Instructor(s): *Detweiler*

PHYSICS DEPARTMENT

PHY 2020 Test #3 October 28, 2015

Name (print, last first): _____ Signature: _____

On my honor, I have neither given nor received unauthorized aid on this examination.

YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.

(1) **Code your test number on your answer sheet (use lines 76–80 on the answer sheet for the 5-digit number)**. Code your name on your answer sheet. **DARKEN CIRCLES COMPLETELY**. Code your UFID number on your answer sheet.
(2) Print your name on this sheet and sign it also.
(3) Do all scratch work anywhere on this exam that you like. **Circle your answers on the test form.** At the end of the test, this exam printout is to be turned in. No credit will be given without both answer sheet and printout.
(4) **Blacken the circle of your intended answer completely, using a #2 pencil or blue or black ink**. Do not make any stray marks or some answers may be counted as incorrect.
(5) **The answers are rounded off. Choose the closest to exact. There is no penalty for guessing. If you believe that no listed answer is correct, leave the form blank.**
(6) Hand in the answer sheet separately.

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1. On your pink answer sheet, did you correctly bubble in your test number in rows 76–80, and also bubble in your name and your UF ID number? Also, did you print and sign your name at the top of your test, and will you hand in the "white sheets?" before leaving the room? This question counts, and the correct answer is "Yes".

   (1) Yes (2) No (3) X (4) X (5) X

2. As we learned, satellites are kept in orbit by the force of gravity. Thus the acceleration, in m/s^2, of a satellite in a very low orbit around the earth is about

   (1) 10 (2) 20 (3) 30 (4) 40 (5) 50

3. Ignore air resistance and friction for the next three problems. As a pendulum swings back and forth the kinetic energy is

   (1) Greatest at the bottom of the arc.
   (2) Greatest at the top of the arc.
   (3) Always the same.
   (4) X
   (5) X

4. And as a pendulum swings back and forth the potential energy is ...

   (1) Greatest at the top of the arc.
   (2) Greatest at the bottom of the arc.
   (3) Always the same.
   (4) X
   (5) X

5. Finally, as a pendulum swings back and forth the total energy is ...

   (1) Always the same.
   (2) Greatest at the bottom of the arc.
   (3) Greatest at the top of the arc.
   (4) X
   (5) X

6. The period, T, of a pendulum is related to its length, L, and the acceleration of gravity, g, by $T = 2\pi\sqrt{L/g}$. If the pendulum initially had a period of 1 second, and then we quadrupled (multiplied by 4) the length of the pendulum, then what is the new period, in seconds?

   (1) 2 (2) 1 (3) 1/4 (4) 1/2 (5) 4

7. A fast sprinter can run 100 meters in 10 sec. What is her average speed (in units of meters/second)?

   (1) 10 (2) 25 (3) 15 (4) 20 (5) 100

8. What would be her approximate time for running 1600 m, if she could keep up the same fast pace (in units of seconds)?

   (1) 160 (2) 320 (3) 240 (4) 80 (5) 16

9. When a ball is attached to a string and whirled around in a horizontal circle at a constant speed, the acceleration

   (1) depends upon the speed of the ball. (2) is zero. (3) depends upon the mass of the ball. (4) X (5) X

10. A collision occurs when a cart moves down an air track with a speed of 4 m/s and collides with a second, identical cart (having the same mass) which is initially at rest. The two carts stick together and subsequently move with a speed of half the original speed. This is an example of which law of physics?

    (1) The conservation of momentum.
    (2) The conservation of energy.
    (3) Newton's law of gravity.
    (4) F=ma.
    (5) Newton's first law.

11. In a demonstration in class I rolled a coffee can away from me on the lecture table. Its subsequent motion demonstrated which fundamental principle of physics?

    (1) The conservation of energy.
    (2) The conservation of momentum.
    (3) Newton's law of gravity.
    (4) Newton's second law, F=ma.
    (5) Galileo's principle of inertia.

12. A bullet is fired horizontally at a speed of 1000 m/s from a gun resting on a table. Simultaneously, a bullet is rolled off the side of the table. Which bullet hits the ground first? Ignore the curvature of the earth.

    (1) They hit the ground at the same time.
    (2) The one rolling off the table.
    (3) The one fired from the gun.
    (4) The one fired from the gun doesn't actually hit the ground; it goes into orbit around the earth.
    (5) The one rolling off the table defies gravity and flies higher into the air.

13. Newton's law of gravity states that there is a force of attraction between any two objects. As I stand on the earth, how does the magnitude of the force of gravity on me, from the earth, compare to the magnitude of the force of gravity on the earth, from me?

    (1) They are the same.
    (2) The force on me is greater than the force on the earth.
    (3) The force on the earth is greater than the force on me.
    (4) The force on me is zero.
    (5) The force on the Earth is zero.

14. A Mack Truck hits a Volkswagen Beetle in a collision. Compare the magnitudes of the forces on the truck and on the Beetle.

    (1) The forces have the same magnitude.
    (2) The force on the truck is bigger.
    (3) The force on the beetle is bigger.
    (4) X
    (5) X

15. When a ball on the end of a string whirls in a horizontal circle with a constant speed ...

    (1) there is a force of constant magnitude on the ball.
    (2) the energy of the ball is increasing.
    (3) the momentum of the ball is increasing.
    (4) the energy of the ball is decreasing.
    (5) the momentum of the ball is decreasing.

16. In the demonstration where the plastic milk jug shoots across the room, what fundamental principle of physics is being demonstrated?

    (1) The conservation of momentum
    (2) Kepler's laws
    (3) Newton's first law (an object at rest...)
    (4) Newton's law of gravity
    (5) The conservation of energy

17. Imagine that the Earth has a constant mass density everywhere, and that a tunnel went straight from the North Pole to the South Pole. If you dropped a stone into the tunnel starting at the North Pole, how long would it take for the stone to come out of the hole at the South Pole? Choose the closest answer.

    (1) 41.5 minutes (2) 166 minutes (3) 24 hours (4) 12 hours (5) 6 months

18. A balance beam 1 m long has a fulcrum in the middle. A 3 kg mass hangs at the far left hand end of the beam, and a 2 kg mass hangs at the far right hand end of the beam. Where on the beam should you hang a second 2 kg mass so that the arrangement of masses will balance. Give your answer as the distance as measured from the *center* of the beam.

    (1) 0.25 m (2) 0.5 m (3) 0.75 m (4) 0.4 m (5) 0.1 m

19. There is a metal spool on the desktop wrapped with a pink tape. When the tape is pulled to the right (from your point of view) the spool will roll to the:

    (1) right (2) left (3) it spins in place (4) it doesn't move at all (5) it lifts off the table

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20. A rock hangs at one end of a uniform meter stick. The meter stick has a mass of 1 kg and balances on a fulcrum at the 25 cm mark on the meter stick. What is the mass of the rock?

(1) 1 kg (2) 2 kg (3) 4 kg (4) x (5) Cannot be balanced.

THE FOLLOWING QUESTIONS, NUMBERED IN THE ORDER OF THEIR APPEARANCE ON THE ABOVE LIST, HAVE BEEN FLAGGED AS CONTINUATION QUESTIONS: 4 5 8