Worksheet 15
Module 7.6 Power
Problems 43, 45, 46

----- Problem 1 -----  Starting from rest at ground level, an elevator of mass 900 kg rises by means of a cable with a constant upward acceleration of 1.2 m/s².

• What is the tension in the cable?

• What is the average power delivered by the cable’s tension on the elevator over the time it takes to rise from ground level to a height of 14 m?*
  *Assume it just keeps on going even past 14 m continuing with the same acceleration.

• What is the instantaneous power as we are passing through 14 m?

----- Problem 2 -----  A 90 kg crate is being dragged down a hallway starting from rest by means of a rope that is angled 30° above the horizontal. The horizontal acceleration of the crate is a constant 1.2 m/s². The coefficient of kinetic friction between the floor and the crate is 0.34.

• What is the average power delivered by the rope on the crate over the first 14 m of sliding?

• What is the instantaneous power by the rope on the crate at the instant the crate is moving with a speed of 10 m/s?

Answers
1. $F_T = 9900 \, N$, $P_{avg} = 2892.9 \, W$, $P = 57385.9 \, W$
2. $F_T = 393.697 \, N$, $P_{avg} = 988.17 \, W$, $P = 3409.52 \, W$