

Physics 11 – Intro to Dynamics

1. A helicopter with a mass of 4500 Kg accelerates upward at 2.0 m/s^2 . What lift force is exerted by the air on the propellers?



2. The maximum lift force a grocery bag can withstand and not rip is 250 N. If 20.0 Kg of groceries are lifted from the floor to a table top with an acceleration of 5.0 m/s^2 , will the bag hold?
3. A racing prototype has a mass of 710 Kg. It starts from rest and travels 40.0 m in 3.0 s (assume uniform acceleration). What net force is applied to the vehicle?
4. A force of -9000 N is used to stop a 1500 Kg vehicle travelling at 20.0 m/s. What breaking distance is needed to stop?
5. A swimmer with a mass of 65.0 Kg, jumps off a 10.0 m diving board.
- Determine the velocity of the swimmer when hitting the water.
 - If the swimmer comes to a complete stop 2.0 m below the surface, what net force does the water exert on the swimmer?
6. David hooks a 2.0 Kg fish on a line that can only sustain a maximum of 38 N of force without breaking. At one point while reeling in the fish, it fights back with a force of 40.0 N. What is the minimum acceleration in which David must play out the line during this time in order to keep the line from breaking?
7. Drew is pushing one side of a 25.0 Kg box with a force of 315 N, east. If Thomas is pushing with a force of 225 N, west,
- What is the net force exerted on the box?
 - What is the acceleration of the box?
 - If Thomas stopped pushing the box, what would the acceleration be?
8. Safety engineers estimate that an elevator can hold 20 (2 sig digs) people with an average mass of 75 Kg. The elevator has a mass of 500 Kg. (3 sig digs) Tensile strength tests show that the cables supporting the elevator can withstand a maximum force of $2.96 \times 10^4 \text{ N}$. What is the greatest acceleration that the elevator motor can produce without breaking the cable?



9. A high jumper of mass 60 Kg falls at 4.0 m/s, landing in a foam pit and coming to rest in 40.0 cm. What is the average force the pit exerts on the high jumper when breaking the fall?

10. A 20 Kg child steps off a 3.0 Kg stationary skateboard with an acceleration of 0.50 m/s^2 . With what acceleration will the skateboard travel in the opposite direction?

11. In bench pressing $1.00 \times 10^2 \text{ Kg}$, Avery exerts a lift force of 1040 N. What is the upward acceleration she exerts on the weights during the lift?