0 6 The speed limit on many roads in towns is 13.5 m/s

Outside schools this speed limit is often **reduced by** one-third.

0 6 . 1 Calculate the reduced speed limit.

[2 marks]

Reduced speed limit = _____ m/s

0 6 . 2 A reduced speed limit may reduce air pollution.

Explain **one** other advantage of a reduced speed limit.

[2 marks]

Question 6 continues on the next page

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0 6 . 3 **Figure 11** shows a car being driven at a constant speed past a speed camera.

Figure 11

Speed camera

Car

The camera recorded two images of the car 0.70 s apart.

The car travelled 14 m between the two images being taken.

The maximum deceleration of the car is 6.25 m/s^2

Calculate the minimum braking distance for the car at the speed it passed the speed camera.

[6 marks]

Minimum braking distance = _____ m

0 6 . 4 **Figure 12** shows a delivery van full of packages.

Figure 12

Packages

The driver delivers all the packages.

The empty van has a shorter stopping distance than the full van when driven at the same speed.

Explain why.

[3 marks]

_____

_____

_____

_____

_____

_____

13

Turn over for the next question

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	$13.5 \times \frac{2}{3}$ 9.0 (m/s) OR $13.5 \times \frac{1}{3} = 4.5$ (1) 13.5 - 4.5 = 9.0 (m/s) (1)	allow 9 (m/s)	1 1	AO2 6.5.4.3
06.2	reduced speed reduces stopping distance means less chance of collision **OR** the car will have less kinetic energy (1) so less likely to cause injury in the event of a collision (1)	allow reduces thinking / braking distance	1 1	AO1 6.5.4.3.2 6.5.4.3.3
06.3	$14 = v \times 0.70$ $v = \dfrac{14}{0.70}$ v = 20 (m/s) $0^2 - 20^2 = 2 \times (-6.25) \times s$ $s = \dfrac{20^2}{(2 \times 6.25)}$ s = 32 (m)	ignore minus signs throughout	1 1 1 1 1 1	AO2 6.5.4.1.2 6.5.4.1.5

06.4	same maximum force applied by the brakes		1	AO2
	because mass is less there is a greater deceleration	allow momentum for mass	1	AO1
	braking distance is less		1	AO1
	OR			6.5.2
	reducing the mass reduced the kinetic energy of the van (at a given speed) (1)			
	less work needed to be done to bring the van to a stop (1)			
	(force from the brakes is the same) so braking distance is less (1)			

| **Total** | | | **13** | |