This print-out should have 39 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

This is the second part of your review. Print this and bring it to class.

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001 (part 1 of 2) 10 points

If a golf ball and a ping-pong ball both move with the same kinetic energy, which has the greater speed?

1. the ping-pong ball

2. The two balls have the same speed.

3. Cannot be determined

4. the golf ball

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002 (part 2 of 2) 10 points

In a gaseous mixture of massive molecules and light molecules with the same average KE, which have the greater speed?

1. They have the same speed.

2. the massive molecules

3. the light molecules

4. Cannot be determined

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003 (part 1 of 1) 10 points

Does the KE of a car change more when it accelerates from 35 km/h to 45 km/h or when it accelerates from 45 km/h to 55 km/h?

1. No difference

2. More information is needed.

3. From 35 km/h to 45 km/h

4. From 45 km/h to 55 km/h

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004 (part 1 of 1) 10 points

A moving car has kinetic energy.

If it speeds up until it is going four times faster than before, how much kinetic energy does it have in comparison?

1. The mass is needed.

2. Sixteen times smaller

3. Four times smaller

4. Sixteen times larger

5. Four times larger

6. The same

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005 (part 1 of 1) 10 points

The amount of work done by two boys who apply 340 N of force in an unsuccessful attempt to move a stalled car is

1. 0.

2. 680 N-m.

3. 340 N-m.

4. 680 N.

5. 340 N.

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006 (part 1 of 2) 10 points

A horizontal force of 151 N is used to push a 49.0 kg packing crate a distance of 7.00 m on a rough horizontal surface.

The acceleration of gravity is 9.81 m/s^2 .

If the crate moves with constant velocity, calculate

a) the work done by the force. Answer in units of J.

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007 (part 2 of 2) 10 points

b) the coefficient of kinetic friction.

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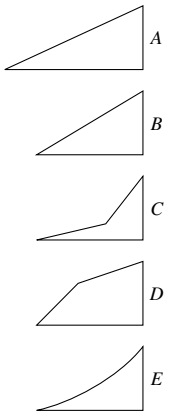
008 (part 1 of 1) 10 points

Five ramps lead from the ground to the second floor of a workshop, as sketched below. All

five ramps have the same height; ramps B, C, D and E have the same length; ramp A is longer than the other four. You need to push a heavy cart up to the second floor and you may choose any one of the five ramps.



Assuming no frictional forces on the cart, which ramp would require you to do the least work?

1. Ramp D.

2. Ramp A.

3. Unable to determine without knowing the exact profiles of ramps C, D or E.

4. Ramp E.

5. Same work for the straight ramps A and B; less work for ramps C, D, and E.

6. Same work for ramps B, C, D or E; more work for ramp A.

7. Ramp B.

8. Same work for all five ramps.

9. Ramp C.

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009 (part 1 of 2) 10 points
Assume your mass is 86 kg. The acceleration due to gravity is 9.8 m/s^2.

How much work against gravity do you do when you climb a flight of stairs 2 m high? Answer in units of J.

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010 (part 2 of 2) 10 points
Consider the energy consumed by a 200 W light bulb in an hour.

How many flights of stairs would you have to climb to equal the work of the lightbulb?

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011 (part 1 of 1) 10 points
Two construction cranes are each able to lift a maximum load of 25000 N to a height of 100 m. However, one crane can lift that load in $\frac{1}{5}$ the time it takes the other.

How much more power does the faster crane have?

1. 25

2. Unable to determine.

3. $\frac{1}{5}$

4. $\frac{1}{25}$

5. 5

6. 1

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012 (part 1 of 2) 10 points
A 1.92×10^3 kg car accelerates uniformly from rest to 12.3 m/s in 3.63 s.

a) What is the work done on the car in this time interval? Answer in units of J.

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013 (part 2 of 2) 10 points
b) What is the power delivered by the engine in this time interval? Answer in units of W.

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014 (part 1 of 1) 10 points
A kilowatt-hour is a unit of

1. None of these

2. power

3. voltage

4. torque

5. current

6. work

7. force

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015 (part 1 of 1) 10 points
The unit of power is the

1. Joule.

2. Coulomb.

3. Newton.

4. Watt.

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016 (part 1 of 2) 10 points
Consider the following systems:
I) water behind a dam;
II) a swinging pendulum;
III) an apple on an apple tree;
IV) the space shuttle in orbit.
In which of the systems is potential energy present?

1. I, II, III and IV

2. I, II and III

3. II, III and IV

4. II and IV

5. I and II

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017 (part 2 of 2) 10 points
In which of the systems is kinetic energy present?

1. I and II

2. I, II and III

3. II, III and IV

4. II and IV

5. I, II, III and IV

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018 (part 1 of 3) 10 points
At what point in its motion is the KE of a pendulum bob a maximum?

1. at the highest point

2. The KE does not change.

3. at the lowest point

4. midway between the highest and lowest points

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019 (part 2 of 3) 10 points
At what point is its PE a maximum?

1. The PE does not change.

2. at the highest point

3. at the lowest point

4. midway between the highest and lowest points

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020 (part 3 of 3) 10 points
When its KE is half of its maximum value, how much PE does it have?

1. its maximum value

2. the same as its PE at any other point.

3. half of its maximum value

4. its minimum value

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021 (part 1 of 1) 10 points
Three identical balls are thrown from the top of a building, all with the same initial speed. The first ball is thrown horizontally, the second at some angle above the horizontal, and the third at some angle below the horizontal.
Neglecting air resistance, rank the speeds of the balls as they reach the ground, from the slowest to the fastest.

1. 2, 3, 1

2. All three balls strike the ground with the same speed

3. 2, 1, 3

4. 1, 3, 2

5. 3, 1, 2

6. 3, 2, 1

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022 (part 1 of 1) 10 points

If a moving object doubles its speed, how much more momentum does it have? How much more kinetic energy?

1. Unable to determine

2. Momentum doubles; kinetic energy won't change.

3. Momentum won't change; kinetic energy doubles.

4. Both will remain the same.

5. Both will double.

6. Momentum doubles; kinetic energy will increase by four times.

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023 (part 1 of 1) 10 points

If you throw a raw egg against a wall, you'll break it, but if you throw it with the same speed into a sagging sheet it won't break. Why?

1. The sheet is much slicker than the wall.

2. The velocity of the egg decreases faster in the sheet than on the wall.

3. The impact time when the egg strikes a sagging sheet is long, so the impact force is small.

4. The breaking egg causes a larger impact time, decreasing the force.

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024 (part 1 of 1) 10 points

Think fast! You've just driven around a curve in a narrow one-way street at 25 mph when you notice a car identical to yours coming straight toward you at 25 mph. You have only two options: hitting the other car head on or swerving into a massive concrete wall, also head on.

Which course will cause the least damage to you?

1. hit the other car

2. hit the wall

3. consult your lecture notes

4. hit either one - it makes no difference

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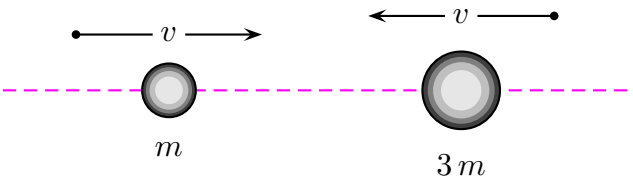
025 (part 1 of 1) 10 points

Two particles of masses m and $3\,m$ are moving toward each other along the x-axis with the same speed v. They undergo a head-on elastic collision and rebound along the x-axis.



Determine the final speed of the heavier object.

1. $v'_{3m} = \frac{2}{3}\,v$

2. $v'_{3m} = v$

3. $v'_{3m} = 3\,v$

4. $v'_{3m} = 0$

5. $v'_{3m} = \frac{1}{2}\,v$

6. $v'_{3m} = \frac{3}{2}\, v$

7. $v'_{3m} = \frac{1}{3}\, v$

8. $v'_{3m} = 2\, v$

9. $v'_{3m} = 4\, v$

10. $v'_{3m} = \infty$

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026 (part 1 of 1) 10 points

You are given two carts, A and B. They look identical, and you are told that they are made of the same material. You place A at rest on an air track and give B a constant velocity directed to the right so that it collides elastically with A. After the collision, both carts move to the right, the velocity of B being smaller than what it was before the collision.

What do you conclude?

1. Cart A is hollow

2. need more information

3. The two carts are identical

4. Cart B is hollow

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027 (part 1 of 1) 10 points

According to some nineteenth-century geological theories (now largely discredited), the Earth has been shrinking as it gradually cools.

If so, how would g have changed over geological time?

1. It would increase; g is inversely proportional to the square of the radius of the Earth.

2. It would decrease; the Earth's radius is decreasing.

3. It would not change; the mass of the Earth remained the same.

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028 (part 1 of 1) 10 points

How does the force of gravity between two bodies change when the distance between them doubles?

1. drops to one quarter of its original value

2. remains the same

3. Unable to determine; the mass is needed.

4. quadruples

5. halves

6. doubles

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029 (part 1 of 1) 10 points

Two balls, each with a mass of 0.852 kg, exert a gravitational force of 8.47×10^{-11} N on each other.

How far apart are the balls? The value of the universal gravitational constant is 6.673×10^{-11} N m^2/kg^2. Answer in units of m.

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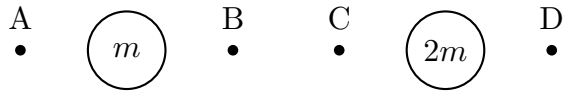
030 (part 1 of 1) 10 points

Two planets with the same diameter are close to each other, as shown. One planet has twice the mass as the other planet.



At which locations would both planets' gravitational force pull on you in the same direction? From among these four locations, where would you stand so that the force of gravity on you is a maximum; *i.e.*, at which point would you weigh the most?

1. B and C; D

2. A and D; D

3. D; D

4. C; A

5. A and D; A

6. None of these

7. B and C; C

8. A and B; D

9. B; D

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031 (part 1 of 1) 10 points

The Earth and the moon are attracted to each other by gravitational force.

The more massive Earth attracts the less massive moon with a force that is (greater than, less than, the same as) the force with which the moon attracts the Earth.

1. Unable to determine

2. less than

3. greater than

4. the same as

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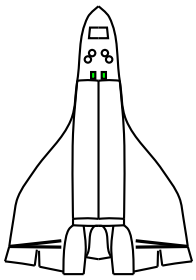
032 (part 1 of 1) 10 points

When at rest on the launching pad, the force of gravity on the space shuttle is quite huge.

When in orbit, some 360 km above Earth's surface, what is the force of gravity on the shuttle? Neglect changes in the weight of the fuel carried by the shuttle.



1. zero

2. nearly as much

3. about half as much

4. nearly zero (micro-gravity)

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033 (part 1 of 1) 10 points

The environment in a satellite or space station orbiting the Earth is often referred to as *weightless* environment; however, we have defined *weight* as the force of gravity on an object.

In this sense, what statement is not correct concerning an object on board an orbiting satellite?

1. There is a force of gravity on the object.

2. We refer to the object in orbit as weightless because it is accelerating toward the Earth, but it is not actually weightless.

3. The weight of an object in orbit is only a few percent less than it is on the Earth.

4. The object is weightless.

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034 (part 1 of 1) 10 points

If the earth were of uniform density, what would be the value of g inside the earth at half its radius? (The value of g at the surface of earth is 9.8 m/s^2.)

1. 9.8 m/s^2

2. 39.2 m/s^2

3. 19.6 m/s^2

4. 4.9 m/s^2

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035 (part 1 of 1) 10 points

Since the moon is gravitationally attracted to the Earth, why doesn't it simply crash into the Earth?

1. When the moon moves close to the Earth, the air on the Earth repels it.

2. The Sun attracts the moon so that the moon cannot move closer the Earth.

3. The moon does not have enough speed to

crash into the Earth.

4. The moon's tangential velocity keeps the moon coasting around the Earth rather than crashing into it.

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036 (part 1 of 1) 10 points

When the space shuttle coasts in a circular orbit at constant speed about the Earth, is it accelerating? If so, in what direction?

1. Yes; in a direction from the moon to the Sun.

2. No acceleration

3. Yes; in a direction from the Earth to the moon.

4. Yes; toward the Earth's center.

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037 (part 1 of 1) 10 points

If you stopped an Earth satellite dead in its tracks, it would simply crash into the Earth.

Why, then, don't the communications satellites that hover motionless above the same spot on Earth crash into the Earth?

1. The moon attracts the satellites at the same time.

2. The satellites are not attracted by the Earth.

3. There is no power on the satellites.

4. The satellites' orbital period coincides with the daily rotation of the Earth.

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038 (part 1 of 1) 10 points

If the Space Shuttle circled the Earth at a distance equal to the Earth-moon distance, how long would it take for it to make a complete orbit?

1. 365 days

2. 28 days

3. 7 days

4. 24 hours

5. 35 days

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039 (part 1 of 1) 10 points

Which are the correct statements regarding Kepler's laws?

A. They were obtained first by Tycho Brahe.
B. They were obtained by Kepler from Brahe's observations combined with Newton's second law.
C. They were deduced by Kepler from Brahe's observations.
D. They were derived by Newton from his gravitational and second laws.
E. They were derived by Newton using his gravitational and second law together with Brahe's data.

1. A and D

2. A, B, and C

3. B and E

4. C and E

5. B and D

6. A and E

7. C and D