

Simple and Compound Interest Exam Practice



Simple Interest

Q1. Tom invests £300 in a bank which offers 5% simple interest.
Work out how much money he will have after 2 years.

$$1\% \text{ of } 300 = \underline{£3}$$

$$5\% \text{ of } 300 = \underline{£15}$$

$$2 \text{ years : } 2 \times \underline{£15} = \underline{£30}$$

$$\begin{aligned} \text{Total after 2 years : } & \underline{£300} + \underline{£30} \\ & = \underline{£300} + \underline{£30} \\ & = \underline{£330} \end{aligned}$$

Answer: £330
(2 marks)

Q2. Sally invests £8000 in a bank which offers 3.5% simple interest.
Work out how much money she will have after 4 years.

$$1\% \text{ of } \underline{£8000} = \underline{£80}$$

$$3.5\% \text{ of } \underline{£8000} = \underline{£280}$$

$$\text{After 4 years : } 4 \times \underline{£280} = \underline{£1120}$$

$$\text{Total : } \underline{£8000} + \underline{£1120} = \underline{£9120}$$

Answer: £9120
(2 marks)



Q3. Peter invests £12,500 in a bank which offers 2% simple interest.
How much interest will he have earned after 3 years?

$$1\% \text{ of } £12,500 = £125$$

$$2\% \text{ of } £12,500 = £250$$

$$3 \text{ years: } 3 \times £250 = £750$$

Answer: £750
(2 marks)

Compound Interest

Q4. Pat invests £250 in a bank which offers 1% compound interest.
Work out how much money she will have after 2 years.

$$(£250 \times 1.01) \times 1.01 = £255.03$$

Answer: £255.03
(2 marks)



Q5. Ray invests £90,000 in a bank which offers 4.7% compound interest. Work out how much interest he will have earned after 3 years.

$$\begin{aligned} \text{Interest} &= 90000 \times (1.047)^3 - 90,000 \\ &= \underline{\underline{£13,295.77}} \end{aligned}$$

Answer: £13,295.77
(3 marks)

Q6. Determine how much money Yasmin will have if she invests £5000 in a bank which offers 3% compound interest after 4 years.

$$£5000 \times (1.03)^4 = \underline{\underline{£5627.54}}$$

Answer: £5627.54
(3 marks)



Problem Questions:

Q7. Mary is saving for a trip around the world. Her target is £25,000. At the start of the year, she has £20,000 in her bank account which offers 4% compound interest. Assuming that she goes on the trip at the end of the year in which she reaches her target, how many years will it be before she goes?

$$20,000 \times 1.04 = 20,800$$

$$20,000 \times 1.04^2 = 21,632$$

$$20,000 \times 1.04^3 = 22,497.28$$

⋮

$$20,000 \times 1.04^6 = 25,306 \quad (\text{1st over } \pounds 25,000)$$

⇒ 6 years

Answer: 6 years
(4 marks)

Q8. A tree is 3.5 metres tall. It grows by 8% each year. Work out the complete number of years which pass before the tree doubles in height.

$$3.5 \times 1.08 = 3.78$$

$$3.5 \times 1.08^2 = 4.0824$$

$$3.5 \times 1.08^3 = 4.408992$$

⋮

$$3.5 \times 1.08^{10} = 7.55 \quad (\text{1st over } 2 \times 3.5 = 7\text{m})$$

Answer: 10 years
(3 marks)



Q9. Harry sees the following adverts in the high street:

MegaSave Bank:

2% simple interest

£50 welcome bonus

GoldRush Bank:

1.75% compound interest

He decides to invest £4000 just for 2 years, and then withdraw his money. Which bank should he invest his money in?

You must show all your working.

MegaSave: $1\% \text{ of } £4000 = £40$
2 years: $2 \times £40$
Bonuses: $£50$
Total earned: £130

GoldRush: $4000 \times 1.0175^2 - 4000$
Total earned: £141.23

He should choose GoldRush.

Answer: GoldRush

(4 marks)



Q10. At the end of 3 years, Paula had £420 in her account. If the bank had offered 4% simple interest during this period, work out the amount of money Paula originally invested.

let N = the original amount

$$N + N \times 0.04 \times 3 = £420$$

$$N + N \times 0.12 = £420$$

$$1.12 N = £420$$

$$N = £375$$

Answer: £375
(3 marks)

Q11. A luxury car is worth £55,000 at the start of 2020. Each year it depreciates by 6%. At the start of which year will it have lost a quarter of its original value?

$$\frac{1}{4} \text{ of } £55000 = £13,750$$

$$\text{start of 2021: } 55000 \times 0.94 = 51700$$

$$2022 \quad 55000 \times (0.94)^2 = 48598$$

$$2023 \quad 55000 \times (0.94)^3 = 45682.12$$

⋮

$$2025 : 55000 \times 0.94^5 = 40364.72$$

Answer: Year 2025
(4 marks)



- Q12. Maria invests £4000 in a savings account for 4 years.
The account pays compound interest at an annual rate of 1.8% for the first year and then $x\%$ for the next 3 years.
There is a total amount of £4333.96 in the savings account at the end of the 4 years.

Work out the value of x , giving your answer to 1 decimal place.

let $M = \% \text{ multiplier for } x\%$

$$4000 \times 1.018 \times M^3 = 4333.96$$

$$M^3 = 1.0643$$

$$M = 1.0209$$

$$\Rightarrow x \text{ is } 2.1$$

Answer: 2.1
(4 marks)

- Q13. Helen earns a pay rise of 5% in 2020 and another of 2% in 2021. She claims her pay has increased by 7% over the two years. Do you agree? Explain your reasoning.

let $N = \text{Helen's original pay, before 2020}$

After 2 years, she receives $N \times 1.05 \times 1.02$

$$N \times 1.071$$

\Rightarrow Her pay has increased by 7.1%.

Disagree

Answer: Disagree
(2 marks)



Q14. The population P , of a colony of frogs, is modelled by the following formula:

$$P = 160 \times 1.04^t$$

where t is the number of months since records began.

(i) How many frogs were there when the records first began?

$$t = 0 \Rightarrow P = 160 \times 1.04^0$$
$$\Rightarrow P = 160$$

Answer: 160 Frogs
(1 mark)

(ii) Lexi says that after 5 years the model predicts that there will be more than 1500 frogs. Do you agree? Explain your reasoning fully.

$$5 \text{ years} = 5 \times 12 \text{ months} \quad (60)$$
$$\Rightarrow P = 160 \times 1.04^{60}$$
$$P = 1683, \text{ which is } > 1500$$

Agree.

Answer: Agree
(2 marks)

(iii) After 30 months, the population of frogs will be k times the population after 10 months. Find k to the nearest whole number.

$$\begin{aligned} \cdot \quad 30 \text{ months} &: 160 \times 1.04^{30} \\ \cdot \quad 10 \text{ months} &: 160 \times 1.04^{10} \end{aligned}$$
$$\frac{160 \times 1.04^{30}}{160 \times 1.04^{10}} = 1.04^{20} \Rightarrow k = 2.19$$

Answer: 2
(3 marks)