Question Number	Answer		Mark
14(a)	• Use of $F = mv^2/r$ • $v = 9.78$ (m s^{-1}) (3 sf) **Or** $d = 29.6$ (m) (3 sf) **Or** centripetal force = 1170 (N) (3 sf) (accept $r = 14.8$ (m)) (3 sf) Example of calculation 1180 N = 185 kg × v^2/ 15 m $v = 9.78$ m s^{-1}	(1) (1)	(2)
14(b) (i)	• State $R \sin \theta = mv^2/r$ • State $R \cos \theta = mg$ • Divide $R \sin \theta$ by $R \cos \theta$ and use $d/2$ **Or** • Vector diagram with normal contact force as hypotenuse • Divide mv^2/r by mg • Substitute $r = d/2$	(1) (1) (1) (1) (1) (1)	(3)
14(b)(ii)	• Use of $\tan \theta = 2v^2 / gd$ • Angle = 33° Example of calculation $\tan \theta = 2 \times (9.72$ m s$^{-1})^2 / 9.81$ N kg$^{-1} \times 30$ m = 0.642 $\theta = 32.7°$	(1) (1)	(2)
14 (c)	Max 2 points • Higher speeds can be used • A smaller track can be used • The kart is less likely to skid • The (maximum) centripetal force is larger	(1) (1) (1) (1)	(2)
	Total for Question 14		**9**