Foundation Check In - 5.03 Discrete growth and decay

1. Aliya invests £3000 at 1.5% compound interest per year. How much money does she have at the end of 2 years?
2. A pram bought for £500 depreciates by 5% each year. How much is the pram worth after one year?
3. David invests £2500 at 2.4% per year interest. How much money will he have if he closes the account after 6 months?
4. Jane takes out a bank loan of £7000 over 3 years at 5.9% compound interest per year. Assuming she does not pay back any of the loan, how much interest does she pay over the 3 years?
5. A new car bought for £10 000 depreciates by 40% in its first year, then a further 20% in its second year and 15% in its third year. How much is the car worth after 3 years?
6. Explain why a 10% increase followed by a further 10% increase is not the same as a single increase of 20%.
7. Sam earns £15 000 per year. He is given a pay rise of 2% per year for the next 4 years. He says, “In 4 years’ time I will earn £16 200”. Explain why he is wrong.
8. Wilson holds some shares in a company which he bought for £2500. The value of the shares increased by 4% in the first year and then fell by 4% in the next year. Explain why the shares are not worth £2500 after the 2 years.
9. Karen borrows £6000 from her parents to buy a car when she starts her first job. The loan is given on a simple interest basis at a rate of 2% per year. Karen decides to save up and pay the full amount plus any interest owing to her parents in one payment. Karen pays back £6630. How long did Karen borrow the money for?
10. Leo bought a house for £650 000. If it increases in value by 3% each year, how many years will it take to reach a value of £1 million?

**Extension**

Juan has £6000 to invest for 5 years. He has the choice of 2 offers.

**Offer B**

**Offer A**

5 years at 2% per year.

4.6% interest per year for the first year followed by 4 years at 1.3% per year.

Which offer would give Juan the most money at the end of 5 years and by how much?

Answers

1. £3090.68
2. £475
3. £2530
4. £1313.54
5. £4080
6. , which is equivalent to a 21% increase.

Or £100 increased by 10% is £110, £110 increased by 10% is £121, whereas £100 increased by 20% is £120, therefore it is not the same.

1. Sam has used simple interest not compound interest. He should earn £16 236.48 in 4 years’ time because interest is paid on previous interest.
2. In the first year the value of the shares increase to £2600 but in the second year the value of the shares decrease to £2496.
3. 5.25 years or 5 years and 3 months
4. 15 years

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| --- | --- | --- | --- | --- | --- | --- |
|  | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| Start | £650,000 | £669,500 | £689,585 | £710,273 | £731,581 | £753,528 |
| End | £669,500 | £689,585 | £710,273 | £731,581 | £753,528 | £776,134 |
|  | **Year 7** | **Year 8** | **Year 9** | **Year 10** | **Year 11** | **Year 12** |
| Start | £776,134 | £799,418 | £823,401 | £848,103 | £873,546 | £899,752 |
| End | £799,418 | £823,401 | £848,103 | £873,546 | £899,752 | £926,745 |
|  | **Year 13** | **Year 14** | **Year 15** |  |  |  |
| Start | £926,745 | £954,547 | £983,183 |  |  |  |
| End | £954,547 | £983,183 | £1,012,679 |  |  |  |

**Extension**

Offer B by £15.71

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| AO1 | 1 | Calculate the value of a compound interest investment |  |  |  |  | AO1 | 1 | Calculate the value of a compound interest investment |  |  |  |
| AO1 | 2 | Calculate a constant rate of depreciation over time |  |  |  |  | AO1 | 2 | Calculate a constant rate of depreciation over time |  |  |  |
| AO1 | 3 | Calculate the value of a simple interest investment |  |  |  |  | AO1 | 3 | Calculate the value of a simple interest investment |  |  |  |
| AO1 | 4 | Calculate the amount of compound interest |  |  |  |  | AO1 | 4 | Calculate the amount of compound interest |  |  |  |
| AO1 | 5 | Calculate a variable rate of depreciation over time |  |  |  |  | AO1 | 5 | Calculate a variable rate of depreciation over time |  |  |  |
| AO2 | 6 | Explain the result of repeated percentage increase |  |  |  |  | AO2 | 6 | Explain the result of repeated percentage increase |  |  |  |
| AO2 | 7 | Determine whether simple or compound interest applies |  |  |  |  | AO2 | 7 | Determine whether simple or compound interest applies |  |  |  |
| AO2 | 8 | Explain the result of repeated percentage change |  |  |  |  | AO2 | 8 | Explain the result of repeated percentage change |  |  |  |
| AO3 | 9 | Solve a simple interest problem |  |  |  |  | AO3 | 9 | Solve a simple interest problem |  |  |  |
| AO3 | 10 | Solve a compound interest problem |  |  |  |  | AO3 | 10 | Solve a compound interest problem |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| AO1 | 4 | Calculate the amount of compound interest |  |  |  |  | AO1 | 4 | Calculate the amount of compound interest |  |  |  |
| AO1 | 5 | Calculate a variable rate of depreciation over time |  |  |  |  | AO1 | 5 | Calculate a variable rate of depreciation over time |  |  |  |
| AO2 | 6 | Explain the result of repeated percentage increase |  |  |  |  | AO2 | 6 | Explain the result of repeated percentage increase |  |  |  |
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| AO3 | 10 | Solve a compound interest problem |  |  |  |  | AO3 | 10 | Solve a compound interest problem |  |  |  |