wk.7.practice.2.power.sta

1. A motor uses 175 watts.

(a) How much energy does it use in 12.0 hours in joules?

(b) In kwh's?

2. A spring with a spring constant *k* of 345 N/m is compressed by a distance of 2.0 cm in a period of 15 milliseconds

(a) How much energy is stored in the spring?

(b) What is the power developed in compressing the spring in this amount of time?

3. A 1500 kg car develops 170 hp while traveling at a speed of 50 mi/h.

(a) Convert the hp to watts and the mi/h to m/s

(b) Find the force on the car

(c) Find the acceleration of the car.

(d) How many "g's" is this?

4. A torque of 95 Nm rotates through 35 rotations in 45 s.

(a) How many radians is this?

(b) How much work does the torque do?

(c) What is the power developed by this torque?

5. Electricity costs $ 0.15 per kwh. An air conditioner that is 5,000 BTU's (British Thermal units where 1 BTU = **1 british thermal unit/s = 0.29 watts**

Assuming that you keep this air conditioner on for 8.0 hours per day, how much does it cost you to run it for 3.5 months (assume 30 days per month). Assume that it runs at full power (5,000 BTU) during this time.

It does not matter what order you put the conversion factors in as long as the right stuff cancels and gives you the right answers. I am more concerned that you set it up correctly than whether or not you make a calculator error

6. To keep a compact car running at a constant speed of 65 mile/h on the highway, it must develop enough force to overcome air resistance and friction. For a typical car this is about 25 horsepower.
(a) How many watts is this?

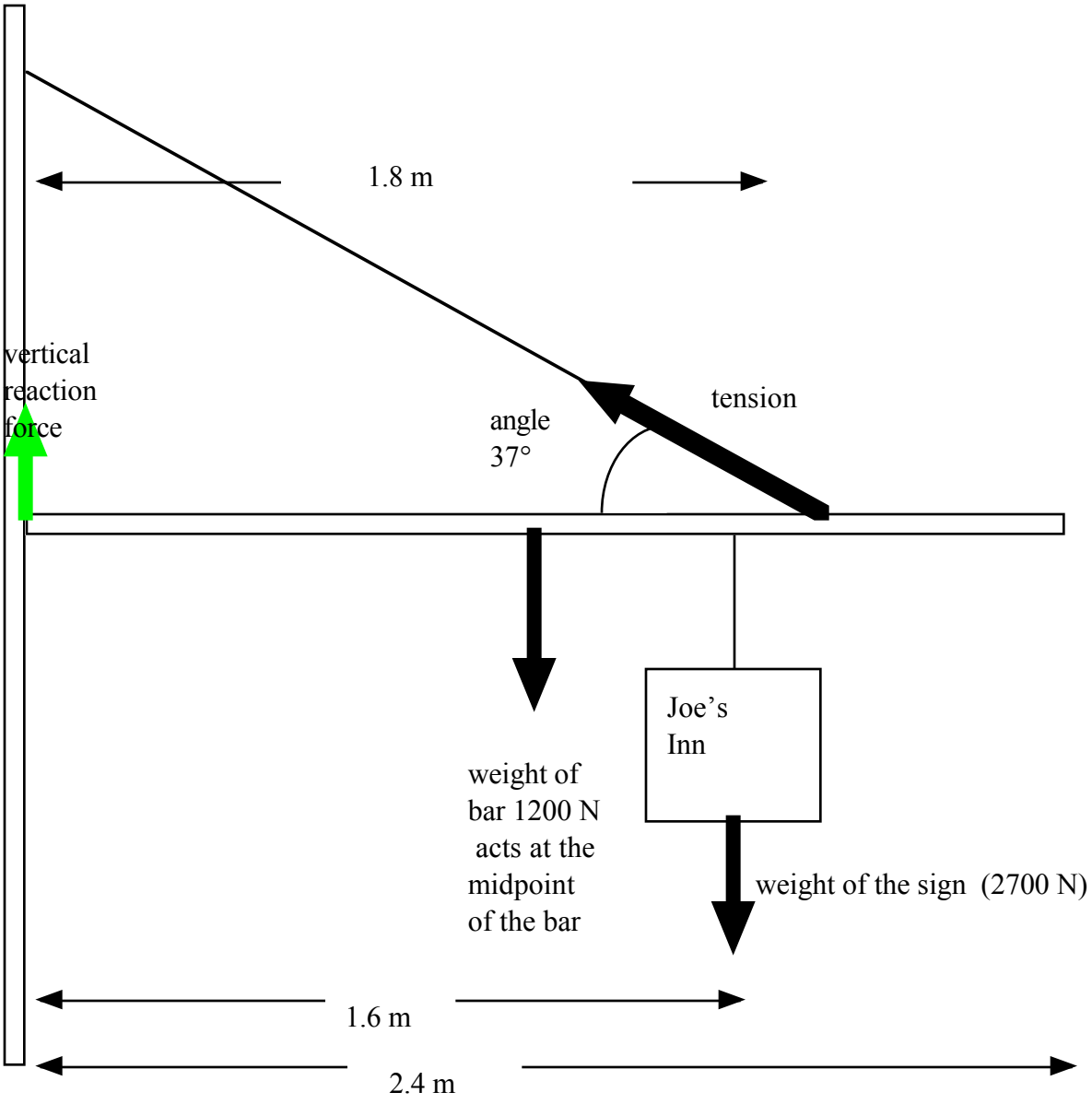
(b) How long would it take the car to travel 700 miles on the highway?

(c) How much energy (in joules) would an electric motor providing 25 horsepower use in driving the car 700 miles?

(d) If the car used a gasoline engine that gave it 30 miles/gal and gas was $0.29 per

gallon (like it did when I was your age sucka!!!), how much would it cost to drive the car 700 miles?

(e) If it cost $0.12 per kwh to charge the car's electric system and the car ran off an electric motor, how much would it cost to run the car for 700 miles.



7. Find the tension in the wire by setting the sum of the torques to zero.

8. Find the vertical reaction force by setting the sum of the forces in the **j** direction to zero.

$$\Sigma F_j = 0$$

This means that the sum of the forces in the **j** direction (the vertical , y direction) must be equal to zero

Answers:

1) a. 7.6×10^6 joules b. 2.1 2) (a) 6.9×10^{-2} joules (b) 4.6 watts

3) (a) 1.3×10^5 watts and 22 m/s (b) 5.9×10^3 newtons (c) 3.9 m/s^2

(d) 0.40 g's

4) 220 radians (b) 2.1×10^4 joules (c) 464 watts

5) $183.00

6 (a) 1.9×10^4 J (b) 3.9×10^4 s (10.8 hours) (c) 7.4×10^8 joules (206 kwh)

(d) $6.77 (e) $25.00

7. 5.3×10^3 newtons

8. 700 newtons (it points up)