

Question	Answer	Marks	Guidance
1 a i	Golf (1)	1	
	ii 7.7 (s)(1) Skoda (because it takes less than 7.7 seconds) (1)	2	allow 7.69..... (1) allow 'Skoda' [1] (even if working incomplete or incorrect)
C O M M O N b	Jo (no mark) idea that Jo will have the longest thinking time / distance (1) Chris (no mark) largest braking distance / less friction, grip or traction (1)	2	answer must be Jo to score the mark for the explanation allow slowest reaction [1] NOT slowest time / slowest reaction time answer must be Chris to score the mark for the explanation if no marks scored allow Jo (for tired) and Chris (for icy) (1)

<p>c</p>	<p>yes / no (no mark)</p> <p>any three from</p> <p>idea that CO₂ produced when biofuel made (1)</p> <p>carbon dioxide is given out (when fuel burns) (1)</p> <p>(biofuel is made from) plants / animals / living things (1)</p> <p>(plants) photosynthesise [1]</p> <p>carbon neutral (1)</p>	<p>3</p>	<p>Allow trees [1]</p> <p>but plants photosynthesize (2)</p> <p>allow plants take in carbon dioxide when they grow (2)</p> <p>Award marks for combining marking points: eg. 'CO₂ given out (by fuel) compensated by photosynthesis [2] Eg. carbon dioxide given out when fuel burns = carbon dioxide taken in by plants [3]</p>
<p>d</p>	<p>brakes automatically go on and off (frequently or quickly) (1)</p> <p>when the car likely to skid (1)</p>	<p>2</p>	<p>Allow 'pumping of the brakes' [1]</p> <p>allow example of when likely to skid e.g. on icy roads (1)</p> <p>allow to continue to control the car while braking / prevents skidding or wheels locking (1)</p>
<p>Total</p>		<p>10</p>	

Question	Answer	Marks	Guidance
2 a C O M M O N	ideas that cost (per km) does not depend on distance travelled (1) petrol engines / cars cost more to run (per km) than diesel engines (1) cost (per km) decreases with speed up to 80 km/hr / increases above 80km/hr / ORA (1)	3	Eg. Lower fuel consumption with diesel [1] ignore diesel engines cost less allow cost is a minimum at 80km/hr
b	any one from few charging points (1) long time to recharge (1) frequent charging needed (compared to re-fuelling) [1] limited mileage / range (for one charge) (1) lower top speed [1] (high) cost of batteries (1) large space needed for batteries [1] (too) quiet (for pedestrians to hear) [1]	1	ignore cost of car ignore need to be charged allow slower [1] ignore 'fossil fuels still needed for electricity for charging'
	Total	4	

Question	Answer	Marks	Guidance
3 a i	C (1)	1	
ii	<p>any two from</p> <p>Reference to speed changing (1)</p> <p>Reference to load(1)</p> <p>Reference to road conditions (1)</p> <p>Reference to driving style (1)</p>	2	<p>must relate to more fuel used</p> <p>eg traffic is heavy / needs to stop and start a lot / lots of braking and accelerating/ traffic lights / not optimum speed</p> <p>eg large load carried / increased number of passengers /towing/ open windows / air con /heaters/</p> <p>eg hilly / bends / wet/ windy</p> <p>eg heavy braking / rapid acceleration / wrong gear</p> <p>allow manufacturers' data is at a steady speed on a level road (1)</p>

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4	<p>(Level 3) calculates the force AND Gives a detailed linked answer in terms of forces or acceleration Quality of written communication does not impede communication of the science at this level (5 – 6 marks)</p> <p>(Level 2) calculates the force AND Gives a simplistic answer in terms of forces or acceleration Quality of written communication partly impedes communication of the science at this level (3 – 4 marks)</p> <p>(Level 1) calculates the force OR Gives a simplistic answer in terms of forces or acceleration Quality of written communication impedes communication of the science at this level (1 – 2 marks)</p> <p>(Level 0) Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted up grade C</p> <p>Indicative scientific points at level 3 may include: The calculation from level 1 and 2 and a link between change in distance or stopping time to acceleration or force.</p> <ul style="list-style-type: none"> • increases distance travelled by dummy so this reduces force / acceleration of dummy • increase stopping time of dummy so this reduces force / acceleration of dummy • reduced acceleration so reduced force • reduces the rate of change of momentum • <p>Indicative scientific points at level 1 and 2 may include:</p> <ul style="list-style-type: none"> • force = 28020 or 28000 N <p>seatbelts</p> <ul style="list-style-type: none"> • hold dummy in seat / stop dummy hitting windscreen • stretches • reduce forces on dummy • increase stopping time of dummy • decrease acceleration of dummy <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
Total		6	

Question	Answer	Marks	Guidance
5 a	Sand provides friction force (1) Going uphill KE lost/ slows the car down (1) car has less KE so less energy needed in braking (1)	2	going uphill increases drag (1) Sand absorbs some of the energy of the car(1)
b	<p>passengers (maximum two marks)</p> <p>risks may be trapped if in accident or in water (1)</p> <p>benefits will prevent head hitting windscreen in accident (1) will prevent being thrown out of car in accident (1)</p> <p>wider community (maximum two marks)</p> <p>benefits reduction in number of serious injuries /deaths so reduction in hospital costs (1) less chance of trauma of relatives due to road accident / AW (1)</p> <p>risk more chance of injury to pedestrians / themselves as drivers take more risk (1)</p>	3	<p>allow specific example of where belt may injure passengers in accident (1) eg whiplash, bruising, crushed ribs</p> <p>ignore unqualified statements</p> <p>allow reduces injuries / chance of death (1)</p>
Total		5	

Question	Answer	Marks	Guidance
6	<p>Level 3 (5 or 6 marks) Answer identifies up to six arguments at least two for and two against. Only five arguments scores 5 marks providing there are at least two for and two against arguments. Quality of written communication does not impede communication of science at this level.</p> <p>Level 2 (3 or 4 marks) Answer identifies up to four arguments at least one for and one against. Only three arguments scores 3 marks providing there is a for and against argument. Quality of written communication partly impedes communication of science at this level.</p> <p>Level 1 (1 or 2 marks) Answer identifies two arguments either for or against. One argument only; award 1 mark. Quality of written communication impedes communication of science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades up to C Any point in the extract must be developed to gain credit. Indicative scientific points may include:</p> <p>For:</p> <ul style="list-style-type: none"> • no petrol / diesel or fuel used (in car) • no emissions given out (by car) or at point of use • less sound pollution / quieter environment • grants / lower tax make them less expensive • likely to become less costly • easily charged from mains or at home • conserves or reduces reliance on fossil fuels / fuel can be put to other uses <p>Against:</p> <ul style="list-style-type: none"> • fuel or power source needed for electricity • emissions / CO₂ at power station • emissions / CO₂ add to global warming • pedestrians may not hear (quiet) car • expensive to buy (at the moment) • charging facilities not always available • low top speed • idea of threats to jobs in petrochemical industry • long time / 12 hours to fully charge • easier / quicker to fill cars with fuel • short range • battery disposal or replacement issues <p>Use the L1, L2, L3 annotations in scoris. Do not use ticks.</p>
	Total	6	

Question		Answer	Marks	Guidance
7		<p>thinking and braking distances increase (with more speed) (1)</p> <p>thinking distance doubles (as speed doubles) (1)</p> <p>braking distance quadruples (as speed doubles) (1)</p> <p>braking distance increases due to reduced friction or grip (if road is wet) (1)</p>	3	
		Total	3	