Problem Set 3.1
Work

1. A 20 N pomegranate is lifted at a constant velocity from the floor to a height of 1.5 m in 7 s. How much work is done on the pomegranate by the lifting force? Draw an FBD.

2. A 15 N potato is attached to a rope and pulled horizontally 3 m across a level floor. If the tension in the rope is 6 N, how much work does the rope do on the potato?

3. A 2.2 N pear is held 2.2 m above the floor for 10 s. How much work is done on the pear by the person holding it?

4. A 10 kg pink grapefruit is accelerated horizontally from rest to a velocity of 11 m/s in 5 s by a student. How much work does the student do on the grapefruit? Assume there's no friction (it's a very slippery grapefruit).

5. A 90 N box of papayas is pulled 10 m along a level surface by a rope. If the rope makes an angle of $20°$ above horizontal and has a tension of 75 N, how much work does the rope do on the box?

6. A 60 kg student goes up an escalator at constant velocity. If the height of the escalator is 3.2 m, what is the work done by the escalator on the student? Draw an FBD.

7. A 20 kg passionfruit is pulled horizontally 9 m along a level surface at a constant velocity. The coefficient of friction between the passionfruit and the surface is 0.2. How much work is done on the passionfruit by the pulling force?

8. A 25 kg pickle is attached to a string and accelerated from rest across a distance of 6 m in 4 s across a level floor. The pickle experiences 3.8 N of friction. Draw an FBD for the pickle.

   What is the work done on the pickle...
      a. ...by friction?

      b. ...by tension?

      c. ...by gravity?

      d. ...by the normal force?

9. In the previous question, calculate the total work done in accelerating the pickle.

Answers: 1) 30 J   2) 18 J   3) 0 J   4) 605 J   5) 704.8 J   6) 1881.6 J   7) 352.8 J   8a) -22.8 J
8b) 135.3 J   8c) 0   8d) 0   9) 112.5 J