

Name of the Student: _____

Max. Marks : 16 Marks

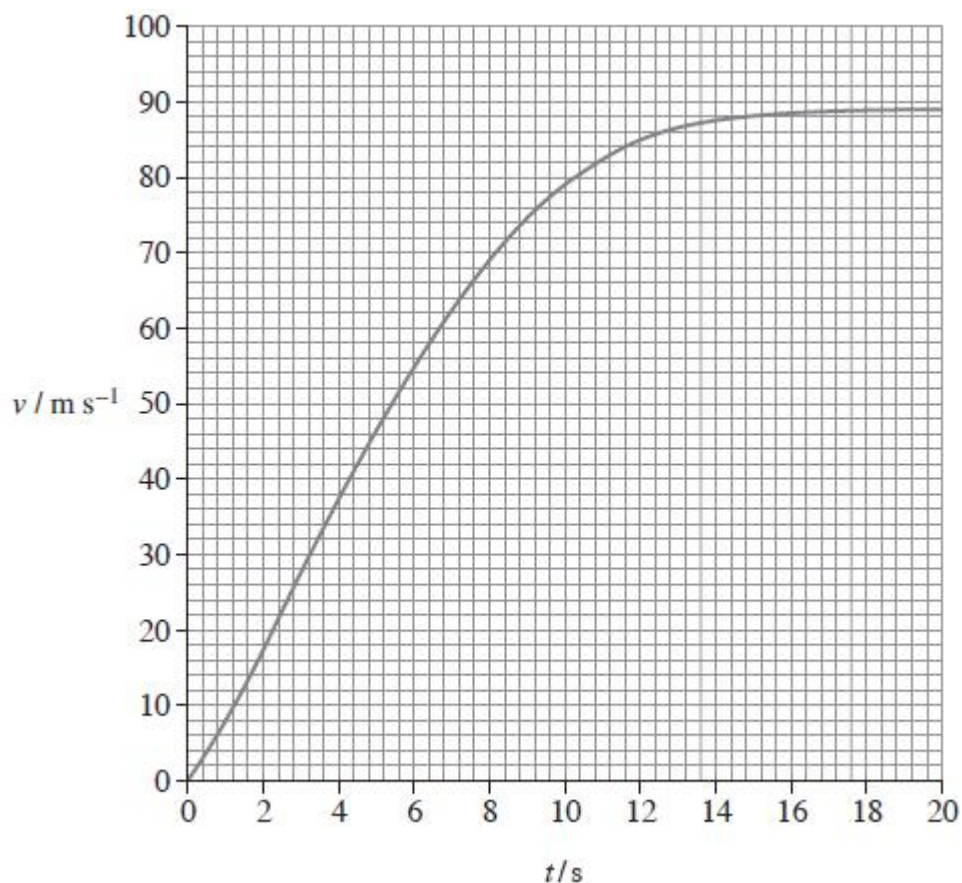
Time : 16 Minutes

Mark Schemes

Q1.

Figure 1 shows the variation of velocity v with time t for a Formula 1 car during a test drive along a straight, horizontal track.

The total mass of the car and driver is 640 kg. The car engine provides a constant driving force of 5800 N.

Figure 1

- (a) (i) Determine the distance travelled by the car during the first 10 s.

distance _____ m

(3)

- (ii) Show that the instantaneous acceleration is about 4 m s^{-2} when t is 10 s.

(2)

- (iii) Calculate the magnitude of the resistive forces on the car when t is 10 s.

resistive forces _____ N

(3)

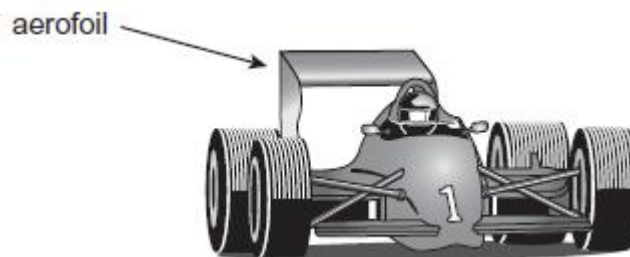
- (iv) Calculate the power, in kW, of the car at the maximum speed during the test drive.

power _____ kW

(2)

- (b) **Figure 2** shows the aerofoil that is fitted to a Formula 1 car to increase its speed around corners.

Figure 2



However, the aerofoil exerts an unwanted drag force on the car when it is travelling in a straight line so a Drag Reduction System (DRS) is fitted. This system enables the driver to change the angle of the aerofoil to reduce the drag.

The graph in **Figure 1** is for a test drive along a straight, horizontal track. Under the conditions for this test drive, the DRS was not in use and the engine produced a constant driving force.

Explain why the velocity varies in the way shown in the graph.

Go on to explain how the graph will be different when the DRS is in use and the driving force is the same.

The quality of written communication will be assessed in your answer.

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(6)

(Total 16 marks)