**Net Force**

Directions: Show the solutions (i.e. your work) to these on a separate sheet of paper. Use g = 9.81 m/s/s

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| 33.4 N | 1. What is the weight of a 3.40 kg mass? |
| 73.4 kg | 2. What mass has a weight of 720. N? |
| .112 m/s/s | 3. Bob must exert 240. N of force on a 980. Kg car to move it at a constant speed up an incline. (The frictional and gravity force is 240. N) What is the acceleration of the car if he exerts a force of 350. N? |
| +3.5 m/s/s  -4.8 m/s/s | 4. What is the acceleration of a 6.0 Kg object hanging on a string that is under a tension of 80. N? 30. N? (Make up positive) |
| 125 N | 5. What force is needed to accelerate a 60.0 Kg cart and rider from rest to 4.20 m/s in 2.50 seconds when the friction force is 24.0 N? |
| 2.6 kg | 6. What is the mass of a box that moves at a constant velocity along a surface with a force of 15 N, and accelerates at +4.2 m/s/s when you exert +26 N? (The box is moving in the same direction as the forces, there is a frictional force of 15 N) |
| 1000 kg | 7. If you exert a force of 60. N on a car, it moves at a constant velocity. (i.e. there is a frictional force of 60. N) What is its mass if when you exert 80. N on it, it accelerates from rest to 2.0 m/s in 100. seconds? |
| 901 N | 8. A 60.0 Kg rocket accelerates upward from rest reaching a height of 23.4 m in 3.00 seconds. What must be the thrust of the engine? |
| 77 N | 9. It takes 45 N to make a 10. kg cart move at a constant speed. What force does it take to make the cart accelerate at 3.2 m/s/s in the direction it is moving? |
| 80. N  18 N | 10. What tension would accelerate a 5.0 Kg object suspended on a string upwards at 6.2 m/s/s? Downwards? |
| 11.24 N | 11. A 45.00 gram rocket accelerates upward from 0 to 12.00 m/s in .05000 seconds. What must be the thrust of the engines? |
| 1.2 kg | 12. A rocket has engines that produce 60. N of thrust. What is its mass if it accelerates upward at 40. m/s/s? |
| -2.33 m/s/s  +281 N | 13. A dog is pulling forward on a 215 kg sled that slows from +6.20 m/s to rest in a distance of 8.25 m. What is the deceleration of the sled? If the force of friction slowing the sled is 782 N, what force is the dog exerting in the direction the sled moves? |
| -7.83 m/s/s  -32.0 kN | 14. An 18,380 kg airplane slows from 48.1 m/s to rest in 6.14 seconds. What was its acceleration? If the engines generated 112 kN (112,000 N) of reverse thrust, how much air friction was acting against the plane as it slowed down? (this would be average) |
| -21.6 m/s  +72.6 m/s/s  +9750 N | 15. A drop tower has a 118 kg experiment that free falls from rest for 2.20 seconds, and strikes an airbag that slows it to rest in a distance of 3.20 m. With what velocity does the experiment strike the airbag? What is the upward acceleration as the experiment stops? What is the upward force acting on the experiment to stop it? |
|  | Problems 16-20 are questions like the skill set and the test |
| 1.52 s | 16. A 9.0 kg object hangs on a string that can have a maximum tension of 275 N. What is the shortest time you could raise the object from rest a distance of 24.0 m? |
| 2190 N | 17. A 58.0 kg person is rock climbing when he loses his grip and falls. He hits the end of the rope going 15.3 m/s straight down, and is stopped by the rope in a vertical distance of 4.20 m. What is the average tension in the rope as it stops him? |
| 3280 N | 18. A 478 kg elevator accelerates downward reaching its top speed of 4.12 m/s in a time of 1.40 s. What is the tension in the supporting cable if it accelerates uniformly? |
| 2010 N | 19. A 528 kg elevator accelerates downward from rest reaching its top speed of 6.12 m/s in a distance of 3.12 m. What is the tension in the supporting cable if it accelerates uniformly? |
| 10,600 N | 20. A 984 kg elevator reaches a height from rest of 3.68 m in 2.70 s. What is the tension in the supporting cable if it accelerates uniformly? |

Friction

Show the solutions (i.e. your work) to these on a separate sheet of paper.

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| 111.6 N | 1. What is the force of friction between a block of ice that weighs 930 N and the ground if  = .12? |
| .51 | 2. What is the coefficient of static friction if it takes 34 N of force to move a box that weighs 67 N? |
| 1000 N | 3. A box takes 350 N to start moving when the coefficient of static friction is .35. What is the weight of the box? |
| 8500 N  8.3 m/s/s  43.7 m | 4. A car has a mass of 1020 Kg and has a coefficient of friction between the ground and its tires of .85. What force of friction can it exert on the ground? What is the maximum acceleration of this car? In what minimum distance could it stop from 27 m/s? |
| .15 | 5. Clarice moves an 800. gram set of weights by applying a force of 1.2 N. What is the coefficient of friction? |
| 1200 kg | 6. A car has a coefficient of friction between the ground and its tires of .85. What is the mass of the car if it takes 9620 N of force to make it slide along the ground? |
| 2.73 m/s/s | 7. A 5.00 Kg block has a coefficient of friction of .150 on a flat surface. What is its acceleration if you exert a force of 21.0 N sideways on it when it is at rest? (Find the friction force first) |
| 6.4 m/s/s  51 N  .52 | 8. A 10. Kg block is at rest on a level surface. It accelerates from rest to +51.2 m/s in 8.0 seconds when you exert a force of +115 N on it sideways. What is the acceleration of the block? What is the force of friction between the surface and the block, and what is the coefficient of friction? |
| 498 N | 9. A 120. Kg log sled accelerates at 1.40 m/s/s when a horse pulls on it. What force must the horse exert if the coefficient of friction between the ground and the sled is .28? |
| 1.2 kg | 10. You exert a force of +24 N sideways on an object and it accelerates from 0 - 12 m/s over a distance of +5.2 m. You know that the coefficient of friction between the object and the ground is .58, so what is its mass? |
| -5.30 m/s/s  1.87 m | 11. A 15.0 kg block of wood with a kinetic coefficient of .370 is sliding to the right at 4.45 m/s is stopped by friction and a force of 25.0 N to the left. What is its deceleration? In what distance does it stop? |
| -23.2 m/s/s  -25,900 N | 12. The 1835 kg Batmobile needs to stop from a speed of 48.2 m/s. Its tires have a coefficient of friction of .93 with the road, and Batman goes to full reverse thrusters on his jet engines. What would be his acceleration if he stopped in a distance of 50.0 m? What additional stopping force does he need to do this? |
| -8.40 m/s/s  -437 kN  .499 | 13. An 89,320 kg airplane landing at 83.5 m/s must stop in a distance of 415 m. The engines can generate 313 kN of reverse thrust. What must be the deceleration of the airplane? What additional force of friction from the tires does the plane need to stop? What is the minimum coefficient of friction that must exist between the tires of the plane and the runway? |
| -5.75 m/s/s  -42.8 N (left) | 14. An 18.5 kg block of orthoclase chondritic basalt has a coefficient of .350 between it and the floor. It is sliding to the right at 6.72 m/s and stops in a distance of 3.93 m under the influence of friction, and another force. What is its deceleration? What is the magnitude and direction of this other force? |
| 4.9 m  -3.2 m/s/s  -9.4 N (to the left) | 15. An 8.12 kg block of wood is moving to the right with at 4.5 m/s. There is a coefficient of kinetic friction of .21 between the wood and the floor. If no other force acts along the ground, in what distance will the block stop? If the block stops sliding in 3.15 m. What is the acceleration of the block? What other force besides friction must be applied to the block? |
|  | Problems 16 – 20 are problems like the skill set and test |
| 134 N | 16. Kate exerts a force to the right on a 24.5 kg box that accelerates at 2.31 m/s/s in the direction he pushes. What force is she pushing with if the coefficient of kinetic friction is 0.320 between the box and the floor? |
| 5.66 m/s/s | 17. Ferdinand exerts a force of 283 N to the right on a 27.3 kg box where there is a coefficient of kinetic friction of 0.480 between the box and the floor. What is the acceleration of the box assuming it is already sliding to the right? |
| 0.37 | 18. James pushes a box with a mass of 45 kg along the floor. He exerts a force of 258 N to the right and the box accelerates at 2.1 m/s/s to the right. What must be the coefficient of friction between the box and the floor? |
| 0.38 | 19. Kelsey pushes a box with a mass of 35 kg along the floor. She exerts a force of 213 N to the right and the box accelerates at 2.4 m/s/s to the right. What must be the coefficient of friction between the box and the floor? |
| 5.5 m/s/s | 20. What is the acceleration if you exert 27 N of force to the right on a 4.0 kg object on a level surface where the coefficient of kinetic friction is 0.13? (Assume it is already sliding to the right) |