1(a). The value of a car £V is given by

$$V = 20\,000 \times 0.9^t$$

where t is the age of the car in complete years.

Write down the value of V when $t = 0$.

(a) £ _ _ _ _ _ _ _ _ _ _ _ _ **[1]**

(b). What is the value of V when $t = 3$?

(b) £ _ _ _ _ _ _ _ _ _ _ _ **[2]**

(c). After how many complete years will the car's value drop below £10 000?

(c) _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ **[2]**

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2(a). A shop sold goods worth a total of £50 000 in January.

The value of goods sold in February was 10% lower than in January.

Calculate the value of goods sold in February.

(a) £ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ **[2]**

(b). Each month, the value of goods sold continued to be 10% lower than the previous month.

When the value of goods sold was less than £35 000, the shop closed at the end of that month.

Show that the store closed at the end of May.

You must show your working.

[3]

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(c). The store reopens under new management and sells goods worth £100 000 in the first month.

- The value of goods sold in the second month is 20% more than the first month.
- The value of goods sold in the third month is 10% less than the second month.

Find the percentage increase in the total value of goods sold from the first month to the third month.

(c) _ % **[5]**

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3(a). Here are the interest rates for two accounts.

Account A	Account B
Interest: 3% per year compound interest.	Interest: 4% for the first year, 3% for the second year and 2% for the third year.
No withdrawals until the end of three years.	Withdrawals allowed at any time.

Derrick has £10 000 he wants to invest.

Calculate which account would give him most money if he invests his money for 3 years.
Give the difference in the interest to the nearest penny.

(a) Account _ _ _ _ _ _ _ _ by _ _ _ _ _ _ _ _ p [5]

(b). Explain why he might **not** want to use Account A.

--[1]

4.   At the start of 2014 Priya's house was worth £240 000.
      The value of her house increased by 5% every year.

      Work out the value of her house at the start of 2017.

£ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ **[3]**

5. Corinne invests £8400 at a simple interest rate of 12% per year.

   Work out the value of the investment after 3 years.

   £_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ **[3]**

6. Luka invests £1500.
   At the end of the first year, 2% interest is added.
   At the end of the second year, after interest has been added, the investment is worth £1606.50.

   Show that 5% interest has been added at the end of the second year.   **[4]**

END OF QUESTION PAPER

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Question			Answer/Indicative content	Marks	Part marks and guidance	
1	a		£20 000	1		
	b		£14 580 or £14 600	2	**M1** for 20 000 × 0.9^3	
	c		7 years	2	**M1** for 2 trials shown	
			Total	5		
2	a		45 000	2	**M1** for 50 000 × 0.9 **soi** or 50 000 – 5000	
	b		Total value of goods sold in May was £32 805, which is less than £35 000	3	**M2** for 50 000 (or 45 000) × 0.9 used three times (or two times) **soi** or decreasing by 10% three times Or **M1** for 45 000 × 0.9 or 45 000 – 4500	Implied by 36 450 and 32 805 Implied by 40 500
	c		8	5	**M2** for 100 000 × 1.2 × 0.9 Or **M1** for 100 000 × 1.2 **oe** **M1** for *their* '120 000' × 0.9 **oe** And **A1** for 108 000 **M1** for $$\frac{their\ '108\ 000' - 100\ 000}{100\ 000} \times 100$$ **oe**	
			Total	10		
3	a		(Account) A (by) 103[p]	5	**B2** for 10 927.27 and **B2** for 10 926.24 or **B1** for 10 400 or 10 712 If zero scored **M1** for 1.03^3 **oe** used **M1** for 1.04, 1.03 and 1.02 used **oe**	
	b		He may not want to leave it there for 3 years	1	Accept any valid reason	
			Total	6		

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Question			Answer/Indicative content	Marks	Part marks and guidance	
4			277 830	3	**M2** for 240000 × 1.05^3 or **M1** for 240000 × 1.05^2 soi by or 264600 If 0 scored **SC1** for 291721[.5] or 291722	
					Examiner's Comments Many candidates scored the full 3 marks on this question, but a large number failed to score at all. A common error was to use simple interest, leading to £276000. Others failed to progress further than one year. It was rare to see the efficient method 240 000 × 1.05^3 used; a large number made separate calculations one year at a time and while they were often successfully, these were much more likely to have an arithmetic error somewhere. Many used non-calculator methods, usually incurring errors.	
			Total	3		

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Question			Answer/Indicative content	Marks	Part marks and guidance		
5			11 424	**3**	**B2** for 3024 OR **M1** for 8400 × [0] .12 or 1008 **M1** for [8400 +] *their* 1008 × 3	**M0** if used for compound interest *Their* 1008 must be seen to come from a calculation with 8400 and 12 **Non-calculator methods** Candidates must have equivalent, correct, processes at each stage to score **M** marks Eg 10% so ÷ 10 and 2% so ÷ 5 then add. Answers may be incorrect but process may be implied by correct values Eg (10%) 840 + (2%) 168 From compound interest	
					If 0 scored **SC1** for 11 801[...]		
					Examiner's Comment Some correct answers were seen, but a very significant number incorrectly worked out compound interest.		

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Question			Answer/Indicative content	Marks	Part marks and guidance	
					8400 was sometimes multiplied by 1.12 and sometimes divided by 12. Non-calculator methods (breaking down 12%) were usually unsuccessful.	
			Total	3		

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Question	Answer/Indicative content	Marks	Part marks and guidance		
6	1500 × 2 ÷ 100 oe	M1	Follow method if **calculations** seen Allow 1500 × [0].02	Mark by **ONE method only** 1500 × 1.02 = 1530 scores **M1 B2**	
	1500 + 30 = 1530	B2	**B1** for 30 or 1530 (no addition shown) or (1606.50 – 1530)÷1530 × 100 [= 5] or 76.50 ÷ 1530 × 100 [= 5]	30 or 1530 (no working) scores **M0B1** May be seen in stages Non-calculator method must be complete to score **M1** 1% → 1530 ÷ 100 = 15.3 5% → 15.3 × 5 = 76.5 1530 + 76.5 [= 1606.5]	
	1530 × 1.05 oe leading to 1606.5[0] OR	M1			
	<u>Alternative marking</u> 2% of 1500 = 30 1500 + 30 = 1530 5% of 1530 = 76.5[0] 1530 + 76.5[0] = 1606.5[0]	B1 B1 B1 B1	Follow method if **explanation** seen		

<u>Examiner's Comments</u>

This question was reasonably well answered. However, few candidates used efficient methods to calculate percentages and final values. Many found percentages using "non-calculator" methods. Some found 5% of 1500 rather than the 1530 at the end of the first year.

Candidates need to

Question			Answer/Indicative content	Marks	Part marks and guidance
					understand how to calculate percentage with a calculator. Most candidates did not understand that "Show that…" means "Give the calculations that lead to…" and embarked on an explanation which was sometimes well structured. Candidates were allowed to annotate some working to show that the final value was achieved. Many candidates gained 2 or more marks.	
		Total		4	

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