Exam

Name_____

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

1) A truck is moving at constant velocity. Inside the storage compartment, a rock is dropped from the midpoint of the ceiling and strikes the floor below. The rock hits the floor

     1) _____

    A) ahead of the midpoint of the ceiling.

    B) behind the midpoint of the ceiling.

    C) exactly below the midpoint of the ceiling.

    D) More information is needed to solve this problem.

    E) none of these

2) The gain in speed each second for a freely-falling object is about

     2) _____

    A) 0.

    B) 20 m/s.

    C) 10 m/s.

    D) 5 m/s.

    E) depends on the initial speed

3) Whirl a rock at the end of a string on an ice-covered pond and it follows a circular path. If the string breaks, the tendency of the rock is to

     3) _____

    A) follow a straight-line path.   B) continue to follow a circular path.

4) According to Newton's law of inertia, a rail road train in motion should continue going forever even if its engine is turned off. We never observe this because railroad trains

     4) _____

    A) must go up and down hills.

    B) move too slowly.

    C) are much too heavy.

    D) always have forces that oppose their motion.

5) A sheet of paper can be withdrawn from under a container of milk without toppling it if the paper is jerked quickly. This best demonstrates that

     5) _____

    A) there is an action-reaction pair of forces.

    B) the milk carton has no acceleration.

    C) the milk carton has inertia.

    D) gravity tends to hold the milk carton secure.

    E) none of these

6) A package falls off a truck that is moving at 30 m/s. Neglecting air resistance, the horizontal speed   6) _____
of the package just before it hits the ground is

    A) less than 30 m/s but larger than zero.

    B) more than 30 m/s.

    C) zero.

    D) about 30 m/s.

    E) More informationis needed for an estimate.

7) A scientific statement that can never be changed is a scientific   7) _____

    A) theory.

    B) principle.

    C) law.

    D) hypothesis.

    E) None of the above choices are correct.

8) Whirl a rock at the end of a string and it follows a circular path. If the string breaks, the tendency of   8) _____
the rock is to

    A) revolve in a smaller circle   B) continue to follow a circular path.

    C) increase its speed   D) follow a straight–line path.

9) A moving body must undergo a change in   9) _____

    A) direction.   B) distance.   C) velocity.   D) position.

10) If no external forces are acting on a moving object it will   10) _____

    A) move slower and slower until it finally stops.

    B) continue moving at the same speed.

    C) continue moving at the same velocity.

11) At one instant an object in free fall is moving downward at 50 meters per second. One second later   11) _____
its speed should be about

    A) 100 m/s.   B) 60 m/s.   C) 50 m/s.   D) 55 m/s.   E) 25 m/s.

12) While a car travels around a circular track at a constant speed its   12) _____

    A) inertia is zero.   B) acceleration is zero.

    C) velocity is zero.   D) none of the above

13) If a car increases its velocity from zero to 60 km/h in 10 seconds, its acceleration is   13) _____

    A) 60 km/h/s.

    B) 10 km/h/s.

    C) 3 km/h/s.

    D) 6 km/h/s.

    E) 600 km/h/s.

14) An object covers a distance of 8 meters in the first second of travel, another 8 meters during the next second , and 8 meters again during the third second. Its acceleration in meters per second per second is approximately

14) _____

    A) 24.   B) 0.   C) 8.   D) 5.

15) Drop a rock from a 5–m height and it accelerates at 10 m/s^2 and strikes the ground 1 s later. Drop the same rock from a height of 2.5 m and its acceleration of fall is about

15) _____

    A) twice as much.   B) half as much.

    C) four times as much.   D) the same amount.

16) A car maintains a constant velocity of 100 km/hr for 10 seconds. During this interval it acceleration is

16) _____

    A) zero.   B) 10 km/hr.   C) 1000 km/hr.   D) 110 km/hr.

17) Ten seconds after starting from rest, a car is moving at 40 m/s. What is the car's acceleration in meters per second per second?

17) _____

    A) 2.8   B) 10   C) 0.25   D) 40   E) 4.0

18) A car accelerates at 2 meters per second per second. Assuming the car starts from rest, how much time does it need to accelerate to a speed of 30 m/s?

18) _____

    A) 15 seconds

    B) 60 seconds

    C) 30 seconds

    D) 2 seconds

    E) none of these

19) A pot falls from a ledge and hits the ground 45 m below. The speed with which it hits the ground is

19) _____

    A) about 120 m/s.   B) about 30 m/s.

    C) about 60 m/s.   D) more than 120 m/s.

20) If a rocket initially at rest accelerates at a rate of 50 m/s^2 for one minute, its speed will be

20) _____

    A) 50 m/s.   B) 3600 m/s.   C) 3000 m/s.   D) 500 m/s.

21) A man weighing 800 N stands at rest on two bathroom scales so that his weight is distributed evenly over both scales. The reading on each scale is

21) _____

    A) 200 N.

    B) 800 N.

    C) 1600 N.

    D) 400 N.

    E) none of these

22) Which has the greater mass?

22) _____

    A) an automobile battery

    B) a king–size pillow

    C) neither — both have the same

23) A 10-kilogram block with an initial velocity of 10 m/s slides 10 meters across a horizontal surface and comes to rest. It takes the block 2 seconds to stop. The stopping force acting on the block is about

23) _____

   A) 50 N.

   B) 10 N.

   C) 5 N.

   D) 25 N.

   E) none of these

24) An coconut and a feather fall from a tree through the air to the ground below. The amount of air-resistance force is

24) _____

   A) greater on the coconut.   B) greater on the feather.   C) the same on each.

25) Strange as it may seem, it is just as hard to accelerate a car on a level surface on the moon as it is here on the Earth. This is because

25) _____

   A) the weight of the car is independent of gravity.

   B) the mass of the car is independent of gravity.

   C) Nonsense! A car is much more easily accelerated on the moon than on the Earth.

26) An object is propelled along a straight-line path in space by a force. If the mass of the object somehow becomes twice as much, its acceleration

26) _____

   A) quadruples.

   B) stays the same.

   C) doubles.

   D) halves.

   E) none of these

27) When you relax at rest with your left foot one bathroom and your right foot on a similar scale, each of the scales will

27) _____

   A) indicate different values that will equal your weight when added together.

   B) indicate part of your total weight but not necessarily half of it.

   C) indicate exactly half your weight.

   D) Any of the above may be correct.

28) An apple at rest weighs 1 N. The net force on the apple when it is in free fall is

28) _____

   A) 9.8 N.

   B) 0 N.

   C) 1 N.

   D) 0.1 N.

   E) none of these

29) A rock is thrown vertically into the air. At the very top of its trajectory the net force on it is

29) _____

   A) almost equal to its weight.

   B) more than its weight.

   C) less than its weight.

30) The mass of a pet turtle that weighs 10 N is   30) _____
   A) about 1 kg.
   B) about 10 kg.
   C) about 1000 kg.
   D) about 100 kg.
   E) none of these

31) The Earth pulls on the moon. Similarly the moon pulls on the Earth, evidence that   31) _____
   A) these two pulls comprise an action–reaction pair.
   B) the moon is smaller so its pull is smaller.
   C) larger objects pull harder.
   D) the earth is larger so its pull is larger.

32) A automobile and a baby carriage traveling at the same speed collide head–on. The impact force is   32) _____
   A) greater on the baby carriage.
   B) greater on the automobile.
   C) the same for both.

33) During the time of the year when the Earth starts moving closer to the sun, the sun   33) _____
   A) starts moving the same distance toward the Earth.
   B) moves toward the Earth but a larger distance.
   C) moves toward the Earth, but a smaller distance.
   D) does not move at all in response to the Earth's approach.

34) A player catches a ball. Consider the action force to be the impact of the ball against the player's   34) _____
   glove. The reaction to this force is the
   A) muscular effort in the player's arms.
   B) player's grip on the glove.
   C) friction of the ground against the player's shoes.
   D) force the glove exerts on the ball.
   E) none of these

35) A person is attracted toward the center of the Earth by a 500–N gravitational force. The Earth is   35) _____
   attracted toward the person with a force of
   A) 1000 N.   B) 500 N.   C) zero.   D) 250 N.

36) A player hits a ball with a bat. The action force is the impact of the bat against the ball. The reaction   36) _____
   to this force is the
   A) air resistance on the ball.
   B) grip of the player's hand against the ball.
   C) weight of the bat.
   D) weight of the ball.
   E) force that the ball exerts on the bat.

37) A horse exerts 500 N of force on a heavy wagon. The wagon pulls back on the horse with an equal   37) _____
force. The wagon still accelerates because

    A) nevertheless there is still an unbalanced force on the wagon.

    B) the horse pulls on the wagon a brief time before the wagon reacts.

    C) the wagon does not accelerate because these forces are equal and opposite.

    D) these forces are not an action–reaction pair.

    E) the wagon is not alive.

38) Two people, one twice as massive as the other, attempt a tug–of– war with 12 meters of massless   38) _____
rope on frictionless ice. After a brief time, they meet. The heavier person slides a distance of

    A) 4 m.   B) 6 m.   C) 3 m.   D) 0 m.

39) A Mack truck and a Volkswagen traveling at the same speed have a head–on collision. The vehicle   39) _____
that undergoes the greatest change in velocity will be the

    A) Volkswagen.   B) Mack truck.   C) same for both.

40) Wherever the is an action force, there must be a reaction force which   40) _____

    A) is exactly equal in magnitude.

    B) is slightly larger in amplitude than the action force.

    C) is slightly smaller in magnitude than the action force.

    D) always acts in the same direction.

41) The difference between impulse and impact force involves the   41) _____

    A) difference between acceleration and velocity.

    B) distance the force acts.

    C) mass and its effect on resisting a change in momentum.

    D) time the force acts.

42) The conservation of momentum is most closely related to   42) _____

    A) Newton's 1st law.   B) Newton's 4th law

    C) Newton's 3rd law.   D) Newton's 2nd law.

43) A large heavy truck and a small baby carriage roll down a hill. Neglecting friction, at the bottom of   43) _____
the hill, the baby carriage will have a greater

    A) acceleration.

    B) momentum.

    C) speed.

    D) all of these

    E) none of these

44) Two objects have the same size and shape, but one is much heavier than the other. When they are dropped simultaneously from a tower, they reach the ground at the same time, but the heavier one has a greater

   A) acceleration.

   B) speed.

   C) momentum.

   D) all of these

   E) none of these

44) _____

45) A 1-kg glider and a 2-kg glider both slide toward each other at 1 m/s on an air track. They collide and stick. The combined mass moves at

   A) 1/3 m/s.   B) 1/2 m/s.   C) 0 m/s.   D) 1.5 m/s.   E) 1/6 m/s.

45) _____

46) A 5000-kg freight car moving at 2 m/s runs into a 10,000-kg freight car at rest. They couple upon collision and move away as one body at

   A) 1 m/s.   B) 2 m/s.   C) 1/3 m/s.   D) 2/3 m/s.

46) _____

47) 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) the same.   B) smaller.   C) greater.

47) _____

48) The impulse-momentum relationship is a direct result of

   A) Newton's 1st law.   B) Newton's 2nd law.

   C) Newton's 4th law.   D) Newton's 3rd law.

48) _____

49) A golf ball moving forward with 1 unit of momentum strikes and bounces backward off a heavy bowling ball that is initially at rest and free to move. The bowling ball is set in motion with a momentum of

   A) 1 unit.   B) less than 1 unit.

   C) more than 1 unit.   D) not enough information

49) _____

50) An astronaut, floating in space, throws a ball as massive as herself toward her nearby spaceship. If the ball bounces back toward her without losing speed, her best choice at that time is to

   A) try to catch the ball and then throw it away from the spaceship.

   B) forget about catching the ball and wait a few minutes to be rescued.

   C) try to catch the ball and wait a few minutes to be rescued.

   D) hope that the spaceship pilot is able to rescue her somehow.

50) _____

51) A 2-kg mass is held 4 m above the ground. What is the approximate potential energy of the mass with respect to the ground?

   A) 6 J

   B) 80 J

   C) 8 J

   D) 32 J

   E) none of these

51) _____

52) If you push for a half hour or a whole hour against a stationary wall,   52) _____

    A) twice as much work is done during the half hour.

    B) half as much work is done during the half hour.

    C) no work is done in either case.

    D) it is impossible to determine how much work is done.

53) If a ping pong ball and a golf ball are both moving in the same direction with the same amount of   53) _____
kinetic energy, the speed of the ping pong ball must be

    A) the same as the golf ball.

    B) less than the golf ball.

    C) more than the golf ball.

    D) impossible to predict without additional information

54) A job is done slowly, while an identical job is done quickly. Both jobs require the same amount of   54) _____
work, but different amounts of

    A) energy.   B) effort.   C) power.   D) none of these

55) Two identical freight cars roll without friction (one at 1 m/s, the other at 2 m/s) toward one   55) _____
another on a level track. They collide, couple together, and roll away in the direction that

    A) the faster car was initially going.

    B) the slower car was initially going.

    C) neither of these — they stop.

56) A sandbag in outer space moving at 3 m/s and collides and sticks to a half-as-massive sandbag   56) _____
initially at rest. Compared with the kinetic energy of the moving bag before collision, the kinetic
energy of the coupled bags after collision is

    A) the same

    B) two thirds as much

    C) three quarters as much

    D) twice as much

    E) one third as much

57) A ball rolling down an incline has its minimum speed   57) _____

    A) half way down the incline.

    B) near the top of the incline.

    C) at the end the incline.

    D) impossible to predict without knowing the ball's mass

    E) impossible to predict without knowing the size of the ball

58) When a car is braked to a stop, its kinetic energy is transformed to   58) _____

    A) heat.

    B) stopping energy.

    C) energy of motion.

    D) energy of rest.

    E) potential energy.

59) Two pool balls, each moving at 2 m/s, roll toward each other and collide. Suppose after bouncing apart, each moves at 4 m/s. This collision violates conservation of

    59) _____

   A) energy.
                B) momentum.
   C) both momentum and energy.
      D) none of the above choices

60) A moving object has

    60) _____

   A) speed.
   B) energy.
   C) velocity.
   D) momentum.
   E) all of these

1) C
2) C
3) A
4) D
5) C
6) D
7) E
8) D
9) C
10) C
11) B
12) D
13) D
14) B
15) D
16) A
17) E
18) A
19) B
20) C
21) D
22) A
23) A
24) A
25) B
26) D
27) D
28) C
29) A
30) A
31) A
32) C
33) C
34) D
35) B
36) E
37) A
38) A
39) A
40) A
41) D
42) C
43) E
44) C
45) A
46) D
47) C
48) B
49) C
50) D

51) B
52) C
53) C
54) C
55) A
56) A
57) B
58) A
59) A
60) E