

**QUESTIONSHEET 1**

(a) 750 MJ / 750,000,000 J	1
$\frac{1}{2} \times 150,000 \times 100^2$	1
(b) engine thrust / jet thrust	1
weight of plane / downward force of plane due to gravity	1
(c) $500,000 \times d = 750\,000\,000$	1
$d = 1500 \text{ m}$	1 + 1 (units)
	<b>TOTAL / 7</b>

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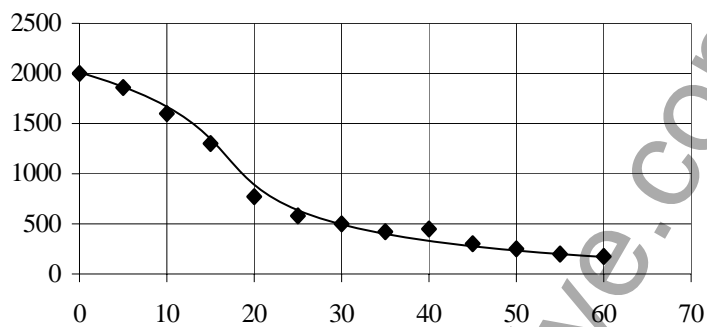
**QUESTIONSHEET 2**

(a) 80 N in the direction of motion / 80 N forward.	1
(b) work done = force $\times$ distance	1
1600	1
J	1
(c) (i) 300 J	1
(ii) the sledge falls / slides down the hill	1
potential energy converted to kinetic energy.	1
	<b>TOTAL / 7</b>

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## QUESTIONSHEET 3

- (a) Terminal velocity 1
- (b) Air resistance and gravity 1
- (c) Air resistance reduces 1  
Gravity remains constant 1  
Resultant force/ unbalanced so acceleration. 1
- (d)(i)



Graph

2/3rds of paper used and correct axis 1

Majority of correct points plotted. 1

Anomalous result at 40secs not included in line. 1

Smoothed line/ curve of best fit used. 1

- (ii) Gradient calculated using straight line values between 10-15 secs 1  
Accept answer 25-75 m/s 1

TOTAL / 10

**QUESTIONSHEET 4**

(a) speed = distance/time	1
(b) $200 / 19.32$ $= 10.35\text{m/s}$	1 1
(c) $\frac{1}{2} \times \text{final speed} \times \text{time}$ $\frac{1}{2} \times 7.5 \times 2$ $= 7.5 \text{ m}$	1 1 1
(d) speed / time $7.5 / 2$ $= 3.75\text{m/s}^2$	1 1 1
	<b>TOTAL / 9</b>

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**QUESTIONSHEET 5**

(a) 2000 m	1
(b) Alecia	1
(c) Alecia has stopped	1
(d) $\frac{500}{400}$ $= 1.25 \text{ ms}^{-1}$	1 1
(e) Dina overtakes Alecia	1
(f) Dina	1
(g) $\frac{2000}{800}$ $= 2.5 \text{ ms}^{-1}$	1 1
	<b>TOTAL / 9</b>

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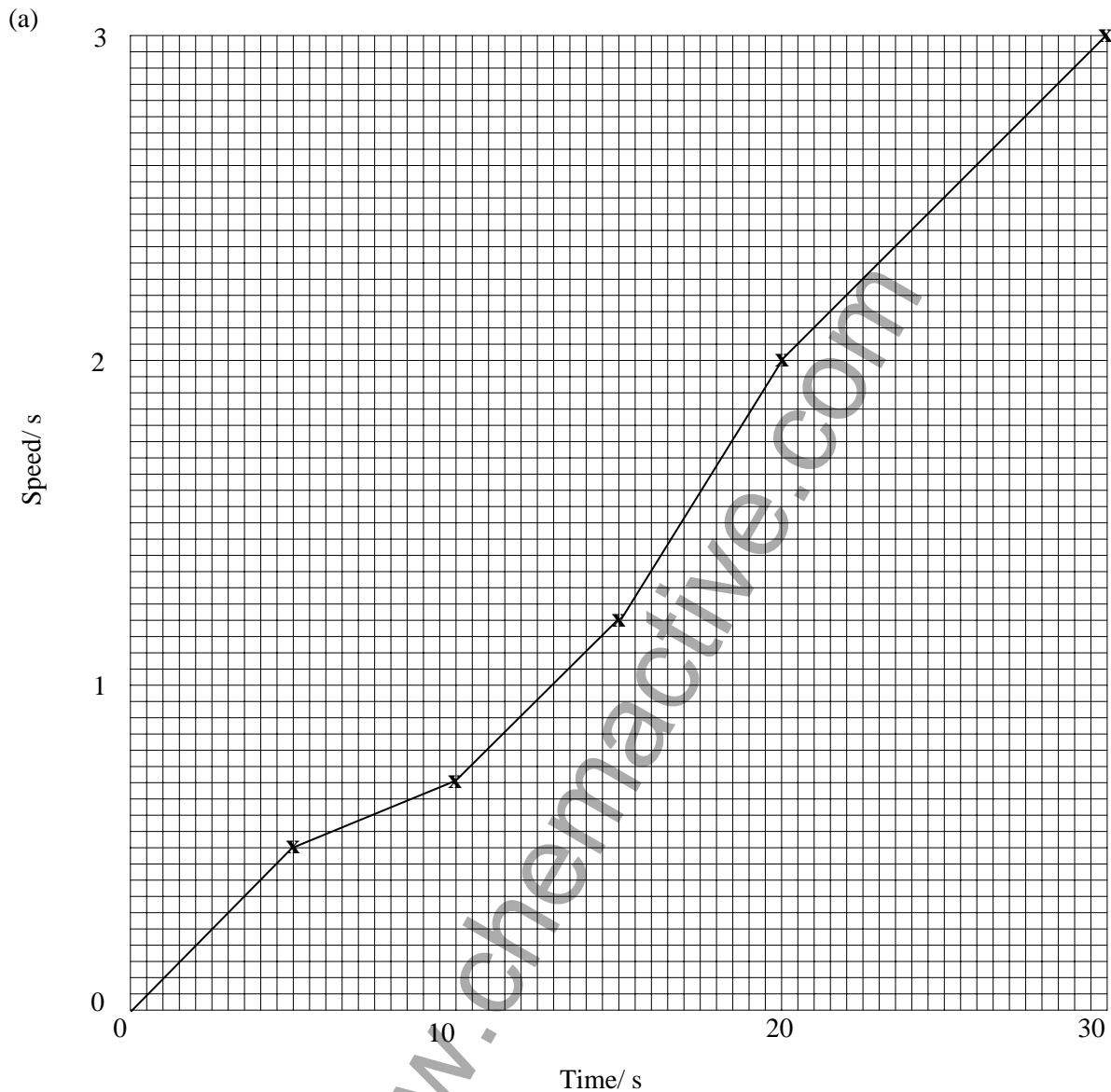
**QUESTIONSHEET 6**

(a) 1.2 s	1
(b) deceleration= change in velocity/time	1
= $27 / 4.2$	1
= $6.43\text{m/s}^2$	1
(c) distance in 1st 1.2s = velocity $\times$ time	1
= $27 \times 1.2$	1
= 32.4 m	1
distance until car stops = $(27 \times 4.2) / 2$	1
= 56.7 m	1
total = $32.4 + 56.7 = 89.1$ m	1

**TOTAL / 10**

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QUESTIONSHEET 7



- sensible scales 1
- correct plotting 1
- correct lines drawn 1

- (b) (i) average acceleration = change in velocity / time 1  
 =  $0.5 / 5$  1  
 =  $0.1 \text{ m/s}^2$  1
- (ii)  $(3 - 2) / 5$  1  
 =  $0.2 \text{ m/s}^2$  1
- (iii) As the man pulls the lorry, he is able to accelerate more once the lorry gets moving 1

**TOTAL / 9**

**QUESTIONSHEET 8**

(a) speed=distance/time	1
(b)(i) $100 / 9.96$ = 10.04 m/s	1 1
(ii) $100 / 12$ = 8.33 m/s	1 1
(iii) any viable reason: better diet/training technique improved in 100 years/ better footwear	1
(c)(i) $100 / 40.2$ = 2.49 m/s	1 1
(ii) resistance of water slows swimmer	1
	<b>TOTAL / 9</b>

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**QUESTIONSHEET 9**

(a) constant speed/constant velocity.	1
(b) $1 \text{ ms}^{-2}$ : answer – 1, units – 1	2
(c) region c: deceleration from 20 to $10 \text{ ms}^{-1}$ in 5 sec	1
region d: constant speed of $10 \text{ ms}^{-1}$ for 20 sec	1
region e: deceleration from 10 to $0 \text{ ms}^{-1}$ in 15 sec	1
(note: 1 mark for correct description for all 3 regions, but no quoted figures.)	
(d) Bus stop, traffic jam.	1
	<b>TOTAL / 7</b>

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**QUESTIONSHEET 10**

(a) (i) 0.9m	1
(ii) 0.3s	1
(iii) 1.6m	1
(b) conversion of 40kg to 400N.	1
360 J	1

**TOTAL / 5**

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**QUESTIONSHEET 11**

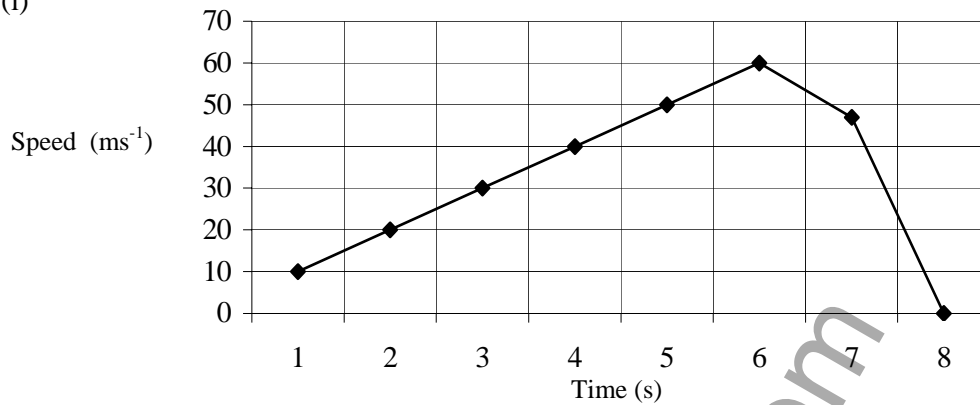
(a) $420 \times 3 =$ potential energy gained potential energy $\div$ 3seconds = power = 420 W	1
(b) Potential energy converted to kinetic energy.	1
(c) $140 \times 3 = 420$ J working – 2, correct answer with units –1	3
(d) $560 \times 3 = 420 \times$ time $t = \frac{560 \times 3}{420} = 4$ seconds	1 1

**TOTAL / 7**

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## QUESTIONSHEET 12

(a) (i)



correctly plotted points  
line joining points.

1  
1

(ii) Rope fully stretched so speed changes from  $60\text{ms}^{-1}$  to 0 / speed changes from  $60\text{ms}^{-1}$  to 0.

1

(b) (i) formula: deceleration =  $\frac{\text{change in speed}}{\text{time}}$

1

correct answer with units:  $60\text{ms}^{-2}$

1

(ii) Upward force in the elastic

1

(c) (i) formula: acceleration =  $\frac{\text{change in speed}}{\text{time}}$

1

correct answer with units:  $10\text{ms}^{-2}$

1

(ii) force  
of gravity

1  
1

**TOTAL / 10**



## QUESTIONSHEET 13

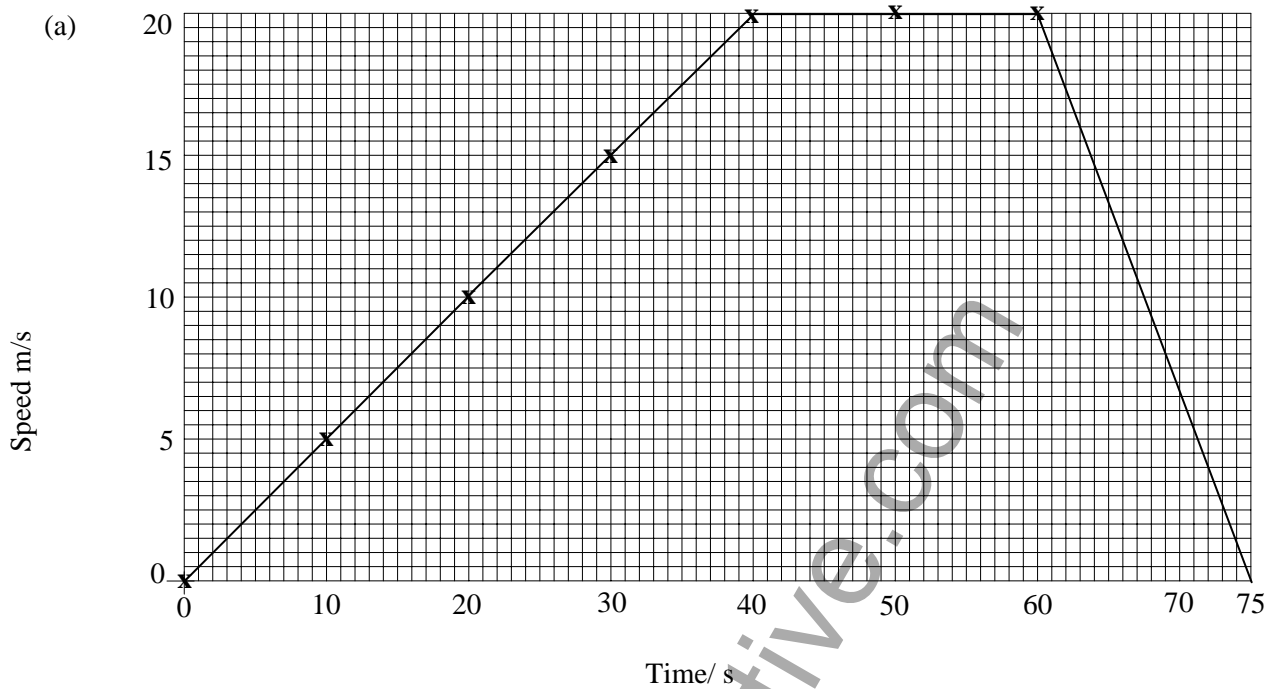
- (a) 10 km 1
- (b) formula:  $\text{speed} = \frac{\text{distance}}{\text{time}}$  1
- correct answer:  $1 \text{ km min}^{-1} / 60 \text{ kmh}^{-1}$  1
- (c) (i) car is standing still / stationary 1
- (ii) formula:  $\text{speed} = \frac{\text{distance}}{\text{time}}$  1
- correct answer:  $1.5 \text{ km min}^{-1} / 90 \text{ km h}^{-1}$  1
- (d) use of re-arranged formula:  $\text{time} = \frac{\text{distance}}{\text{speed}}$  1
- correct calculation of time for BC: 6 min 1
- correct final answer: 12 min 1

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TOTAL / 9

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## QUESTIONSHEET 14



sensible scales  
correct plotting  
correct lines drawn

1  
1  
1

(b)  $\frac{1}{2} \times \text{final velocity} \times \text{time}$   
 $\frac{1}{2} \times 15 \times 30$   
 $= 225 \text{ m}$

1  
1  
1

(c) moving at constant speed

1

(d) (i) line drawn from end of graph to  $\times$  axis at 75 s

1

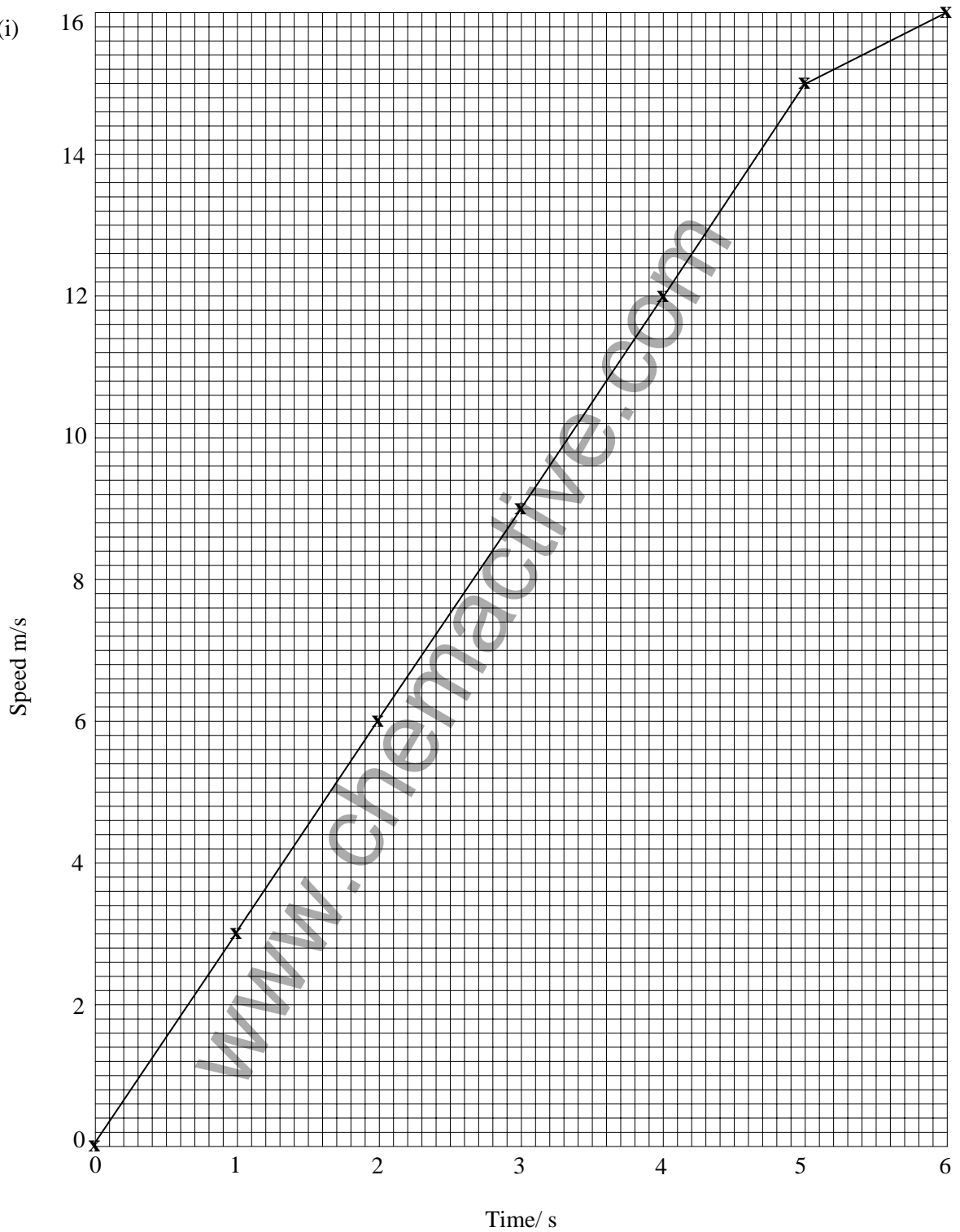
(ii) change in velocity / time  
 $= 20 / 15$   
 $= 1.33 \text{ m/s}^2$

1  
1  
1

**TOTAL / 11**

QUESTIONSHEET 15

(a) (i)



sensible scales  
correct plotting  
correct lines drawn

1  
1  
1

(Continued...)

**QUESTIONSHEET 15 CONTINUED**

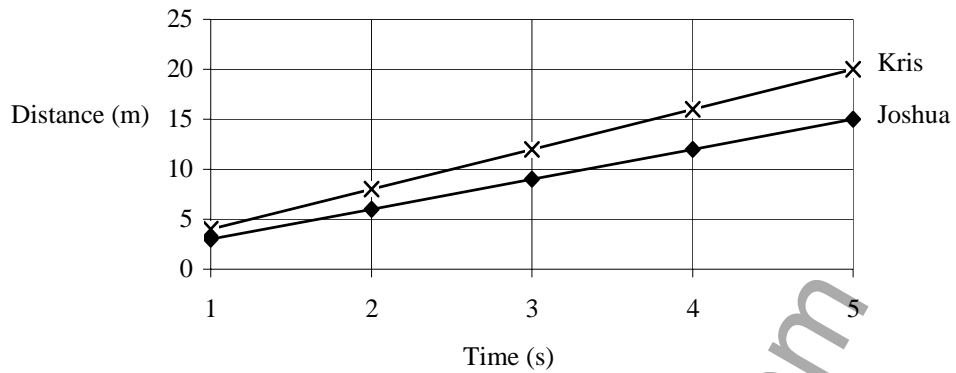
(ii) speed/time	1
= 15/5	1
= 3m/s <sup>2</sup>	1
(iii) $\frac{1}{2} \times \text{final speed} \times \text{time}$	1
$\frac{1}{2} \times 15 \times 5$	1
= 37.5 m	1
(b)(i) line parallel to time axis	1
(ii) anywhere on last line sloping down	1
	<b>TOTAL / 11</b>

**QUESTIONSHEET 16**

(a) speed=distance/time	1
=15 / 0.6	1
=25m/s	1
(b) 63 –15 = 48m	1
(c) none	1
(d) Two from mass of car, friction surfaces e.g. brakes, road condition, tyres	2
	<b>TOTAL / 7</b>

QUESTIONSHEET 17

(a)



Deduct one mark for each incorrectly plotted point

3

(b)(i) Kris:  $4 \text{ ms}^{-1}$

1

Joshua:  $3 \text{ ms}^{-1}$

1

average speed =  $\frac{\text{distance}}{\text{time}}$

1

(ii) Kris's car

1

(c) kinetic energy to heat and sound.

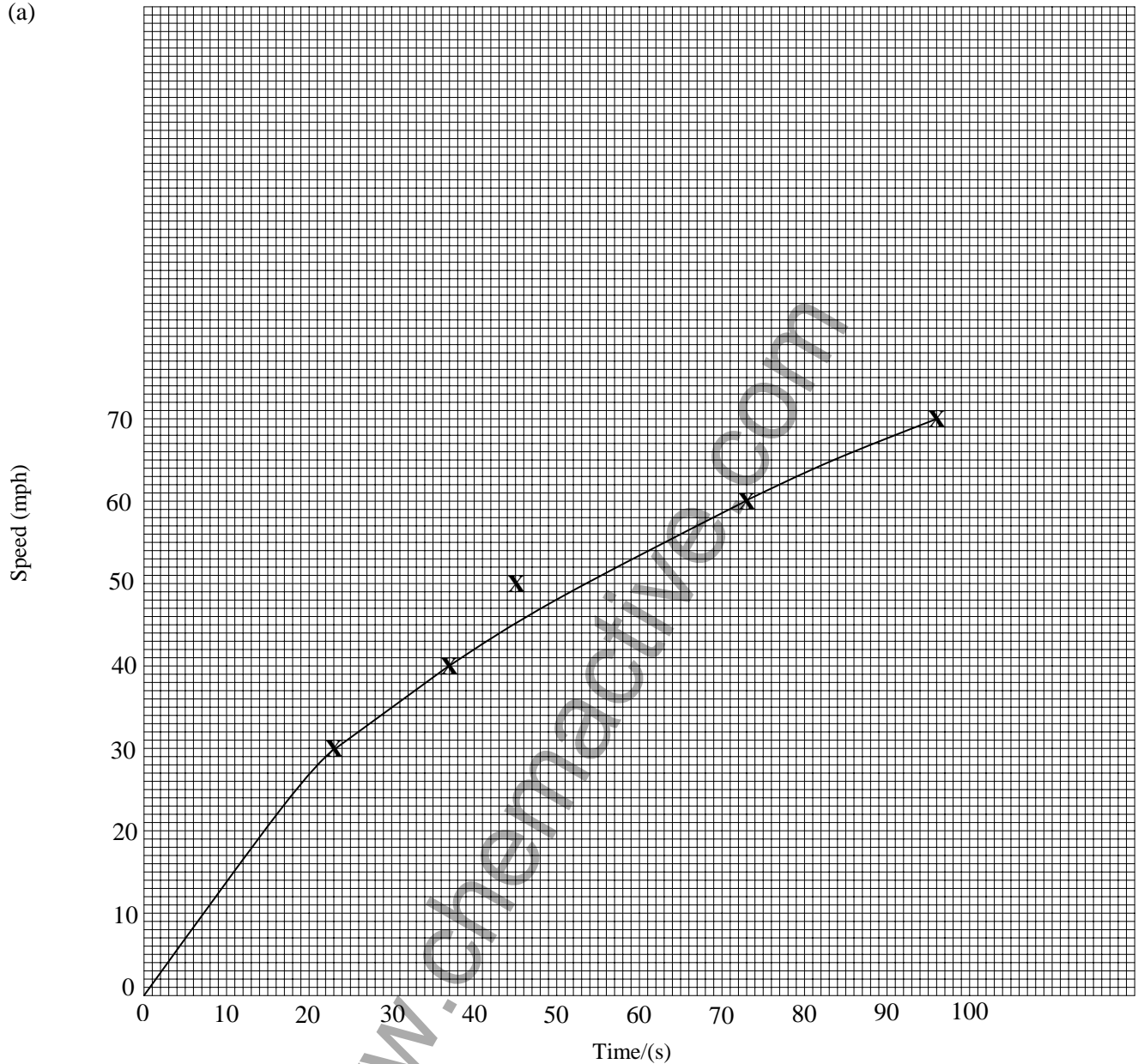
1

**TOTAL / 8**

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QUESTIONSHEET 18

(a)



sensible scales  
correct plotting  
correct lines drawn

1  
1  
1

(b) 50 mph

1

(c) (i) distance travelled while reacting

1

(ii) distance travelled while braking

1

(d) Two from

wet roads, driver may have drunk alcohol, driver tired,  
bald tyres

2

**TOTAL / 8**

**QUESTIONSHEET 19**

(a) Gravity/ weight	1
(b) stays the same.	1
(c) Write answers are:-	
(i) Unbalanced	1
(ii) Unbalanced	1
(iii) Balanced	1
(d) Constant/ steady/ same speed	1
(e) Stage 1: Acceleration	1
Resultant force is downward	1
Stage 2: Acceleration	1
Resultant force is upward.	1

**TOTAL / 10****QUESTIONSHEET 20**

(a) 40m/s	1
(b) (i) train travelling at 40m/s (constant speed)	1
(ii) train decelerates	1
(c) B	1
(d) distance = speed $\times$ time	1
time = 200 – 50 s	1
distance = 40 $\times$ 150	1
= 600 m	1

**TOTAL / 8**