1. (10 pts) Governor Haslam (160 pounds) is riding in an elevator. He is standing on a scale that reads 190 pounds. Determine the magnitude and direction (up or down) of the acceleration of the governor. (FBD=KD required)

2. (10 pts) A 35 pound box of portfolios is being pushed across the floor with a constant velocity. Determine the coefficient of kinetic friction. (FBD required)

3. (14 pts) A tennis ball is shot as a projectile. 0.8 seconds after it is launched the ball is 15 ft above and 20 ft to the right of where it was launched. Determine the magnitude of the initial velocity of the tennis ball. (Neglect air resistance)

4. (14 pts) An airplane is flying on a heading of 15° West of North relative to the air. A person on the ground observes the plane to fly at 100 mph at 30° East of North. The direction of the wind is 10° North of East. Determine the speed of the wind. To receive full credit, a complete vector diagram (with arrows) must be drawn with all vectors labeled and known magnitudes and angles shown.
5. (14 pts) Derek Dooley is pulling two carts that are connected to together. The coupling force between the two carts is 12N. Determine the force, P, with which Derek is pulling on the carts. (2 FBDs and KDs required)

![Diagram of two carts connected by a coupling force of 12N.]

6. (14 pts) A 40 pound box is pulled across the floor as shown. A force of 22 pounds is required to start the box moving. Determine the coefficient of static friction. (FBD required)

![Diagram of a 40 lb box being pulled with a force of 22 lb at an angle of 25 degrees.]

7. (14 pts) A cart with 6 GTAs (1300 lb total weight) is speeding down a 10% decline at 88 ft/s. A 50 lb braking force is applied. Determine their speed after the brakes have been applied for 5 seconds. (Hint: constant acceleration) (FBD=KD required)

![Diagram of a cart with 6 GTAs moving down a 10% decline at 88 ft/s with a braking force of 50 lb applied.]

Write the correct answer.

8. (2 pts) When a falling object reaches terminal velocity, what two forces are equal in magnitude?

Circle the correct answers.

9. (2 pts) Which property of an object does not affect the drag force it experiences when moving through the air? Cross-sectional area Velocity Mass Surface roughness Shape

10. (2 pts) A car starts from rest and accelerates to the left. What direction is the force between the tires and the ground? Left Right There is no force unless the tires spin Impossible to determine.

11. (2 pts) Two tug-of-war opponents each pull with a force of 100 lb on opposite ends of a rope. What is the tension in the rope?

<table>
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<th>Force (lb)</th>
<th>0 lb</th>
<th>50 lb</th>
<th>100 lb</th>
<th>150 lb</th>
<th>200 lb</th>
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<tbody>
<tr>
<td>Tension</td>
<td></td>
<td></td>
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12. (2 pts) A fly collides with a bus – which one experiences the greater impact force?

Fly Bus Both the same Depends upon the speeds