Pop Quiz Questions

Week #1:

1. What is the name of the instructor for this section of P3A?
2. What items will be used to determine your grade?
3. Who has to "walk through the door"?
4. What are the units in the SI system?
5. What starts with an “e”, ends with an “e” and contains only one letter?

1. How many significant digits are in:
   a. 127 001 889 000?  b. 0.0004790?  c. 9.880 x 1012?
2. What are the "dimensions" of kinetic energy if it is computed from:

   \[ K.E. = \frac{1}{2} m v^2 \]

   where \( m \) is the amount of matter in the object and \( v \) is its velocity.
3. Name a class of motion where a Cartesian coordinate would be easiest to use to describe it. What are its coords?
4. What about a plane polar coordinate system?
5. What is everyone in the world doing at the same time?

1. Can you ever have two vectors add together to give 0? (if so, is the result a vector or scalar?)
2. You are in a car which is accelerating at 10 km/hr/sec. Hanging out the window, you throw a tennis ball in the forward direction at 50 km/hr which then hits your physics instructor on the head. At what speed is the ball traveling when it hits me? (ignore friction)
3. Using a graphical method, find the resultant of the following vectors:
4. When are two vectors equal?
5. What question can you never answer “yes” to?

Week #2

1. What are the 3 unit vectors, and their directions, used in “unit-vector-notation”?
2. What are the advantages of adding vectors through their
1. Components over adding vectors graphically?
2. How do you determine the “amount” of vector A that points in the direction of vector B?
3. Can the magnitude of the displacement vector of an object ever be equal to the distance the object moves during the displacement?
4. Who makes it, has no need of it.
   Who buys it, has no use for it.
   Who uses it can neither see nor feel it.

1. Is the instantaneous velocity ever "always" equal to the average velocity?
2. How can you extract the average velocity from a plot of position versus time? How about the instantaneous velocity?
3. What does the plot of x versus t look like for constant velocity? How about for non-constant velocity?
4. For a given object, can the average velocity vector be 0 and the average speed be non-zero?
5. Whoever makes it, tells it not.
   Whoever takes it, knows it not.
   And whoever knows it wants it not.

1. If the instantaneous velocity is equal to the average velocity over the full time interval, what can you say about the average acceleration?
2. If the acceleration vector points in the same direction as the velocity vector, what can you say about changes in the velocity vector?
3. Referring to diagram on chalkboard, state info about the displacement, velocity and acceleration vectors at points A, B, C, D, E, F.
4. Can the average velocity be zero over some time interval and the acceleration be non-zero? Can the acceleration be non-zero and the speed be constant?
5. My love, when I gaze on thy beautiful face,
   Careening along, yet always in place --
   The thought has often come into my mind
   If I ever shall see thy glorious behind.   (Sir Edmund Gosse)

Week #3:

1. If a car is "de-accelerating", what can you say about the car's velocity and acceleration vectors?
2. Can you compute the velocity of a ball which was thrown upward, just from how high it went? (assume on earth)
How?

3. If \( x(t) = 3.5 - 25.1t + 7.8 t^2 - 2.1t^3 \) describes the position of an object as a function of time, is the object undergoing constant acceleration motion?

4. Ball A is thrown upward with the same speed with which ball B is thrown downward. What are the directions of the accelerations of both balls after the leave the person's hands?

5. If you break me, I do not stop working.
   If you touch me, I may be snared
   If you lose me, nothing will matter.

1. In 2-D motion, what is the position vector?

2. If the position vector's magnitude is constant, describe the motion. How about if its direction is constant? Both?

3. If the x-component of the position vector of an object at a specific time is zero, then is the x-component of its instantaneous velocity zero also at that time?

4. Can you determine if the 2-D acceleration of an object is non-zero, just by looking at its position vector? How about constancy of \( a \)?

5. What flies when its on, and floats when its off?

1. Can an object have a non-zero acceleration and a constant speed? or a constant velocity?

2. How is the velocity changing if the acceleration vector is perpendicular to the velocity vector? parallel to the velocity vector?

3. You throw ball A with velocity \(|v_A|\) at an angle relative to horizontal and it lands \( R \) meters away and spends \( t \) seconds in the air. If you throw ball B at the same angle but with velocity \(|v_B|\) which is double \(|v_A|\), how far does ball B go horizontally and how long does it spend in the air?

4. Where along the path of a projectile is the velocity vector perpendicular to the acceleration vector? Where parallel?

5. What runs but never walks and has a mouth but never talks?

Week #4:

1. How does the velocity of an object change which is undergoing uniform circular motion?

2. Is all motion around a circle "uniform circular motion"?

3. If the magnitude of a object's velocity is not changing, but its direction is, what can you say about the object's radial and tangential acceleration?
4. Glittering points
   That downward thrust,
   Sparkling spears
   That never rust.

1. Why do people feel more safe driving SUV's instead of more efficient smaller cars?
2. Why do people who drive more efficient smaller cars feel less safe with larger SUV's on the road?
3. Suppose a bowling ball has been thrown at you. Is it better to stop the bowling ball over a short period of time or over a long period of time?
4. T F For one object to exert a force on another object it is necessary for them to be in contact.
5. What can you put in a barrel and make it lighter?

Week #5:

1. If a sports car collides with a dump truck, which vehicle experiences the greater force? Which experiences the greater acceleration?
2. Image a book sitting on a desk in your room. List all the forces exerted on the book and desk. Which are normal forces? Which are contact forces?
3. A baseball of mass m is thrown vertically upward. What is the magnitude of the force on the ball (a) when it reaches half its maximum height and (b) when it reaches its peak?
4. If a body is de-accelerating what can you say about the directions of the body's velocity, acceleration and net applied force?
5. Whilst I was engaged in sitting
   I spied the dead carrying the living.

1. T F A box is sliding across the floor. You apply a horizontal force to the box. Friction is always opposite the direction you are pulling on the box.
2. You and your friend need to push a box across the floor (you work at "Boxes-R-Us", obviously). However, the frictional force between the box and floor is too large. How can you decrease the frictional force so you can move the box?
3. In class I said a car relies on frictional forces to move (between the wheel and road). Is this force given by $s$ or $k$?
4. Why is the frictional force not dependent on area of the surfaces in contact?
5. Friction effects impending or actual motion. Houses are not usually in motion, so why would a house fall apart without friction?

1. You carelessly drop a marble into a bucket of syrup at your IHOP job. The marble enters the syrup at a speed greater than the terminal speed. What can you say about the net force on the marble just after it enters the syrup?

2. Why does a skydiver accelerate upward just after he opens his parachute?

3. On your wedding night you open a bottle of Champaign and the quark goes flying out at an angle smaller than 45 degrees relative to horizontal. Waiting for your new wife to change, you ask yourself the question "Is the resistive force greater in the horizontal or the vertical direction?" Your answer is?

4. Do you think the terminal speed of the space shuttle is constant as it returns from space, once it is in the atmosphere?

5. Mr & Mrs. Smith have 2 kids. You ring their doorbell and one of them, a girl answer's it. What is the probability that the other kid is a girl?

Week #6:

1. Why are door handles placed far from the hinges on doors?

2. In the figure below, what must $F_2$ be so the object does not rotate?

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\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure.png}
\caption{Object and forces diagram}
\end{figure}
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3. Consider a meter stick floating in space away from all material bodies and is not rotating. Is there a location along the stick where single force can act perpendicular to the stick and the stick remain rotationally still? How about if the force acts parallel to the stick?

4. How does a bicycle move forward?

Week #7:

1. A ball tied to a string undergoes uniform circular motion
1. If you transfer energy into a system, does the kinetic energy always increase?
2. If the speed of an object doubles, how does the kinetic energy change?
3. Does a stiff spring store more work on an object than a less stiff spring?
4. Two objects have the same kinetic energy. One is hard, the other is soft. Which would you rather be hit by and why?

Week #8:

1. If a positive net work is done on a system, does the system's kinetic energy always increase?
2. Consider one full swing of a pendulum. Is the net work done by gravity: negative, positive, or zero?
3. When is the work done by a force NOT equal to the dot product of the force and the displacement?
4. You lift your pet gorilla (m=250 kg) from the floor to a 2 meter height at a constant speed of 0.5 m/s. Let the system be the gorilla. You have done a huge amount of work on the system. Where did the energy go?
5. A man in a restaurant asked for a glass of water with a twist of lemon from the waiter. The waiter pointed a gun at him. Surprised at first, then shocked, followed by a moment or two of stark terror, the man finally comprehended. He said thank you to the waiter, and smiling, continued eating his food. Why did the waiter point a gun at the man?

1. Day-dreaming in your P3A lecture again you think back to your 5th grade gym class where you had to climb up a rope to the ceiling. If you climbed up the rope at a constant speed, where did all that energy you output go to? Once you were at the top, you quickly slid back down at a constant speed. Where did all the energy go to again?
2. How does a hybrid Ford Escape get better gas mileage than a regular Ford Escape?
3. You drop an egg from the middle of a ladder at a height $h$ and it hits the top of your friend’s head with a speed $v$. Next you climb to the top of the ladder and drop another egg from a height $2h$. With what speed does the second egg hit your friend?

4. Where in a pendulum’s swing is the velocity maximum? Where is it half the maximum?

5. Here on earth it is true, yesterday is always before today; but there is a place where yesterday always follows today. Where?

Week #9:

1. Which experiences a larger impulse, a clay ball of mass $m$ thrown at a wall with initial speed $v$ and the clay ball sticks, or a rubber ball with mass $m$ and initial speed $v$ which bounces of the wall with final speed $v$ backward? Why?

2. T F The force applied to an object is always parallel to the momentum of the object.

3. You have just built your first model rocket. Which of the following engines would send you rocket to a greater altitude? (ignore air resistance)

4. In boxing matches of the 19th century, bare fists were used. In modern boxing, fighters wear padded gloves. How does this better protect the brain of the boxer from injury?