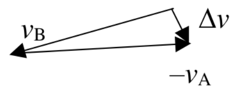
Question Number	Answer		Mark
17(a)	• Vector velocities at the two positions as part of a triangle and third side identified as Δv • Small angle, so $\Delta v/v \approx \theta \approx \sin\theta$ **Or** Small angle, so arc AB $\approx$ chord AB **Or** Small angle, so $s/r = \theta \approx \sin\theta$ • Use of $\theta/t = \omega$ and $v = r\omega$ **Or** Use of similar triangles and $\theta = s/r$ and $s/t = v$ • Use of acceleration $a = \Delta v/t$ • Suitable algebra to show $a = v^2/r$ <u>Example of derivation</u>  Small angle, so $\Delta v/v \approx \theta \approx \sin\theta$ $\theta/t = \omega$ So $\theta = \omega t$ But $v = r\omega$ So $\theta = vt/r$ $\Delta v/v \approx \theta$ So $vt/r = \Delta v/v$ $a = \Delta v/t = v^2/r$	**(1)** **(1)** **(1)** **(1)** **(1)**	**5**
17(b)(i)	• Idea that vertical component of lift force equals weight of aeroplane • Vertical component of resultant force is zero, so aeroplane does not accelerate vertically **Or** Vertical component of resultant force is zero so it would remain flying horizontally • Horizontal component of lift force acts as centripetal force **Or** Resultant force on aeroplane is horizontal and acts as centripetal force **Or** Horizontal component of lift force acts at 90° to motion • So it follows a circular path (dependent on MP3)	**(1)** **(1)** **(1)** **(1)**	**4**
17(b)(ii)	• Use of $W = mg$ • Use of $L\cos\theta = mg$ • Use of $L\sin\theta = mv^2/r$ • Radius $= 3.2 \times 10^5$ m <u>Example of calculation</u> $W = 4.1 \times 10^5 \times 9.81 = 4.02 \times 10^6$ N $L\cos 5.2° = 4.02 \times 10^6$ N $L = 4.04 \times 10^6$ N $mv^2/r = 4.04 \times 10^6 \text{ N} \times \sin 5.2° = 3.66 \times 10^5$ N $3.66 \times 10^5 \text{ N} = 4.1 \times 10^5 \times 530^2 / r$ $r = 3.15 \times 10^5$ m	**(1)** **(1)** **(1)** **(1)**	**4**
	Total for question 17		**13**