Percentages

Learning objectives

By the end of this topic, you should be able to:

- calculate compound interest;
- calculate appreciation;
- calculate depreciation;
- reverse percentages;

Key Words

Appreciation is when a value **increases**.

Depreciation is when a value **decreases**.

Before, originally, at the start - backward percentages

Example 1

£5000 is invested in a bank for 10 years. 2% interest is paid annually. Calculate the compound interest at the end of 10 years.

Example 2

A house was valued at £125,000 and sold 2 years later.
It increased in value by 4% in the first year and by 7% in the second year.
Calculate the value of the house when it was sold.

Example 3

£640 is placed in a bank for 4 years. 3·5% interest is paid annually. How much is in the bank at the end of the 4 years?

Example 4

The sale price of a bicycle after it has been reduced by 20% is £135·20.
Calculate the original price of the bike.

Q11: A Painting which cost £500000 appreciated by 12% last year and 9% this year. Calculate the value of the painting now.

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Q12: A car worth £15000 loses 8% of its value a year.
What is it worth by the end of 7 years?
Give your answer to the **nearest penny**.

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Q13: A motorbike was bought for £3200.
It depreciated by 20% in the first year and 12% in the second year.
How much is it worth now? Give your answer to the nearest pound.

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Q14: A collector bought an antique vase for £600.
The vase increases in value by 3% in the first year. It decreased in value by 2% in the second year. It decreased in value by 3% in the third year.
What is the vase worth after 3 years?
Give your answer to the **nearest penny**.

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Q16: Appreciation
An antique valued at £3541 appreciates by 11%.
What is it worth now? Give your answer to the **nearest penny**.

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Q17: Appreciation
A house was valued at £215000 and sold 2 years later.
In the first year it increased in value by 24% and 17% in the second year.
Calculate the value of the house when it was sold. Give your answer to the **nearest pound**.

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Q18: Depreciation
A car valued at £2027 depreciates by 10%.
What is it worth now? Give your answer to the **nearest penny**.

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Q19: Depreciation
A yacht was bought new for £86000.
Over the course of 3 years it depreciated by 8%, 12% and 17%.
Calculate the value of the yacht now. Give your answer to the **nearest pound**.

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Q20: Increase/Decrease by a Percentage
A collector bought an antique vase for £400.
The vase increases in value by 3% in the first year.
It decreases in value by 4% in the second year.
It decreases in value by 3% in the third year.
What is the vase worth (in £'s) after 3 years? Give your answer to the **nearest penny**.

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Q23: Undoing a percentage increase

The population of an island increased by 16% this year to 82592.
Calculate the population on the island last year. Give your answer to the **nearest whole number**.

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Q24: Undoing a percentage decrease

A school role has dropped this session by 10% to 1134.
Calculate the school role last session. Give your answer to the **nearest whole number**.

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Q25: Undoing percentages

The Smith's gas bill was £816·96 this year.

a) This was 20% increase on last year. How much did they pay last year? Give your answer to the **nearest penny**.

b) Last year's bill was 8% less than the previous year. How much did they pay for gas the previous year? Give your answer to the **nearest penny**.

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Answers

Q11: £ 610400

Q12: £ 8367.70

Q13: £ 2253

Q14: £ 587.47

Q16: £3930·51

Q17: £311922

Q18: £1824.30

Q19: £57789

Q20: £383·65

Q23: $71200 \ (82592 \div 1 \cdot 16)$

Q24: $1260 \ (1134 \div 0 \cdot 90)$

Q25:

  a) $£680 \cdot 80$

  b) $£740 \cdot 00$

Exam Questions

1. A TV is reduced by 15% in a sale. It originally cost £600. How much does it cost now?

2. A house was valued at £180 000. It appreciated in value by 2.4% in the first year. Depreciated in 1.3% in the second year. How much was the house worth at the end of the second year?

3. The number of bacteria in a petri dish is increasing at a rate of 3% every hour. If there are 12 000 bacteria at the start then how many will there be in 4 hours?

4. A bank offers interest at a rate of 3.8% per annum on savings. Calculate the compound interest on an investment of £600 over three years.

5. A house appreciated in value by 2% over the course of a year. At the end of the year it was worth £117 300. How much was the house worth at the start of the year?