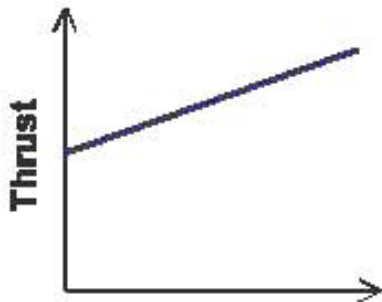
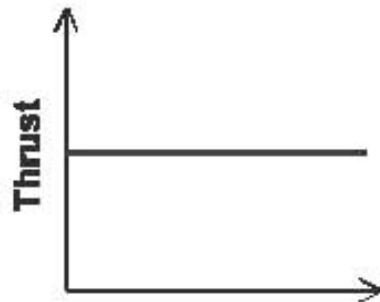


Chapter 2, Question 3: Engine Thrust

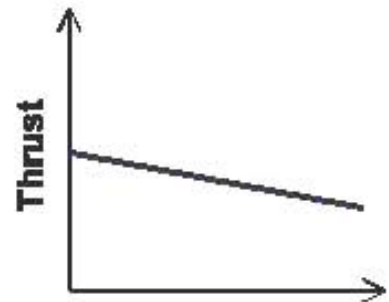
An airplane powered by two jet engines accelerates during takeoff. Assume the exhaust velocity relative to the vehicle is constant and the mass flow into the engine is constant. Neglecting any forces due to the acceleration of the vehicle, how does the thrust vary as the aircraft accelerates?



Speed
1)



Speed
2)



Speed
3)

4) I don't know

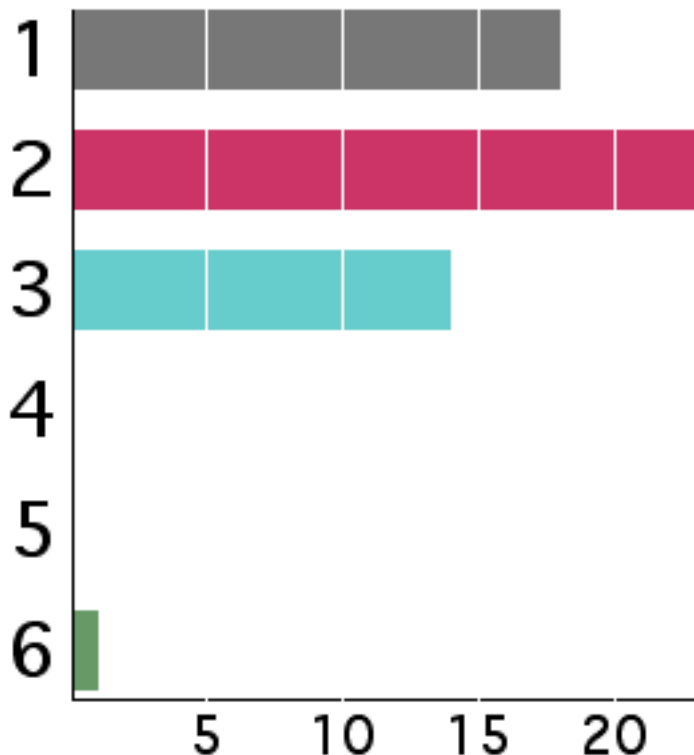
Chapter 2, Question 3 Answer:

The correct answer is 3) Thrust decreases

Since thrust = massflow ($u_{\text{exit}} - u_o$). When the aircraft starts the takeoff roll $u_o=0$ and at the end of the takeoff roll u_o may be an appreciable fraction of u_{exit} . Physically, what is happening is that relative to the engine the molecules coming in have ever increasing momentum and this acts counter to the momentum that the engine gives the molecules (the exit flow). In reference to the PRS question about "rock-breathing" propulsion, it is like having the person on the dock throw the rocks with greater and greater velocity (relative to the boat).

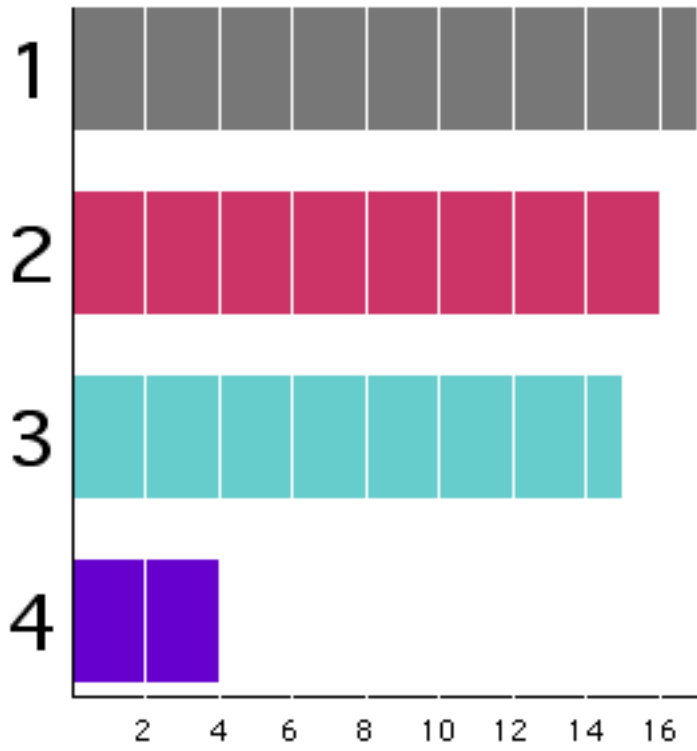
Class performance (2004):

Question 1 : Question 1



Class performance (2003):

Question 2 : Question 2



Class performance (2001):

Question 1 : Question 1

