

Foundation GCSE: Compound Growth & Decay

Name: _____

Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Working out should be shown where appropriate.

1. £500 is invested at 4% compound interest per year. What is the value after 1 year?
2. £400 is invested at 5% compound interest per year. Find the total value after 2 years.
3. A car worth £10,000 depreciates by 10% each year. What is its value after 1 year?
4. A bank account with £1,000 earns 3% compound interest per year. Find the value after 3 years.
5. A laptop depreciates by 20% each year. If it costs £800 new, find its value after 2 years.
6. £2,500 is invested at 2.5% compound interest per year. Find the total amount after 4 years.
7. A population of bacteria grows by 15% every hour. If there are 500 bacteria initially, how many are there after 3 hours?
8. A machine depreciates in value by 12% compound decay each year. If it costs £15,000 new, what is its value after 3 years?
9. £8,000 is invested for 5 years at a compound interest rate of 3.5% per annum. Calculate the total value to the nearest penny.
10. A house increases in value by 4% in the first year and 6% in the second year. If it started at £200,000, what is its value after 2 years?
11. An investment grows by 8% per year. After how many complete years will an initial investment of £1,000 first exceed £1,500?
12. A car depreciates by 18% in the first year and 12% each subsequent year. If bought for £20,000, what is its value after 3 years?
13. £3,000 is invested in an account paying compound interest. After 2 years, it grows to £3,363.00. Find the annual interest rate.
14. A radioactive substance decays by 8% per day. What percentage of the original amount remains after 5 days?
15. An investment earns compound interest of 4% for the first year, 5% for the second year, and 6% for the third year. Calculate the total multiplier.
16. A forest decreases in area by 3% each year due to deforestation. If it currently covers 45,000 hectares, what will its area be after 10 years?
17. An investment doubles in value over 7 years under compound interest. Calculate the annual percentage interest rate to 1 decimal place.
18. A rare painting appreciates by 7.5% compound interest every year. After 4 years, its value is £15,000. Find its original value to the nearest pound.
19. A car loses 25% of its value in year one, and 15% of its remaining value in each subsequent year. If its value after 3 years is £10,837.50, find its original price.
20. Inflation runs at a steady 3.5% per year. How many years will it take for the general price level of goods to increase by at least 50%?

Answers & Worked Solutions

1. £520
 $500 \times 1.04 = 520$.
2. £441
 $400 \times 1.05^2 = 441$.
3. £9,000
 $10000 \times 0.90 = 9000$.
4. £1,092.73
 $1000 \times 1.03^3 \approx 1092.73$.
5. £512
 $800 \times 0.80^2 = 512$.
6. £2,759.53
 $2500 \times 1.025^4 \approx 2759.53$.
7. 760 bacteria
 $500 \times 1.15^3 \approx 760.44$.
8. £10,241.76
 $15000 \times 0.88^3 \approx 10241.76$.
9. £9,499.35
 $8000 \times 1.035^5 \approx 9499.35$.
10. £220,480
 $200000 \times 1.04 \times 1.06 = 220480$.
11. 6 years
 $1000 \times 1.08^6 \approx 1586.87$.
12. £13,595.33
 $20000 \times 0.82 \times 0.88^2 \approx 13595.33$.
13. 6%
 $\sqrt{3363 \div 3000} = 1.06 \implies 6\%$.
14. 65.9%
 $0.92^5 \approx 0.6590 \implies 65.9\%$.
15. 1.1575
 $1.04 \times 1.05 \times 1.06 = 1.15752$.
16. 33,127 hectares
 $45000 \times 0.97^{10} \approx 33127$.
17. 10.4%
 $1.035^7 \approx 2.012 \implies 10.4\%$ (*approx via trial or logs*).
18. £11,223
 $15000 \div 1.075^4 \approx 11223$.
19. £20,000
 $P \times 0.75 \times 0.85^2 = 10837.50 \implies P = 20000$.
20. 12 years
 $1.035^{12} \approx 1.511$.