

7. The distance a particular car can travel in a journey starting with a full tank of fuel was investigated.

- From a full tank of fuel, 40 litres remained in the car's fuel tank after the car had travelled 80 km
- From a full tank of fuel, 25 litres remained in the car's fuel tank after the car had travelled 200 km

Using a **linear model**, with V litres being the volume of fuel remaining in the car's fuel tank and d km being the distance the car had travelled,

(a) find an equation linking V with d .

(4)

Given that, on a particular journey

- the fuel tank of the car was initially full
- the car continued until it ran out of fuel

find, according to the model,

- (b) (i) the initial volume of fuel that was in the fuel tank of the car,
(ii) the distance that the car travelled on this journey.

(3)

In fact the car travelled 320 km on this journey.

(c) Evaluate the model in light of this information.

(1)

(a) linear model $V = ad + b$ (1)

Using given data $40 = 80a + b$ and $25 = 200a + b$ (2)

Subtracting (1) from (2)

$$-15 = 120a$$

$$\Rightarrow a = \frac{-15}{120} = -\frac{1}{8}$$

Substitute in (1) $40 = -10 + b$

$$\Rightarrow b = 50$$

Equation is $V = -\frac{d}{8} + 50$

(b) (i) When $d = 0$, $V = 50$ litres the initial volume

(ii) When out of petrol $V = 0 \Rightarrow -\frac{d}{8} + 50 = 0 \Rightarrow d = 400$ km

(c) When $d = 320$ model predicts $V = -\frac{320}{8} + 50 = 10$ litres

But the tank was empty so this is not a good model

