

Question			Marking details	Marks Available
7	(a)		<p><u>Downward momentum</u> given to air hence a <u>force</u> is applied (1) (N.B. downward can appear next to momentum or force)</p> <p>Newton's 3rd (or implied) force exerted on the plane <u>by the air</u> (1)</p>	2
	(b)		<p>Speed is greater at left side [due to conservation of mass] (1) (accept speed is decreasing)</p> <p>Air is decelerating or acceleration to the left or due to decrease in momentum(1)</p>	2
	(c)		<p>Lift component left is unbalanced (1) i.e. linking to resultant force</p> <p>Vertical component of lift is [slightly] less than weight (1) i.e. linking to direction</p> <p>Alternative: Good vector diagram (award 2 marks) The lift and weight added together give a resultant force acting downwards to the left. (award 1 mark only) Or resultant force is down and left (award 1 mark only) Or lift + weight is down and left (award 1 mark only)</p>	2
	(d)		<p>Air has high speed in tornados (1) (accept moving)</p> <p>This means a much lower pressure outside or much higher pressure inside (1) (N.B. much can also be implied by high speed in the 1<sup>st</sup> mark)</p>	2
	(e)		<p>Attempt at pressure difference (1)</p> <p>Pressure difference correct i.e.155 [Pa] (1)</p> <p>Pressure difference 155 <b>ecf</b> x 850 [=130 kN] (1) (No marks for using the lift equation)</p>	3

	(f)	<p>All units correct award 2 marks  2 or 3 units correct award 1 mark  LHS= <math>\text{kg m s}^{-2}</math> <b>and</b> <math>\text{kg m}^{-3}</math>, <math>\text{m s}^{-1}</math> and <math>\text{m}^2</math> on RHS (2)</p> <p>Convincing algebra and method (1)</p>	3
	(g)	<p>Lift = weight or implied (accept <math>300 \times \text{g}</math>) (1)</p> <p><math>C_L = 0.90</math> (1) <b>ecf</b> on incorrect force</p>	2
	(h)	<div> </div> <p>Hair dryer pointing at metal plate and plate attached to stand (1)</p> <p>Protractor set to measure angle of attack or angle labelled (1)</p> <p>Metal plate &amp; attachment on digital balance (1)</p> <p>Labelling of 4/5 of hair dryer, stand / clamp, protractor, digital balance and metal plate (1)</p>	4
		<b>Question 7 Total</b>	<b>[20]</b>