Examiner only

SECTION B

The questions refer to the case study.
Direct quotes from the original passage will not be awarded marks.

7. *(a)* In your own words and referring to diagram 2 in the case study, explain lift in terms of Newton's laws. (See paragraph 3.) [2]

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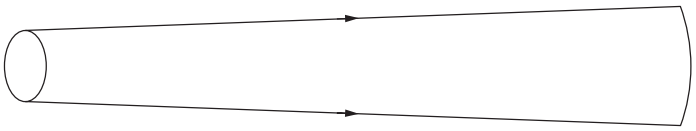
(b) The streamline diagram shows streamlines getting further apart. Explain why there must be a net force to the left acting on the air in the streamline.
(See paragraphs 6 & 7.) [2]



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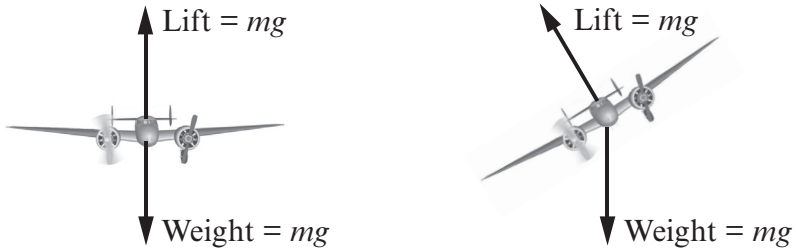
(c) An aeroplane is initially flying forward at a constant speed horizontally. It then tilts as shown. The magnitude of the lift force remains constant. Explain why the aeroplane must now accelerate downwards and to the left. [2]



(d) Houses can explode when tornados pass nearby. Explain this using Bernoulli's equation. (See paragraphs 7, 8 & 9.) [2]

(e) Check that the figure for lift (130 kN) for a super jumbo wing at $80\,m\,s^{-1}$ is correct if you assume that the speed over the top of the wing is only 2% greater than $80\,m\,s^{-1}$. (See paragraph 13.) [3]

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(f) Show that the lift coefficient has no units. (See paragraph 17.) [3]

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(g) Calculate the lift coefficient for an Airbus super jumbo at take-off. (See paragraph 17.) [2]

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(h) Draw a labelled diagram of the set up that might be employed using a hair dryer, stand, clamp, protractor, digital balance and metal plate to measure lift coefficient against angle of attack. (See paragraphs 18 and 19.) [4]