Instructor(s): *S. Obukhov*

PHYSICS DEPARTMENT

PHY 2020 Midterm Exam 2 October 19, 2016

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.

MULTIPLE CHOICE

Choose the one alternative that best completes the statement or answers the question.

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1. The power required to exert 4-N force over 3 meters in 2 seconds is

   (1) 6 W. (2) 8 W. (3) 12 W. (4) 4 W. (5) none of these

2. A 2-kg ball is held 4 m above the ground. Relative to the ground its potential energy is

   (1) 80 J. (2) more than 80 J. (3) 32 J. (4) 6 J. (5) 8 J.

3. Which has greater kinetic energy?

   (1) a car of half the mass traveling at 60 km/hr
   (2) both the same
   (3) a car traveling at 30 km/hr
   (4) none of these
   (5) need more information

4. Which requires the most amount of work by the brakes of a car?

   (1) slowing down from 100 km/h to 60 km/h
   (2) equal amounts for both
   (3) slowing down from 60 km/h to a stop
   (4) —
   (5) —

5. A light aluminum ball and a heavy lead ball of the same size roll down an incline. When they are halfway down the incline, they will have identical

   (1) none of these (2) potential energies. (3) kinetic energies. (4) momentum. (5) inertias.

6. A hydraulic jack is used to lift objects such as automobiles. If the input force is 200 N over a distance of 1 meter, the output force over a distance of 0.1 meter is ideally

   (1) 2000 N. (2) 1000 N. (3) 200 N. (4) 500 N. (5) none of these

7. Compared to the recoiling cannon, a fired cannonball has a

   (1) greater kinetic energy. (2) greater momentum. (3) smaller speed. (4) — (5) all of these

8. The circumference of a bicycle wheel is 2 meters. If it rotates at 1 revolution per second then its linear speed is

   (1) 2 m/s. (2) 3.14 m/s. (3) 1 m/s. (4) 3 m/s. (5) 6.28 m/s.

9. Consider two flywheels of the same size and shape, but one with twice the mass. Rotational inertia of the more massive one is

   (1) two times greater. (2) half. (3) the same as the other one. (4) four times greater. (5) —

10. A 1-kg rock is suspended from the tip of a horizontal meterstick at the 0-cm mark so that the meterstick barely balances like a seesaw when its fulcrum is at the 25-cm mark. From this information, the mass of the meterstick is

    (1) 1 kg. (2) 1/2 kg. (3) 1/4 kg. (4) 3/4 kg. (5) none of these.

11. If you balance a broom horizontally on one finger, the center of gravity of the broom will be above your finger, closer to the bristles end than the handle end. If you saw the broom in two pieces at that point and weigh the two parts on a scale, you'll find that the heavier part is the

    (1) bristles part. (2) handle part. (3) both the same weight (4) — (5) —

12. The force of Earth's gravity on a capsule in space increases as it comes closer. When the capsule moves to half its distance, the force toward Earth is then

    (1) four times greater. (2) twice. (3) three times greater (4) — (5) none of these

13. The planet Jupiter is about 300 times as massive as Earth, yet on its surface you would weigh only about 3 times as much because

    (1) Jupiter's radius is about 10 times Earth's radius.
    (2) Jupiter is significantly farther from the Sun.
    (3) you are 100 times more weightless there.
    (4) your mass is 100 times less on Jupiter.
    (5) none of these

14. During an eclipse of the Sun the high ocean tides on Earth are

    (1) extra high. (2) not significantly different. (3) extra low. (4) — (5) —

15. A ball is tossed upward. Neglecting air drag, the acceleration along its path is

    (1) g downward. (2) g upward, then g downward. (3) g upward. (4) none of these (5) $0\,g$.

16. It there were no gravity a stone thrown upward at 45 degrees would follow a straight-line path. But because of gravity, at the end of 1 second, the stone is actually

(1) 5 m below the straight line.
(2) 15 m below the straight line.
(3) 10 m below the straight line.
(4) —
(5) —

17. A lunar month is about 28 days. If the Moon were closer to Earth than it is now, the lunar month would be

(1) less than 28 days. (2) about 28 days. (3) more than 28 days. (4) need more information (5) —

18. Communications and weather satellites always appear at the same place in the sky, because these satellites are

(1) orbiting Earth with a 24-hour period.
(2) stationary in space.
(3) moving at a speed just short of escape velocity.
(4) beyond the pull of Earth's gravitational field.
(5) none of these

19. Atomic number refers to the number of

(1) protons in the nucleus. (2) nucleons in the nucleus. (3) neutrons in the nucleus. (4) — (5) —

20. Which of the following atoms has the most mass?

(1) uranium (2) hydrogen (3) lead (4) iron (5) all have the same mass

21. How many different kinds of elements are in a water molecule?

(1) two (2) none (3) four (4) one (5) three

22. When a chocolate bar is cut in half, its density is

(1) unchanged. (2) doubled. (3) halved. (4) — (5) —

23. A strong spring is stretched 10 cm by a suspended block. If the block's weight is doubled, the spring will stretch to

(1) 20 cm. (2) 40 cm. (3) its elastic limit. (4) 15 cm. (5) —

24. When a load is placed on the middle of a horizontal beam supported at each end, the top part of the beam undergoes

(1) compression. (2) tension. (3) either of these (4) none of these (5) —

25. Lillian sees a chair at the Exploratorium that has been scaled up by three. In attempting to lift it, she finds the chair is

(1) more than nine times as heavy. (2) six times as heavy. (3) nine times as heavy. (4) three times as heavy. (5) —

26. Eight little spheres of mercury coalesce to form a single sphere. Compared to the combined surface areas of the eight little spheres, the surface area of the big sphere is

(1) less. (2) greater. (3) the same. (4) — (5) —

27. The concept of pressure involves both

(1) force and area. (2) area and volume. (3) force and volume. (4) — (5) —

28. While standing, your blood pressure is normally greatest in your

(1) feet. (2) head. (3) heart. (4) same in each (5) —

29. Water pressure on a submerged object is greatest against its

(1) bottom. (2) sides. (3) same against all surfaces (4) top. (5) none of these

30. The amount of water displaced by a liter-sized block of ordinary wood floating in water is

(1) less than 1 liter. (2) 1 liter. (3) depends on the water density (4) more than 1 liter. (5) none of these