by 3% in the second year, then falls by 2% in the third year. Work out its value after the 3 years. [2 marks]

Answer

C6 A bank pays interest of 6% a year, added as 3% every six months. £5000 is invested. Work out its value after 2 years, to the nearest penny. [2 marks]

Answer

C7 £6250 is invested at compound interest. After 2 years it is worth £7290. Work out the annual rate of interest. [2 marks]

Answer

D Exam-style questions

D1 Zoe says, "If a price falls by 10% each year for 3 years, it falls by 30% altogether." [2 marks]

Explain why Zoe is wrong, and give the actual percentage fall.

D2 A painting was bought in 2021. Its value goes up by 6% each year. In 2024, three years later, it is worth £8932.62.

(a) Work out the price paid for the painting in 2021. [3 marks]

Answer

(b) Work out its value in 2028. Give your answer to the nearest penny.

[2 marks]

Answer

(c) In which year is the painting first worth more than twice the price paid for it?

[2 marks]

Answer

Total for D2: 7 marks

D3 Ana invests £6000 at 3.5% simple interest per year. Ben invests £6000 at 3% compound interest per year. After 5 years, who has more money, and by how much? Give your answer to the nearest penny.

[4 marks]

Answer

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 A price is increased by $x\%$ and then the new price is decreased by $x\%$. The final price is 4% lower than the starting price. Work out the value of x . [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

E1 **Hint 1** Write the two changes as multipliers in terms of x .
Hint 2 $\left(1 + \frac{x}{100}\right) \left(1 - \frac{x}{100}\right) = 0.96$
Hint 3 Expand: $1 - \frac{x^2}{10\,000} = 0.96$, so $x^2 = 400$ and $x = 20$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can use a multiplier for simple, compound and repeated percentage change. ☐ ☐ ☒

I can find the original amount from the amount after a percentage change. ☐ ☐ ☒