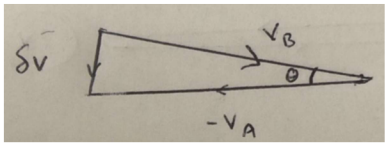
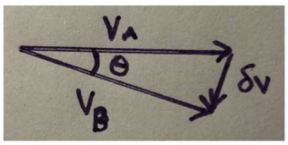
Question Number	Answer		Mark
15a	Correct vector diagram showing velocity change	(1)	**5**
	(Small angle, so) $\delta\theta = \delta v / v$	(1)	
	Use of $\delta\theta / \delta t = \omega$ and $v = r\omega$	(1)	
	Use of $\delta v / \delta t = a$	(1)	
	Algebra to show $a = v^2 / r$	(1)	
	Example of derivation   Small angle, so $\delta\theta = \delta v / v$ $\delta\theta = \omega\delta t$ $\delta\theta = v\delta t / r$ $v\delta t / r = \delta v / v$ $\delta v / \delta t = v^2 / r$		
15b	Use of velocity = $f \times 2\pi r$	(1)	**3**
	Use of $a = v^2 / r$	(1)	
	$a = 39\ \text{m s}^{-2}$	(1)	
	Or		
	Use of $\omega = 2\pi f$		
	Use of $a = \omega^2 / r$		
	$a = 39\ \text{m s}^{-2}$		
	Example of calculation		
	$v = 1.3\ \text{s}^{-1} \times 2\pi \times 0.58\ \text{m} = 4.74\ \text{m s}^{-1}$		
	$a = 4.74^2\ (\text{m s}^{-1})^2 / 0.58\ \text{m} = 38.7\ \text{m s}^{-2}$		
15c	Tension in cord is force on hand	(1)	**4**
	Centripetal force is constant	(1)	
	Weight of ball is added to tension at top	(1)	
	Weight is subtracted from tension at bottom so force on hand varies and child correct	(1)	