Question	Answer	Marks	AO Element	Notes	Guidance
1(a)	(gradient =) 10 (m/s^2)	**B1**			
1(b)	any linking of gradient to acceleration of freefall **OR** gravitational field strength	**B1**			
2(a)	area under graph **OR** $\frac{1}{2}(u + v)t$	**C1**			
	$\frac{1}{2} \times 40 \times 8$	**C1**			
	160 (m)	**A1**			
2(b)	315 + candidate's **(a)**	**C1**			

Question	Answer	Marks	AO Element	Notes	Guidance
	distance = speed × time **OR** distance / time in words, symbols or numbers	**C1**			
	(315 + 160) / 80 **OR** (315 + candidate's **(a)**) / 80	**C1**			
	(5.9) 38 (m / s)	**A1**			
3	horizontal first section	**B1**			
	short lower section, roughly in middle	**B1**			
	horizontal after middle section	**M1**			
	same height as first section	**A1**			
	final deceleration to rest	**B1**			

Question	Answer	Marks	AO Element	Notes	Guidance
4	distance travelled = area under graph	**C1**			
	areas calculated	**C1**			
	areas added or subtracted or trapezium equation correct, as appropriate	**C1**			
	400 (m)	**A1**			
5(a)	speed = distance / time OR distance / speed in words, symbols or numbers	**C1**			
	1850 / 15	**C1**			
	120 (s) or 123 (s)	**A1**			accept any number of sig. figs. ≥ 2
5(b)	top box ticked, greater than	**B1**			
6	B - 300 m	**1**			

Question	Answer	Marks	AO Element	Notes	Guidance
7(a)	(average speed =) distance ÷ time in any form (1) (average speed =) 100 ÷ 12.0 (1) (average speed =) 8.3 (m / s)	**3**			
7(b)	(student Q) as the steeper the line the faster (the runner) ORA	**1**			
8(a)	12.0 (s)	**1**			
8(b)	(distance = 100 – 96 =) 4.0 (m)	**1**			
9	(s =) d ÷ t in any form (1) (s =) 200 ÷ 6.4 (1) (s =) 31 (m / s) (1)	**3**			
10	(between) 10(.0) and 12(.0) (1) steepest section of graph / greatest gradient (1)	**2**			
11	speed = (total) distance ÷ time in any form (1) 12 ÷ 1.5 (1) 8 (km / h) (1)	**3**			

Question	Answer	Marks	AO Element	Notes	Guidance
12	4:30 (pm) **OR** 16:30	**1**			
13	30 (minutes)	**1**			
14(a)	67 (cm) (1) (67 ÷ 5 =) 13.4 (cm) (1)	**2**			
14(b)	C 1st **AND** A 2nd; (1) C 1st **AND** A 2nd; (1)	**2**			
15	smaller gradient **OR** less steep slope owtte	**1**			
16	line curves upwards with increasing gradient **NOT** vertical	**1**			
17	speed = distance ÷ time in any form **OR** (distance =) speed × time (1) 7.5 × 150 (1) 1125 (m) (1)	**3**			
18	(average speed =) dist ÷ time (1) 12 ÷ 1.6 (1) 7.5 (m / s) (1)	**3**			

Question	Answer	Marks	AO Element	Notes	Guidance
19	constant speed **OR** speed of 4 m / s (for 80 s) (1) (constant) deceleration **OR** speed decreases **OR** slows (down after 80 s) **OR** stops after 100 s (1)	**2**			
20(a)	(distance travelled) = area under graph **OR** $\frac{1}{2}$ × base × height (1) $\frac{1}{2}$ × 40 × 20 (1) 400 (m) (1)	**3**			
20(b)	1st section/WX/from 0 s to 30 s has greater gradient than last (section)/YZ/from 60 s to 100 s	**1**			
21(a)	(section) P **OR** from 0 s to 2.5 s (1) (line has) greatest gradient (1)	**2**			
21(b)	dist travelled = area under graph **OR** $\frac{1}{2}$ × b × h (1) $\frac{1}{2}$ × 2.5 × 40 (1) 50 (m) (1)	**3**			

Question	Answer	Marks	AO Element	Notes	Guidance
22	→ accelerating	**1**			
	→ constant speed	**1**			
	→ decelerating	**1**			
23	4 × 20 **OR** 4000 × 20 (1) (average speed =) distance ÷ time (1) 80 000 ÷ 1600 (1) 50 (m / s) (1)	**4**			
24	(average speed =) distance ÷ time (1) 120 ÷ 54 (1) 2.2(2) (m / s) (1)	**3**			
25	B	**1**			
26	C **AND** D	**B1**			
27	stationary / not moving / at rest	**B1**			
28	40 (km)	**B1**			

Question	Answer	Marks	AO Element	Notes	Guidance
29	0.38 and 0.66 seen **OR** correct vertical lines/marks on axes ± $\frac{1}{2}$ square	**C1**			
	0.28 (s)	**A1**			
30(a)	3 points correctly plotted to ½ square	**B2**			
30(b)	(vertical) spacing not uniform / equal **OR** points not on a straight line **OR** points do not line up **OR** difference in gradients between points	**B1**			
					[Total: 81]