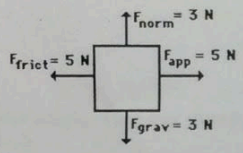
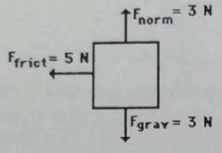
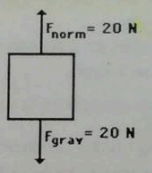
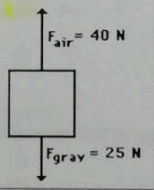
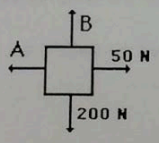
Forces Review

Name:_____ Period:_____

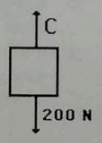
1. **True or False:** A force can simply be defined as a push or a pull.
2. **True or False:** The amount of matter in an object is its weight.
3. **True or False:** The SI unit of mass is the Newton.
4. **True or False:** The force due to gravity acting on an object is its mass.
5. **True or False:** The SI unit of force is the kilogram.
6. **True or False:** If a hockey puck slides on a perfectly frictionless surface, it will eventually slow down because of its inertia.
7. **True or False:** The combination of all the forces that act on an object is called the net force.
8. **True or False:** The force that supports the weight of a book lying at rest on a tabletop is called a normal force.
9. **True or False:** A rocket ship is pushed forward by gases that are forced out the back of the ship.
10. **True or False:** A bicycle and a parked car have a head-on collision. The force of impact is greater on the bicycle.
11. Free-body diagrams for four situations are shown below. For each situation, determine the net force acting upon the object

Situation A	Situation B	Situation C	Situation D
			
$F_{Net} = 0$	$F_{Net} = 5N$ to the Left	$F_{net} = 0$	$F_{net} = 15N$ ↑

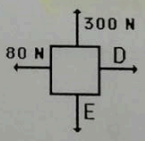
12. Free-body diagrams for four situations are shown below. The net force is known for each situation. However, the magnitudes of a few of the individual forces are not known. Analyze each situation individually and determine the magnitude of the unknown forces.



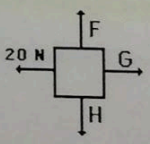
F_{net} = 0 N



F_{net} = 900 N, up



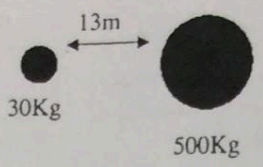
F_{net} = 60 N, left



F_{net} = 30 N, right

Force A = 50 N Force B = 200N	Force C = 1100N	Force D = 20N Force E = 300N	Force F = 100 N Force G = 50N Force H = 100N

13.



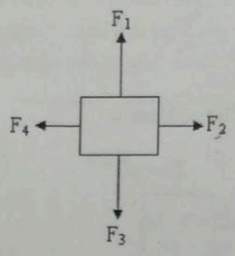
$F = \frac{Gm_1m_2}{d^2}$

$= \frac{(6.67 \times 10^{-11})(30)(500)}{13^2}$

14. What would be the force between the objects shown above?

a) 5.9x10-9N b) 88.8N c) 7.99x1011N d) 9.8N

15. The diagram shows various forces acting on a box. As a result of the forces, the box does NOT accelerate. Which of the equations below best expresses the relationship between forces?



a) F1 = F3 and F2 = F4
b) F1 = F3 = F2 = F4
c) F1 = F3 only
d) F2 = F4 only

16. Which of the following is an example of Newton's 3rd law?

a) An elevator pulls on a cable and a person pushes on the elevator.
b) An elevator pushing on a person and gravity pulling on the elevator.
c) An elevator pulls on the cable and the cable pulls the elevator.
d) An elevator pushes on a person and the elevator pulls on a cable.

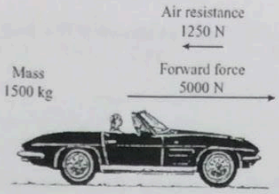
17. Which of the following will definitely cause a change in the velocity of a parked car?

a) The car experiences an unbalanced force.
b) All forces acting on the car increase by 200 N.
c) All forces acting on the car decrease by 200 N.
d) The car experiences all balanced forces.

18. How would the measurable properties of a golf ball change if it were moved from Earth to the Moon?

a) It would have the same mass, but a different weight.
b) It would have the same weight, but a different mass.
c) It would have the same density, but a different mass.
d) It would have the same mass, but a different density.

19. A 1500 kg car has an applied forward force of 5000 N and experiences an air resistance of 1250 N.



What is the car's acceleration?

a) 2.5 m/s² b) 3.3 m/s² c) 4.2 m/s² d) 9.8 m/s²

20. The illustration below shows a 2-ton elephant balancing on a tree stump.



Which of the following statements must be accurate?

a) The weight of the tree stump is greater than 2 tons.
b) A 4-ton force on the ground spreads out in all directions.
c) The tree stump is exerting a 2-ton force upward on the elephant.
d) The downward force on the ground under the tree stump is 4 tons.

21. If an astronaut took a rocket ship to Mars what would change?

a) Width of astronaut b) Mass of astronaut c) Height of astronaut d) Weight of astronaut

22. What is the mass of an object weighing 63 N on Earth?

a) 0.1 kg b) 6.3 kg c) 73 kg d) 617 kg

23. A hot air balloon exerts a force of 1200 N while lifting a load of 800 N. Which free-body force diagram depicts the forces involved?

a)


b)

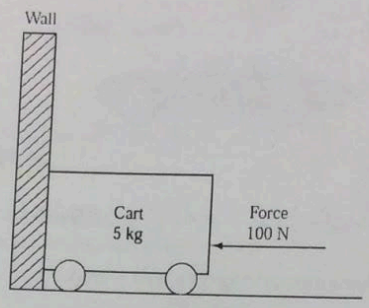

c)


d)


24. A 1500 kg car increases its speed by 2 m/s for each second of travel. What is the net force acting on the car?

a) 750 N
b) 1500 N
c) 3000 N
d) D. 6000 N

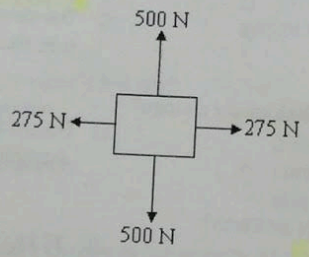
25. A cart with a mass of 5 kg rests on a floor next to a wall, as shown in the diagram below.



A person pushes on the cart to the left toward the wall with a force of 100 N. Which of the following statements is true in this situation?

a) The wall does not push on the cart.
b) The floor pushes 100 N up on the cart.
c) The cart pushes 100 N down on the floor.
d) The wall pushes 100 N to the right on the cart.

26. The diagram shows various forces acting on a box. How could the motion of the box be described from this information?

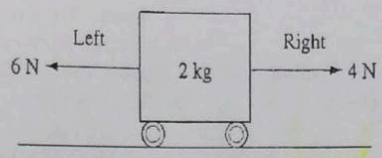


a) The box is accelerating.
b) The box is absolutely motionless.
c) The box has zero acceleration, but may or may not be moving.
d) The box moves in some way that can't be exactly determined.

27. The distance of the star Vega from Earth is 1.6 million times greater than the distance of the Sun from Earth. Which of the following best describes the gravitational influence of Vega on Earth?

a) It is roughly equal to that of the Sun.
b) Its influence is greater than that of the Sun.
c) Its influence is small because of its distance.
d) It influences the magnitude of Earth's mass.

28. Two forces act on the 2 kg box shown below.



A 4 N force acts to the right and a 6 N force acts to the left. What is the net force acting on the box?

a) 10 N to the right
b) 10 N to the left
c) 2 N to the right
d) 2 N to the left

29. As you ride an elevator from the 1st floor to the 3rd floor, what forces do you experience?

a) Gravity is the only force you experience.
b) Gravity and the force of the elevator accelerating and decelerating.
c) No forces because you move at a constant speed.
d) Only the force of the elevator accelerating.

30. A hockey player swings her hockey stick and strikes a puck. According to Newton's third law of motion, which of the following is a reaction to the stick pushing on the puck?

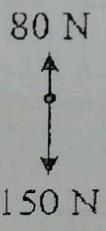
a) the puck pushing on the stick
b) the stick pushing on the player
c) the player pushing on the stick
d) the puck pushing on the player

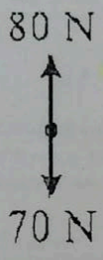
31. A car is parked on the side of a hill. Which of the following most likely prevents the car from moving down the hill?

a) The car has too much mass to move easily.
b) There is friction in the door hinges of the car.
c) There is friction between the tires and the road.
d) The weight of the car is mostly on the front wheels.

32. An upward force of 150 N is applied to a box weighing 70 N. Which of the following is the free-body force diagram for this situation?

a)


b)


c)


d)


33. During an experiment, you notice that as you increase the mass on a spring scale (used to measure weight) that the reading on the scale also increases. Which statement best describes the relationship between the variables in this experiment?

a) Weight directly influences the amount of mass
b) Mass has little influence on weight
c) As mass increases, weight will increase
d) Weight and mass are identical

34. If the force acting on a cart doubles, what happens to the cart's acceleration?

a. it quadruples
b. it doubles
c. it halves
d. it quarters

35. A girl whose weight is 200 N hangs from a bar supported by two vertical strands of rope. What is the tension in each strand?

a. 400 N
b. 300 N
c. 200 N
d. 100 N



36. A 10-N falling object encounters a 4 N of air resistance. The magnitude of the net force on the object is:

a. 0 N
b. 4 N
c. 6 N
d. 10 N

37. A car has a mass of 1000 kg and accelerates at 2 m/s^2. What is the magnitude of the force acting on the car?

a. 500 N
b. 1000 N
c. 1500 N
d. 2000 N

38. A tow truck exerts a force of 3000 N on a car, accelerating it at 2 m/s^2. What is the mass of the car?

a. 500 kg
b. 1000 kg
c. 1500 kg
d. 3000 kg

39. A 747 jumbo jet has a mass of 30,000 kg. The thrust for each of four engines is 15,000 N. What is the jet's acceleration when taking off?

a. ~~0.25 m/s²~~
b. 0.5 m/s^2
c. 1 m/s^2
d. 2 m/s^2

40. You pull horizontally on a 50-kg crate with a force of 500 N, and the friction force on the crate is 250 N. The acceleration of the crate is:

a. zero
b. 2 m/s^2
c. 4 m/s^2
d. 5 m/s^2

41. How much force is needed to accelerate a 2-kg physics book to an acceleration of 6 m/s^2?

a. 36 N
b. 12 N
c. 3 N
d. 0.33 N

42. A jumbo jet cruises at a constant velocity when the total thrust of the engines on the jet is 40,000 N. How much air resistance acts on the jet?

a. 80,000 N
b. 60,000 N
c. 40,000 N
d. 20,000 N

43. A high school student hits a nail with a hammer. During the collision, there is a force:

a. on the hammer but not on the nail
b. on the nail but not on the hammer
c. on the nail, and also on the hammer

45. What is the force of gravity between earth and the moon? The earth's mass is 5.98×10^{24} kg, the distance from center of the earth to the center of the moon is 3.90×10^{8} m. The mass of the moon is 7.30×10^{22} kg.

a) 5.86×10^{25} N
b) 7.47×10^{28} N
c) 1.91×10^{20} N
d) 7.15×10^{23} N

46. You weigh 458 N on earth, but you are on Mars. Here's some data on Mars: radius = 3.38×10^{6} m mass = 6.42×10^{23} kg. How much do you weigh on Mars?

a) 458 N
b) 175 N
c) 1717 N
d) 3.75 N

47. What is the acceleration of gravity on Mars?

a) 3.51 m/s^2
b) 3.75 m/s^2
c) 9.8 m/s^2
d) 5.46 m/s^2

48. Calculate the force of gravitational attraction between two spheres of mass 10.1 kg and 45.4 kg that are 38.5 m apart.

$$F = \frac{(6.67\times10^{-11})(10.1\ kg)(45.4\ kg)}{(38.5\ m)^2} = 2.06\times10^{-11}\ N$$

49. Venus has radius 6.05×10^{6} m and mass 4.87×10^{24} kg. Calculate the value of acceleration due to gravity on Venus's surface.

$g = \frac{Gm}{r^2}$

$g = 8.87\ m/s^2$

$$= \frac{(6.67\times10^{-11})(4.87\times10^{24}\ kg)}{(6.05\times10^{6}\ m)^2}$$

50. A satellite orbits Neptune 4000 km above its surface. Given that the mass of Neptune is 1.02×10^{26} kg and the radius of Neptune is 2.48×10^{7} m, calculate the Force between the satellite and Neptune.

$$\frac{(6.67\times10^{-11})(1.02\times10^{26})}{(2.48\times10^{7} + 4{,}000{,}000)^2} = 8.2\ N$$