

Total time: 1 hr Total Points: 10 pt**Student Name:**

Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page.

$$\text{speed} = \frac{\text{distance}}{\text{time}} \quad \text{velocity} = \frac{\text{displacement}}{\text{time}} \quad \text{acceleration} = \frac{\text{change in velocity}}{\text{time}}$$

$$\text{velocity} = \text{initial velocity} + \text{acceleration} \times \text{time}$$

$$\text{work} = (\text{force})(\text{distance}) \quad \text{power} = \frac{\text{work}}{\text{time}} \quad \text{K.E.} = \frac{1}{2}mv^2 \quad \text{P.E.} = mgh$$

$$\text{Hydraulic Lift: } \frac{F_1}{A_1} = \frac{F_2}{A_2}$$

$$\text{Ohm's Law } I = \frac{E}{R} ; \text{ Power } P = \frac{\text{energy}}{\text{time}} \quad P = IV = I^2R = \frac{E^2}{R}$$

- (1.0 pt) 1. You are driving at 45 mph on the freeway. How much distance do you travel in 3.0 hours?

Solution: 135 mi

- (1.0 pt) 2. How long will it take you to travel 150 mi if you maintain a constant speed of 65 mph?

Solution: 2.3 hr

- (1.0 pt) 3. You are driving at 10 m/s (about 23 mph) and you want to increase the speed to 20 m/s (about 45mph) . You press the gas pedal and the car begins the acceleration at 1.2 m/s². What is your speed after 3.0 seconds?

Solution: 13.6 m/s

- (1.0 pt) 4. How much energy in Joules can a 200-W motor deliver in 5 minutes?

Solution: 60, 000 J

- (1.0 pt) 5. If you run a 350-W engine for 1 hr, how much energy in Joules have you consumed.

Solution: 1.26 Mega Joules

- (1.0 pt) 6. In a hydraulic system a 10.0-lb force is applied to the small piston with cross-sectional area of 5.0 in^2 . What force is exerted by the large piston with area 144 in^2 on the other end?

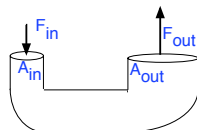


Figure 1: Hydraulic lift.

Solution: 288 lb

- (1.0 pt) 7. You want to lift 500 lb with the hydraulic system on the picture above. The area of the small piston is 5.0 in^2 and the area of the big one is 121 in^2 . With what force do you have to push on the small piston?

Solution: 20 lb

- (1.0 pt) 8. 0.5 mA current flows through a load that is connected to a 12.6-V battery. What is the power in the load?

Solution: 6.3 mW

- (1.0 pt) 9. A 60-W lightbulb is connected to the electrical outlet (110 V). How much is the current through it?

Solution: 0.545 A

- (1.0 pt) 10. A 100-W lightbulb is connected to the electrical outlet. How much energy does it consume in 10 min?

Solution: 60 kJ