Name of the Student:_____

Max. **Marks : 18 Marks**   **Time : 18 Minutes**

Mark Schemes
Q1.

Question Number	Acceptable answers		Additional guidance	Mark
	• A vector has magnitude and direction	(1)		1

Q2.

Question Number	Acceptable answers		Additional guidance	Mark
	• Height = area under the triangle	(1)	Example of calculation height = (4.5 s × 30 m s^{-1}) / 2 height = 67.5 m	
	• Height = 67.5 m	(1)		2

Q3.

Question Number	Acceptable answers		Additional guidance	Mark
	• Straight horizontal line at −2 m s^{-1}	(1)	Example of calculation Time of descent = 67.5/2 = 33.8 s End of motion = 33.8 + 4.5 = 38.3 s	
	• Ending at 38.5 s	(1)		2

Q4.

Question Number	Acceptable answers		Additional guidance	Mark
(a)	• Use of $W = mg$	(1)	Example of Calculation $W = 9.36$ kg × 9.81 $\mathrm{N\,kg^{-1}}$ $W = 91.8$ N $\sin\theta = (0.5(5.94$ m $- 2.20$ m$)) / (0.5(6.06$ m $- 2.20$ m$)$ $= 1.87/1.93$ $\theta = 75.7\,°$ $2T\cos 75.7° = 91.8$ $T = 186$ N	4
	• Calculation of θ	(1)		
	• Resolve forces vertically	(1)		
	• $T = 186$ N	(1)		

Q5.

Question Number	Acceptable answers		Additional guidance	Mark
(b)	An explanation that makes reference to the following points:	(1)	Allow mass for weight	
	• Weight of blanket decreases as it dries			
	• Tension in line decreases	(1)		
	• So stress decreases and Young modulus is constant so strain decreases	(1)		
	• extension decreases Or line gets shorter	(1) (1)	MP4 dependent on MP3 MP5 dependent on MP4	5
	• height of the blanket from the ground increases			

Q6.

Question number	Acceptable answers	Additional guidance	Mark
(i)	• Recognise that for passenger to remain in their seat normal reaction $R \geq 0$ **(1)** **or** centripetal force >= weight **(1)** • Equate centripetal force and weight (for R=0) **(1)** • $v = 9.1$ m s^{-1} **(1)**	Example of calculation: $$\frac{mv^2}{r} = mg$$ $$v = \sqrt{rg} = \sqrt{8.5\,\mathrm{m} \times 9.81\,\mathrm{m\,s^{-2}}} = 9.13\,\mathrm{m\,s^{-1}}$$	3
(ii)	• Equate decrease in gravitational potential energy to increase in kinetic energy at top of loop **(1)** • Adds this to 17.0 **(1)** • $\Delta h = 21.3$ m **(1)**	Example of calculation: $$mgh = \frac{1}{2}mv^2$$ $$h = \frac{v^2}{2g} = \frac{(9.13\,\mathrm{m\,s^{-1}})^2}{2 \times 9.81\,\mathrm{m\,s^{-2}}} = 4.25\,\mathrm{m}$$ $\Delta h = 17 + 4.3 = 21.3$ m	3