Practice Test

Remember, this is only a guide. Your actual test may not have the same questions and will be based on the material in Chapters 4, 5 & 6.

It is the student's responsibility to bring a calculator, pens/pencils (extra if necessary), and an eraser.

NO PHONES!!!

YOU CAN NOT USE THE CALCULATOR ON YOUR PHONE.

PHY 1025 – Fundamentals of Physics

Test 2

Name

Instructions

This exam is closed book and closed notes. You should only need a pencil/pen, an eraser and a calculator. Put everything else away. **Turn off all cell phones.**

The time to visit the restroom is NOW, not during the test!

In each case, show your work. Answer the question in as much detail as possible, but make sure to answer all questions and all parts of all questions. Check them off as you go to make sure you do not miss important aspects of the problem.

If you have a question, raise your hand. Please do not get up from your seat during the test, and do not yell across the room. If a key question is raised that everyone needs to know about, I will make an announcement.

(If required, use acceleration due to gravity g = 10 m/s^2)

1) A net force of 40 N is applied to a cart. If the mass of the cart is 80 kg, what is its acceleration?
A) 0
B) 0.5 m/s/s
C) 2 m/s/s
D) 40 m/s/s

2) You push on a crate that sits on a smooth floor and it accelerates. If you apply four times the net force, how much greater will be the acceleration?
A) it will be the same
B) twice
C) three times
D) four times

3) What is the weight of a 2 kg rock?
A) 2 kg
B) 2 N
C) 20 kg
D) 20 N

4) Your weight is
A) equal to your mass.
B) the gravitational attraction force between you and the Earth.
C) a property of mechanical equilibrium.
D) all of these

5) If an object's mass is decreasing while a constant force is applied to the object, the acceleration
A) decreases.
B) increases.
C) remains the same.

6) Consider drops of water that leak at a steady rate from a dripping faucet. As the drops fall they
A) get closer together.
B) get farther apart.
C) remain at a relatively fixed distance from one another.

7) A 10-N falling object encounters 4 N of air resistance. The net force on the object is
A) 0 N.
B) 4 N.
C) 6 N.
D) 10 N.
E) none of these

8) Nellie Newton sky dives from a high-flying helicopter. As she encounters air resistance and falls faster and faster through the air, her acceleration
A) increases
B) decreases
C) remains the same

9) Consider a book that weighs 15 N at rest on a flat table. What is the support force provided by the table?
A) 0 N
B) 15 N
C) 15 kg
D) 7.5 N

10) A soccer player kicks a ball with 1500 N of force. The reaction force exerted by the ball against the player's foot is
A) Somewhat less than 1500 N.
B) 1500 N.
C) Somewhat more than 1500 N.
D) None of the above.

11) Consider a high-speed bus colliding head-on with an innocent bug. The force of impact splatters the unfortunate bug over the windshield. Which is greater, the force on the bug or the force on the bus?
A) Bug
B) Bus
C) both are the same
D) cannot say

12) For an action force, there must be a reaction force that
A) always acts in the same direction.
B) is slightly smaller in magnitude than the action force.
C) is slightly larger in amplitude than the action force.
D) is exactly equal in magnitude.

13) A person is attracted toward the center of Earth by a 500 N gravitational force. The Earth is attracted toward the person with a force of
A) zero.
B) 250 N.
C) 500 N.
D) 1000 N.

14) The attraction of a person's body toward Earth is called weight. The reaction to this force is
A) the person's body pushing against Earth's surface.
B) the Earth's surface pushing against the person's body.
C) the person's body pulling on the Earth.
D) none of these

15) Your friend says that the heavyweight champion of the world cannot exert a force of 50 N on a piece of tissue paper with his best punch. The tissue paper is held in midair – no wall, no tricks. You
A) agree that it can't be done.
B) have reservations about this assertion.
C) disagree, for a good punch easily delivers this much force.
5)

16) Which of the following has the largest momentum relative to the Earth's surface?
A) a tightrope walker crossing Niagara Falls
B) a pickup truck speeding along a highway
C) a Mack truck parked in a parking lot
D) the Science building on campus
E) a dog running down the street

17) A rifle recoils while firing a bullet. The speed of the rifle's recoil is small because the
A) force against the rifle is smaller than against the bullet.
B) momentum is mainly concentrated in the bullet.
C) rifle has much more mass than the bullet.
D) momentum of the rifle is smaller.

18) Two objects have the same size and shape, but one is much heavier than the other. Ignoring air resistance, when they are dropped simultaneously from a tower, they reach the ground at the same time, but the heavier one has a greater
A) speed.
B) acceleration.
C) momentum.
D) all of these
E) none of these

19) When you jump from an elevated position you usually bend your knees upon reaching the ground. By doing this, you make the time of the impact about 10 times as great as for a stiff-legged landing. In this way the average force your body experiences is
A) less than 1/10 as great.
B) more than 1/10 as great.
C) about 1/10 as great.
D) about 10 times as great.

20) Two billiard balls having the same mass and speed roll toward each other. What is their combined momentum after they meet?
A) 0
B) half the sum of their original momentums
C) twice the sum of their original momentums
D) impossible to determine without additional information

21) A bullet is fired from a gun. The speed of the bullet will be about the same as the speed of the recoiling gun
A) because momentum is conserved.
B) because velocity is conserved.
C) because both velocity and momentum are conserved.
D) if the mass of the bullet equals the mass of the gun.
E) none of these
E) none of these

22) Padded dashboards in cars are safer in an accident than nonpadded ones because an occupant hitting the dash has
A) increased time of impact.
B) decreased time of impact.
C) decreased impulse.
D) increased momentum.

23) Compared to falling on a stone floor, a wine glass may not break when it falls on a carpeted floor because the
A) carpeted floor provides a smaller impulse.
B) stopping time is shorter on the carpet.
C) stopping time is longer on the carpet.
D) carpet provides a smaller impulse and a longer time.

24) A 4 kg ball has a momentum of 12 kg m/s. What is the ball's speed?
A) 3 m/s
B) 4 m/s
C) 12 m/s
D) 48 m/s
E) none of these

25) A karate expert executes a swift blow and breaks a cement block with her bare hand. The magnitude of the force experienced by her hand is
A) zero.
B) less than the force applied to the cement block.
C) identical to the force applied to the block.
D) more than the force applied to the block.
E) impossible to predict without additional information.

26) A piece of putty moving with 1 kgm/s of momentum strikes and sticks to a heavy bowling ball that is initially at rest. After the putty sticks to the ball, both move with a combined momentum of
A) less than 1 kgm/s
B) more than 1 kgm/s
C) 1 kgm/s.
D) not enough information

27) When bowling, your friend asks how much impulse is needed to stop a 10 kg bowling ball moving at 6 m/s. What is your answer?
A) 6 Ns
B) 10 Ns
C) 60 Ns
D) 1000 Ns
E) not enough information

28) A jumbo jet has a mass of 100,000 kg. The thrust for each of its four engines is 50,000 N. What is the jet's acceleration in meters per second per second when taking off?
A) 0.25
B) 1
C) 2
D) 4
E) none of these

29) A 1-kg ball is thrown at 10 m/s straight upward. Neglecting air resistance, the net force that acts on the stone when it is halfway to the top of its path is about
A) 1/2 N.
B) 1 N.
C) 5 N.
D) 7.5 N.
E) 10 N.

31) A skydiver of mass 100 kg experiences air resistance of 500 N, and an acceleration of
A) about 2 m/s/s down
B) about 3 m/s/s down
C) about 4 m/s/s down
D) about 5 m/s/s down

32) Ignoring air resistance, a heavy and a light object released from the same height have equal
A) weights.
B) momenta.
C) accelerations.
D) none of the above

33) If the speed of a moving object doubles, which of the following also doubles?
A) momentum
B) volume
C) acceleration
D) all of the above

34) When an object is in motion, which of the following could not have a value of zero?
A) momentum
B) mass
C) inertia
D) None of the above could be zero.

35) A skydiver falls towards the Earth. The attraction of the Earth on the diver pulls the diver down. What is the reaction to this force?
A) air resistance the diver encounters while falling
B) water resistance that will soon act upward on the diver
C) the attraction to the planets, stars, and every particle in the universe
D) all of these
E) none of these

36) A Mack truck and a Volkswagen traveling at the same speed have a head-on collision. The vehicle that undergoes the greatest change in velocity will be the
A) Volkswagen.
B) Mack truck.
C) same for both.

37) To catch a ball, a baseball player extends the hand forward before impact with the ball and then lets it ride backward in the direction of the ball's motion. Doing this reduces the force of impact on the player's hand principally because the
A) force of impact is reduced.
B) relative velocity is less.
C) time of impact is increased.
D) time of impact is decreased.
E) none of these

38) When you are in the way of a fast-moving object and can't get out of its way, you will suffer a smaller force of impact if you decrease its momentum over a
A) long time.
B) short time.
C) same way either way

39) A heavy truck and a small car rolling down a hill at the same speed are forced to stop in the same amount of time. Compared to the force that stops the car, the force needed to stop the truck is
A) greater.
B) smaller.
C) the same.

40) If an object of constant mass experiences a constant net force, it will have a constant
A) velocity.
B) speed.
C) acceleration.
D) position.
E) more than one of the above

Questions 41- 45: You must show your work.

41) What is the net force acting on a 1 kg ball in free fall? (2 point)

42) A boxer punches a sheet of paper in midair and brings it to from rest up to a speed of 25 m/s in 0.05 seconds.
a) What acceleration is imparted to the paper? (3 point)

b) If the mass of the paper is 0.003 kg, what force does the boxer exert on it? (3 point)

43) A 5 kg fish swimming at 1 m/s swallows an absentminded 1 kg fish swimming toward the big fish at a speed that brings both fish to a halt immediately after lunch. What is the speed of the approaching smaller fish before lunch? (4 points)

44) A 10-kilogram block is pushed across a horizontal surface with a horizontal force of 20 N against a friction force of 10 N. What is the acceleration of the block in meters per second per second? (4 points)

45) Consider massive gliders that slide friction-free along a horizontal air track. Glider A has a mass of 1 kg, a speed of 1 m/s, and collides with Glider B that has a mass of 5 kg and is at rest. If they stick upon collision, what is the speed of the combined system after collision? (4 points)

1) $speed = \frac{Distance}{Time}$

2) $Average\ Speed = \frac{Total\ distance\ covered}{Time\ interval}$

3) $Acceleration = \frac{Change\ of\ velocity}{Time\ interval}$

4) $Distance\ traveled = \frac{1}{2}\ (acceleration\ \times time \times time)$

5) when starting from rest, $velocity\ \ v = at$

6) Gravity $g = 10\ m/s^2$

7) $W = mg$

8) $F = \ m\ a$

9) $momentum\ p = mv$

10) $Impulse\ I = Ft = \ \Delta(mv)$

11) Pythagorean theorem $a^2 + b^2 = c^2$