



AVIATION

GENERAL COURSE

Externally set task

Sample 2016

Note: This Externally set task sample is based on the following content from Unit 3 of the General Year 12 syllabus.

Aerodynamics

- factors affecting directional stability: position of centre of gravity, size of the fin and rudder moment
- factors affecting lateral stability: high and low wing configurations, dihedral, sweepback

Performance and operation

- principles of air navigation
- general concepts of meteorology

Aviation skills

Human factors

- threat and error management

Aviation development

In future years, this information will be provided late in Term 3 of the year prior to the conduct of the Externally set task. This will enable teachers to tailor their teaching and learning program to ensure that the content is delivered prior to the students undertaking the task in Term 2 of Year 12.

Copyright

© School Curriculum and Standards Authority, 2014

This document – apart from any third party copyright material contained in it – may be freely copied, or communicated on an intranet, for non-commercial purposes in educational institutions, provided that the School Curriculum and Standards Authority is acknowledged as the copyright owner, and that the Authority's moral rights are not infringed.

Copying or communication for any other purpose can be done only within the terms of the *Copyright Act 1968* or with prior written permission of the School Curriculum and Standards Authority. Copying or communication of any third party copyright material can be done only within the terms of the *Copyright Act 1968* or with permission of the copyright owners.

Any content in this document that has been derived from the Australian Curriculum may be used under the terms of the [Creative Commons Attribution-NonCommercial 3.0 Australia licence](#)

Disclaimer

Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course.

Aviation

Externally set task

Working time for the task: 60 minutes

Total marks: 50 marks

Weighting: 15% of the school mark

The Boeing 787 Dreamliner is a long-range, mid-size wide-body, twin-engine jet airliner, developed by Boeing Commercial Airplanes. Its variants seat 210 to 330 passengers. Boeing states that it is the company's most fuel-efficient airliner and the world's first major airliner to use composite materials as the primary material in the construction of its airframe. The 787 has been designed to be 20% more fuel efficient than the 767 it is to replace. The Dreamliner's distinguishing features include mostly electrical flight systems, a four-panel windshield, noise-reducing chevrons on its engine nacelles, and a smoother nose contour. It shares a common type rating with the larger 777 twinjet, allowing pilots qualified for the 777 to operate both models, due to their related design features.

The first 787 was unveiled in a roll-out ceremony on July 8, 2007. By October 2013, the 787 program had logged 982 orders from 58 customers. Average price of a 787: USD\$ 250 million.

Source: http://en.wikipedia.org/wiki/Boeing_787_Dreamliner

1. Give **three (3)** reasons why an airline executive would want to buy a Boeing Dreamliner to add to an airline fleet. **(3 marks)**

2. For each reason stated above, provide an explanation that would justify the decision. **(6 marks)**

3. With the aid of a diagram, describe the process of orographic lifting to form a cloud. **(3 marks)**

4. Complete the table of cloud types below. (5 marks)

Cloud type	Abbreviation	Level H, M, L	Description
Cirrus			
Altostratus			
Stratus			
Cumulus			
Cumulonimbus			

- 5(a) What is the principle of operation of the magnetic compass? (2 marks)

- (b) What is magnetic variation? (2 marks)

- (c) What is magnetic deviation? (2 marks)

- 6 What are **two (2)** advantages of a turbocharged engine over a normally aspirated engine?

(4 marks)

Advantage 1:

Advantage 2:

7. Explain how the torque reaction of the propeller causes an aircraft to yaw during the take-off run.

(5 marks)

8. Threat and error management (TEM) is now an integral part of aircraft operations. What are **three (3)** important human TEM factors that can affect aviation safety? Explain the effect of each factor.

(6 marks)

TEM factor 1 _____

TEM factor 2 _____

TEM factor 3 _____

9. Define dihedral.

With the aid of a diagram, explain the purpose of dihedral in the design of an aircraft and how it affects stability.

(10 marks)
