

Forces and Motion Revision

- 1)
- (a) (i) 400 (metres) B1
- (ii) evidence of 6 minutes C1
 speed = distance/time in any form (e.g. $400 \div 360$ or **(a)(i)/6**) C1
- $6 \times 60 = 360$ s C1
 $1.1(1)$ (m/s) A1
- (b) A B1
- shortest time (to return)/steepest gradient B1

[Total: 7]

2)

Question	Answer	Marks
1(a)	cyclist accelerating OR moving faster OR cyclist has higher speed both (cyclist and runner) accelerating cyclists gradient steeper OR acceleration values calculated	B1 B1 B1
1(b)	Constant OR steady OR uniform (speed or motion)	B1
1(c)	indication of an area calculated $6 \times 9 = 54$ (m) $\frac{1}{2} (6 \times 9) = 27$ (m) <u>81(m)</u>	C1 C1 C1 A1
1(d)	horizontal line finishes at 10 seconds straight line to time zero in two seconds	B1 B1
		Total: 10

3)

Question	Answer	Marks
2(a)	air resistance	B1
2(b)	$W = m \times g$ in any form 54(kg)	B1 B1
2(c)	$(540 - 100) = 440$ (N) downwards	B1 B1
		Total: 5

4)

Question	Expected answer	Mark
2(a)	(distance) = area under (speed-time) graph in words, numbers or symbols OR distance = speed \times time 4.4×10 44 (m)	C1 C1 A1
2(b)	C (cyclist is) accelerating (so) forward force must be greater than backward force OR there is a resultant (forward) force	B1 B1 B1

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- 5) (a) (i) 15 (m/s) [1]
(ii) 0 (m/s) [1]
- (b) constant OR nothing [1]
- (c) area of triangle OR area under graph OR appropriate equation of motion [1]
 $\frac{1}{2} \times 30 \times 5$ [1]
75 (m) [1]
- (d) speed = distance/time in any form, letters, words, numbers [1]
750/30 [1]
25 (m/s) [1]
- 6) (a) 1500 (N) [1]
- (b) second box ticked [1]
- (c) slows down / speed decreases / decelerates [1]
resultant force in direction opposing motion / resultant is -500 N / 500 N backwards [1]
- (d) any one from:
increased wind / air resistance OR headwind)
rough(er) ground OR flat tyre OR increased road resistance/friction) [max 1]
brakes applied)
- ignore increased speed / changed car shape / increased load
ignore driver decided to stop
- 7) (a) (i) $a = (v - u) \div t$ OR $a = \Delta v \div t$ in any form OR in words in any form AND with correct numbers substituted B1
- (ii) Straight line from origin to point (3.2 s, 32 m/s) B1
- (iii) Area under graph OR $\frac{1}{2} \times 3.2 \times 32$
OR $s = \frac{1}{2} at^2$ OR $\frac{1}{2} \times 10 \times 3.2^2$ C1
51 m A1
- (b) (i) Air resistance increases B1
- (ii) Graph line Y under graph line X B1
Graph has decreasing gradient B1
Graph extends to value of t greater than 3.5 s and greater than X B1

[Total: 8]

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- 8) (a) (i) ($W = mg = 2.8 \times 10^6 \times 10 = 2.8 \times 10^7$ N) B1
- (ii) $3.2 \times 10^7 - 2.8 \times 10^7$ C1
 4.0×10^6 OR 0.4×10^7 N A1
- (iii) $F = ma$ in any form OR ($a = F \div m$ OR $4.0 \times 10^6 \div (2.8 \times 10^6)$) C1
 1.4 m/s^2 A1
- (b) Mass of rocket decreases (as fuel is used up)
OR
Value of g /gravitational force on rocket decreases as rocket rises B1
OR
Air resistance decreases

[Total: 6]

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