

Question	Scheme	Marks	AOs
14 (a)	(£)18 000	B1	3.4
		(1)	
(b)	(i) $\frac{dV}{dt} = -3925e^{-0.25t}$	M1 A1	3.1b 1.1b
	Sets $-3925e^{-0.25T} = -500 \Rightarrow 3925e^{-0.25T} = 500$ * cso	A1*	3.4
	(ii) $e^{-0.25T} = 0.127... \Rightarrow -0.25T = \ln 0.127...$	M1	1.1b
	$T = 8.24$ (awrt)	A1	1.1b
	8 years 3 months	A1	3.2a
		(6)	
(c)	2 300	B1	1.1b
		(1)	
(d)	Any suitable reason such as <ul style="list-style-type: none"> • Other factors affect price such as condition/mileage • If the car has had an accident it will be worth less than the model predicts • The price may go up in the long term as it becomes rare • £2300 is too large a value for a car's scrap price. Most cars scrap for around £400 	B1	3.5b
		(1)	

(9 marks)

Notes

(a)

B1: £18 000 There is no requirement to have the units

(b)(i)

M1: Award for making the link between gradient and rate of change.

Score for attempting to differentiate V to $\frac{dV}{dt} = ke^{-0.25t}$ An attempt at both sides are required.

For the left hand side you may condone attempts such as $\frac{dy}{dx}$

A1: Achieves $\frac{dV}{dt} = -3925e^{-0.25t}$ or $\frac{dV}{dt} = 15700 \times -0.25e^{-0.25t}$ with both sides correct

A1*: Sets $-3925e^{-0.25T} = -500$ oe and proceeds to $3925e^{-0.25T} = 500$

This is a given answer and to achieve this mark, all aspects must be seen and be correct.

t must be changed to T at some point even if just at the end of their solution/proof

SC: Award SC 110 candidates who simply write

$$-3925e^{-0.25T} = -500 \Rightarrow 3925e^{-0.25T} = 500 \text{ without any mention or reference to } \frac{dV}{dt}$$

$$\text{Or } 15700 \times -0.25e^{-0.25T} = -500 \Rightarrow 3925e^{-0.25T} = 500 \text{ without any mention or reference to } \frac{dV}{dt}$$

(b)(ii)

M1: Proceeds from $e^{-0.25T} = A, A > 0$ using \ln 's to $\pm 0.25T = ..$

$$\text{Alternatively takes } \ln \text{ s first } 3925e^{-0.25T} = 500 \Rightarrow \ln 3925 - 0.25T = \ln 500 \Rightarrow \pm 0.25T = ..$$

$$\text{but } 3925e^{-0.25T} = 500 \Rightarrow \ln 3925 \times -0.25T = \ln 500 \Rightarrow \pm 0.25T = ... \text{ is M0}$$

A1: $T =$ awrt 8.24 or $-\frac{1}{0.25} \ln \left(\frac{20}{157} \right)$ Allow $t =$ awrt 8.24

Notes on Question 14 continue

A1: 8 years 3 months. Correct answer and solution only

Answers obtained numerically score 0 marks. The M mark must be scored.

(c)

B1: 2 300 but condone £ 2 300

(d)

B1: Any suitable reason. See scheme

Accept "Scrappage" schemes may pay more (or less) than £ 2 300.

Do not accept "does not take into account inflation"

It asks for a limitation of the model so candidates cannot score marks by suggesting other suitable models " the value may fall by the same amount each year"