

Name: Mr. Mellon Newton's Law Practice Exam Regents Physics

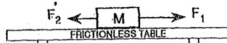
1. If the sum of all the forces acting on a car is zero, then the speed of the car always

- (1) decreases (2) increases (3) remains the same

2. A rocket in space can travel without engine power at constant speed in the same direction. This condition is best explained by the concept of

- (1) gravitation (2) action-reaction (3) acceleration (4) inertia

3. In the diagram below, box M is on a frictionless table with forces F_1 and F_2 acting as shown.



If the magnitude of F_1 is greater than the magnitude of F_2 , then the box is

- (1) moving with a constant speed in the direction of F_1
(2) moving with a constant speed in the direction of F_2
(3) accelerating in the direction of F_1
(4) accelerating in the direction of F_2

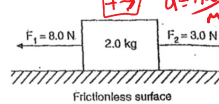
4. As the mass of an object decreases, its inertia will

- (1) decrease (2) increase (3) remain the same

5. What is an essential characteristic of an object in equilibrium?

- (1) zero velocity (2) zero potential energy (3) zero acceleration (4) zero kinetic energy

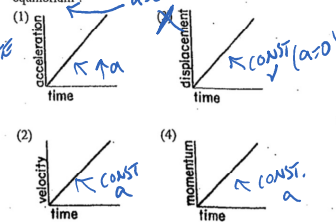
6. Two forces are applied to a 2.0-kilogram block on a frictionless horizontal surface, as shown in the diagram below.



The acceleration of the block is

- (1) 1.5 m/s² to the right (2) 2.5 m/s² to the right (3) 2.5 m/s² to the left (4) 4.0 m/s² to the left

7. Which graph best represents an object in equilibrium?



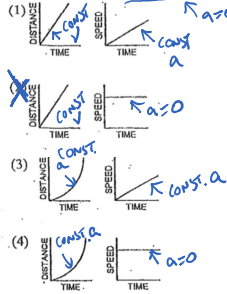
8. An 800-newton person is standing in an elevator. If the upward force of the elevator on the person is 600 Newtons, the person is

- (1) at rest (2) accelerating upward (3) accelerating downward (4) moving downward at constant speed

9. An unbalanced force of 10 Newtons acts on a 20-kilogram mass for 5 seconds. The acceleration of the mass is

- (1) 0.5 m/s² (2) 2 m/s² (3) 40 m/s² (4) 200 m/s²

10. Which two graphs represent the motion of an object on which the net force is zero?



11. If an object is traveling east with a decreasing speed, the direction of the object's acceleration is

- (1) north (2) south (3) east (4) west

12. A 50.-kilogram woman wearing a seat belt is traveling in a car that is moving with a velocity of +10. meters per second. In an emergency, the car is brought to a stop in 0.50 second. What force does the seat belt exert on the woman so that she remains in her seat?

- (1) -1.0×10^3 N (2) -5.0×10^3 N (3) -5.0×10^4 N (4) -2.5×10^4 N

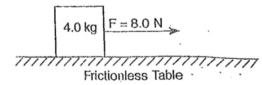
13. A cart is uniformly accelerating from rest. The net force acting on the cart is

- (1) decreasing (2) zero (3) constant (4) increasing

14. In a baseball game, a batter hits a ball for a home run. Compared to the magnitude of the impulse imparted to the ball, the magnitude of the impulse imparted to the bat is

- (1) less (2) greater (3) the same

15. The diagram below shows a horizontal 8.0-newton force applied to a 4.0-kilogram block on a frictionless table.



What is the magnitude of the block's acceleration?

- (1) 0.50 m/s² (2) 2.0 m/s² (3) 9.8 m/s² (4) 32 m/s²

16. An object weighing 4 Newtons rests on a horizontal tabletop. The force of the tabletop on the object is

- (1) 0 N (2) 4 N horizontally (3) 4 N downward (4) 4 N upward

17. As shown in the diagram below, an inflated balloon released from rest moves horizontally with velocity v.



The velocity of the balloon is most likely caused by

- (1) action-reaction (2) centripetal force (3) gravitational attraction (4) rolling friction

18. A mosquito flying over a highway strikes the windshield of a moving truck. Compared to the magnitude of the force of the truck on the mosquito during the collision, the magnitude of the force of the mosquito on the truck is

- (1) smaller (2) larger (3) the same

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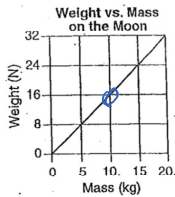
$$a = \frac{F}{m} = \frac{10}{20} = 0.5$$

UNIT 4: NEWTON'S LAWS REVIEW

19. An apple weighing 1 newton on the surface of Earth has a mass of approximately

(1) 1×10^{-1} kg (3) 1×10^1 kg
(2) 1×10^0 kg (4) 1×10^2 kg

20. The graph below shows the relationship between weight and mass for a series of objects on the Moon.



The acceleration due to gravity on the Moon is approximately

(1) 0.63 m/s^2 (3) 9.8 m/s^2
(2) 1.6 m/s^2 (4) 32 m/s^2

21. The table below lists the coefficients of kinetic friction for four materials sliding over steel.

Material	μ_k
aluminum	0.47
brass	0.44
copper	0.36
steel	0.57

A 10-kilogram block of each of the materials in the table is pulled horizontally across a steel floor at constant velocity. Which block would require the smallest applied force to keep it moving at constant velocity?

(1) aluminum (3) copper
(2) brass (4) steel

22. According to your table, Approximate Coefficients of Friction, which road surface would offer the greatest traction for rubber tires?

(1) dry concrete (3) dry asphalt
(2) wet concrete (4) wet asphalt

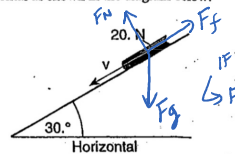
23. A box initially at rest on a level floor is being acted upon by a variable horizontal force, as shown in the diagram at the right. Compared to the force required to start the box moving, the force required to keep it moving at constant speed is

(1) less (3) the same
(2) greater

24. Sand is often placed on an icy road because the sand

(1) decreases the coefficient of friction between the tires of a car and the road
(2) decreases the coefficient of friction between the tires of a car and the road
(3) decreases the gravitational force on a car
(4) increases the normal force of a car on the road

25. A book weighing 20. Newtons slides at constant velocity down a ramp inclined 30° to the horizontal as shown in the diagram below.



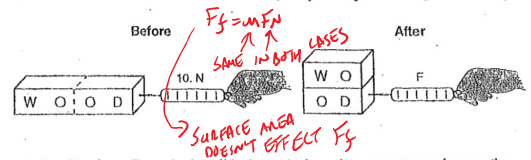
What is the force of friction between the book and the ramp?

(1) 10. N up the ramp (3) 10. N down the ramp
(2) 17 N up the ramp (4) 17 N down the ramp

26. Which term represents a scalar quantity?

(1) distance (3) force
(2) displacement (4) weight

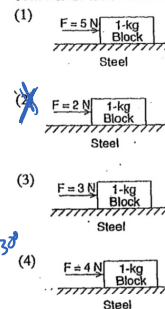
27. The diagram below shows a student applying a 10.-newton force to slide a piece of wood at constant speed across a horizontal surface. After the wood is cut in half, one piece is placed on top of the other, as shown.



What is the magnitude of the force, F , required to slide the stacked wood at constant speed across the surface?

(1) 40 N (2) 20 N (3) 10 N (4) 5.0 N

28. A different force is applied to each of four 1-kilogram blocks to slide them across a uniform steel surface at constant speed as shown below. In which diagram is the coefficient of friction between the block and steel smallest?



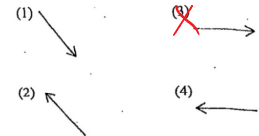
29. According to your reference table, Approximate Coefficients of Friction, what is the minimum horizontal force needed to start a 300. N steel block on a steel table in motion?

(1) 0.57 N (3) 171 N
(2) 074 N (4) 222 N

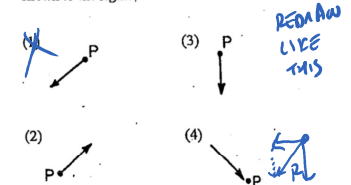
30. Forces A and B have a resultant R . Force A and resultant R are shown in the diagram below.



Which vector below best represents force B ?



31. Which vector below best represents the resultant of the two vectors shown to the right?



22. What is the magnitude of the vector sum of the two concurrent forces represented in the diagram to the right?

$R = \sqrt{2^2 + 1.5^2} = 2.5$

(1) 2.5 Newtons (2) 3.5 Newtons (3) 3.0 Newtons (4) 4.0 Newtons

33. A 150.-newton force, F_1 , and a 200.-newton force, F_2 , are applied simultaneously to the same point on a large crate resting on a frictionless, horizontal surface. Which diagram shows the forces positioned to give the crate the greatest acceleration?

$F_{NET} = m \cdot a$
GREATEST F_{NET}

(1) (2) (3) (4)

34. A constant force is exerted on a box as shown in the diagram.

$F_x = F \cos \theta$

As the angle θ decreases to 0° , the magnitude of the horizontal component of the force

(1) decreases (2) increases (3) remains the same (4) increases

35. Two concurrent forces of 40 Newtons and X Newtons have a resultant of 100 Newtons. Force X could be

(1) 20 Newtons (2) 40 Newtons (3) 80 Newtons (4) 150 Newtons

W/IN RANGE

36. As the angle between a force and level ground decreases from 60° to 30° , the vertical component of the force

(1) decreases (2) increases (3) remains the same (4) increases

$F_y = F \sin \theta$

37. In the diagram below, the weight of a box on a plane inclined at 30° is represented by the vector W .

What is the magnitude of the component of the weight (W) that acts parallel to the incline?

(1) W (2) $0.50 W$ (3) $0.87 W$ (4) $1.5 W$

38. In the diagram below, a block rests on a ramp, making angle θ with the horizontal.

Which vector best represents the direction of the normal force acting on the box?

(1) A (2) B (3) C (4) D

39. The diagram below shows a block on a horizontal frictionless surface. A 100.-newton force acts on the block at an angle of 30° above the horizontal.

What is the magnitude of force F if it establishes equilibrium?

(1) 50.0 N (2) 86.6 N (3) 100. N (4) 187 N

40. In the diagram below, a box is at rest on an inclined plane.

Which vector best represents the direction of the normal force acting on the box?

(1) A (2) B (3) C (4) D

41) $F_{NET} = 5N \cos(25^\circ) - 2N$
 $F_{NET} = 2.53N$ RIGHT
 $a = \frac{F_{NET}}{m} = \frac{2.53N}{0.5kg} = 5.06 m/s^2$ RIGHT

42) $F_g = mg = (2kg)(9.81 m/s^2) = 19.6N$
 $F_g \sin 50^\circ = 15N$
 $F_g \cos 50^\circ = 12.6N$

43) STEEL 2kg
A) FIND F_f
B) NET FORCE
C) ACCELERATION
D) TIME IT TAKES IT TO STOP
 $F_g = mg$
A) $F_f = \mu F_N = (0.57)(2kg)(9.81 m/s^2) = 11.18N$
B) $F_{NET} = -F_f = -11.18N$
C) $a = \frac{F_{NET}}{m} = \frac{-11.18N}{2kg} = -5.59 m/s^2$
D) $a = \frac{\Delta v}{t} = \frac{0 m/s - 5 m/s}{-5.59 m/s^2} = 0.89 s$

44) WHAT IS THE FORCE REQUIRED TO KEEP A 20N WOODEN BLOCK MOVING AT A CONSTANT VELOCITY ON A WOODEN FLOOR?
 $F_g = 20N$
 $F_a = F_{fc} = \mu F_N = (0.3)(20N) = 6N$