

Practice Test#4
Engineering and Physics Review Part I

1. A tower crane must lift a load weighing 1500 lbs. Its counterweight is located 60 feet from the mast. If the load is lifted about 100 feet from the mast, how much counterweight in pounds is required?

2. A demolition crane holds a 15 short ton solid ball for tearing down walls. At a height of 50 feet, how much potential energy does it possess?

3. During an accident investigation, an engineer, reviewing the damaged structure, estimated that approximately $150,000 \text{ ft-lbs/sec}^2$ of force had impacted into a store's structure. If the car involved weighed 2200 lbs, how fast in miles per hour must the car have traveled when it crashed?

- ~~4. A warehouse has a 1,000 lb forklift, which can exert 1,000 lbs onto any load. There is a 5 degree ramp with a coefficient of friction of 0.15. What is the maximum load that the forklift can keep an object from slipping off a ramp?~~
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5. As a safety officer on-site, a supervisor comes to you to advise that he wants 2500 lbs of steel girter lifted onto a commercial building under construction. The tower crane on-site has a counterweight of 20 short tons located 55 feet from the mast. What is the maximum distance from the mast that the load can safely be lifted?

6. Using Problem# 5, the supervisor needs the 2500 lbs of steel girter transported at an area requiring the tower crane to reach 200 feet from its mast. Given the information in Problem#5, is that OK.

~~7. A 2000-lb forklift is holding an object on ramp, which is inclined about 2.5 degrees. The coefficient of friction is 0.10. How much must this object weigh, in pounds?~~

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8. In another vehicle accident investigation, an engineer estimates that the structural damaged was caused by about 135,000 ft-lb per sec² of energy. The car involved was estimated to have traveled 85 miles per hour. How much did the car weigh? (hint: not the mass, the weight).

9. Using Problem#8 above, what is the equivalent height needed, if you raised the car and dropped it, in order to attain the same kinetic energy?

10. A tower crane has a standard counterweight of 345,000 ft-lbs with a distance of 20 feet from the tower's mast. Is it sufficient to lift a 12,000 lb load at a distance of 40 feet from the mast? If not, how much additional counter moment, in ft-lbs, is required?

11. A wheeled cart requires about 25 lbs of pushing force to move a load weighing 450 lbs. The cart weighs 135 lbs. What is the coefficient of friction of the ground? (Obviously, assume that this ground is level.)

12. A truck weighing 10,000 pounds is traveling at 65 miles per hour. How much kinetic energy is being developed?

13. What force is required to keep a load weighing 200 lbs from moving down a ramp, which is inclined at 3 degrees and has a coefficient of friction of .13?

14. How much force in Problem#13 is required to push the load up this ramp?

15. Using Problem#13, except this time, you have a 350 lb load, how much force is needed to push it up the ramp?