1. Three cable forces act on an eyebolt. The magnitude of force $P$ is 946 lb. The magnitude of the resultant of the three forces is:
   A. 0 lb  B. 254 lb  C. 400 lb  D. 454 lb  E. 600 lb  F. 1000 lb

2. The pulley at D is frictionless and the cylinder weighs 100 lb. The tension in the cable is:
   A. 86.6 lb  B. 93.2 lb  C. 100 lb  D. 137.2 lb

3. The vertical reaction at Point A is 6.67kN upward. The vertical reaction at Point E is 7.33kN upward. The force in member CF is:
   A. 0.67kN T  B. 0.67kN C
   C. 0.77kN T  D. 0.77kN C
   E. 1.34kN T  F. 1.34kN C
   Hint: All triangles are equilateral triangles.

4. The magnitude of the moment of the force $F = [(50i + 100j) - 50k]N$ acting about the line going from B to A is:
   A. 15N·m  B. 30N·m  C. 33.5N·m  D. 36.7N·m
5. The magnitude of the vertical reaction at Point A is:
   A. 577 N    B. 727 N
   C. 1000 N   D. 1154 N

6. The 12 lb force $F_{AB}$ expressed as a Cartesian vector is:
   A. $-9.62\hat{i} + 3.21\hat{j} + 6.41\hat{k} \text{ lb}$
   B. $-9.62\hat{i} + 4.61\hat{j} + 6.14\hat{k} \text{ lb}$
   C. $-9.62\hat{i} + 6.41\hat{j} + 3.21\hat{k} \text{ lb}$
   D. $-6.04\hat{i} + 3.21\hat{j} + 9.70\hat{k} \text{ lb}$

7. The boy throws the ball at an angle $\theta_A = 45^\circ$ with a speed of 16.3 m/s. The time it takes for the ball to hit the ground at point B is:
   A. 0.19 sec   B. 0.65 sec
   C. 1.53 sec   D. 2.17 sec

8. The man pushes on the 60 lb crate with a force of 66 lb. This force is sufficient to overcome static friction; hence the crate is moving. The coefficient of kinetic friction between the crate and the floor is $\mu = 0.30$. The acceleration of the crate is:
   A. 0          B. 15.7 ft/s$^2$
   C. 20.4 ft/s$^2$
   D. 21.0 ft/s$^2$   E. 25.8 ft/s$^2$
9. A railroad car having a mass of 16 Mg is coasting at 0.6 m/s on a horizontal track. Behind this car is a 6 Mg railroad car which is coasting at 0.8 m/s. The cars meet and couple together. The speed at which both cars are moving after coupling together is:
A. 0.22 m/s  
B. 0.65 m/s  
C. 0.74 m/s  
D. 0.0 m/s

10. Block A is accelerating upward at 2 ft/s². Block C is also accelerating upward at 2 ft/s². The acceleration of block B is:
A. 0  
B. 2 ft/s² up  
C. 2 ft/s² down  
D. 4 ft/s² up  
E. 4 ft/s² down

11. The 1700 kg sports car is traveling horizontally along a banked track which is circular and has a radius of curvature of ρ = 100 m. The car is traveling at a constant speed of 20 m/s. The angle θ to make the friction force zero should be:
A. 0°  
B. 1.2°  
C. 7.1°  
D. 23.2°  
E. 24.1°  
F. 65.9°

12. Block B has a mass of 0.75 kg and is sliding on the smooth surface with a velocity of +4.0 m/s. It strikes the 2 kg block A, which is originally at rest. The coefficient of restitution between the two blocks is 0.60. The velocity of block B just after the collision is:
A. +0.65 m/s  
B. -0.65 m/s  
C. +0.87 m/s  
D. -0.87 m/s  
E. +1.09 m/s  
F. -1.09 m/s  
G. +2.84 m/s  
H. -2.84 m/s
13. The refrigerator has a weight of 180 lb and rests on a tile floor for which $\mu_s = 0.25$. The man has a weight of 150 lb and the coefficient of static friction between the floor and his shoes is $\mu_s = 0.60$. Assume the refrigerator does not tip. The maximum force with which the man can push on the refrigerator is:
A. 37.5 lb  
B. 45 lb  
C. 67.5 lb  
D. 90 lb

14. The 0.50 kg ball is fired up the smooth vertical circular track using a spring plunger. The spring plunger has a stiffness of 500 N/m and is uncompressed when $s = 0$. The spring is pulled back so the value of $s$ is 0.30 m. The velocity of the ball at point B is:
A. 3.58 m/s  
B. 6.31 m/s  
C. 6.77 m/s  
D. 7.78 m/s

15. The girl throws the 0.5 kg ball toward the wall with an initial speed of 10 m/s. The coefficient of restitution between the ball and the wall is $e = 0.50$. The maximum height above the ground that the ball reaches after bouncing off the wall at Point B is:
A. 2.36 m above ground
B. 2.77 m above ground
C. 5.32 m above ground
D. 6.6 m above ground