

NAME _____ per _____ date _____ mailbox _____

CALCULATING FORCE WORKSHEET

Calculate the force in the following problems by using the equation:

$$\text{Force} = \text{mass} \times \text{acceleration} \quad \mathbf{F = m \times a}$$

Be sure to **(1) ALWAYS** write the equation, **(2)** plug in the numbers and units, and **(3)** give the answer with the correct units. (Disregard friction)

Conversion factor - (1000 grams equals 1kilogram) or (1 gram = .001 kilograms)

1. A man hits a golf ball (0.042kg) which accelerates at a rate of 20 m/s^2 . What amount of force acted on the ball?
2. You give a shopping cart a shove down the aisle. The cart is full of groceries and has a mass of 18 kg. The cart accelerates at a rate of 3 m/s^2 . How much force did you exert on the cart?
3. The wind pushes a paper cup along the sand at a beach. The cup has a mass of 0.25 kg and accelerates at a rate of 5 m/s^2 . How much force is the wind exerting on the cup?
4. You push a friend sitting on a swing. She has a mass of 50 kg and accelerates at a rate of 4 m/s^2 . Find the force you exerted.
5. How much force would it take to push another, larger friend who has a mass of 70 kg to accelerate at the same rate of 4 m/s^2 ?

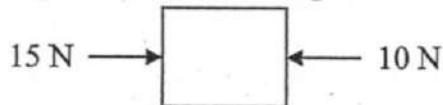
6. A worker drops his hammer off the roof of a house. The hammer has a mass of 2500g. Gravity accelerates objects on earth at 9.8 m/s^2 . How much force does the earth apply to the hammer?
7. A boy skips a stone (2.5grams) across the surface of a pond. He throws the stone with 5 newton of force. What was the stone's acceleration?
8. A woman hits a golf ball with a mass of (45g) with a force of 5 newton. What is the acceleration rate of the ball?
9. You give a shopping cart a shove down the second isle. The cart is full of groceries and has a mass of 18 kg. You apply 55N of force. What is the acceleration for the cart full of groceries?
10. You push your friend again sitting on a swing with 200N of force. She accelerates at a rate of 5 m/s^2 . What is the friend's mass?
11. A boy drops his toy off the bunk bed. The distance to the floor is 2.5m. It takes one second to reach the floor. Gravity accelerates objects on earth at 9.8 m/s^2 . The earth's gravity applies 50 newton of force to the toy? What is the toy's mass?
12. Children playing race match box cars across the floor. One car has a final velocity of 5 m/s . From start to finish the race is only a second. The mass of the car 4grams. How hard did the child push the car?

Name _____ Date _____ Period _____

Force Practice Problems

1. Describe Force - _____

2. A box is being pushed by two stellar science students, one on each side of the box. Lindsey is pushing the box with a force of 10 N to the left. Taylor is pushing the box with a force of 15 N to the right. Who is the stronger individual and what is the net force and direction on the box?



3. What is the force of an object with a mass of 20 kg and an acceleration of 5 m/s²?
4. Calculate the acceleration of a 150 kg object that is moved with a force of 300N.
5. What is the mass of an object that is accelerating 60 m/s² when a force of 3000N is exerted?
6. After shot putter throws the shot, she is no longer accelerating it with a force. The shot now falls into the pit. What is the shot's acceleration as it "falls" to the pit?
7. What net force is required to accelerate a car at a rate of 2 m/s² if the car has a mass of 3,000 kg?

8. A 10 kg bowling ball would require what force to accelerate down an alleyway at a rate of 3 m/s^2 ?
9. Nathan has a car that accelerates at 5 m/s^2 . If the car has a mass of 1000 kg, how much force does the car produce?
10. What is the mass of a falling rock if it produces a force of 147 N? (Hint: Gravity's Acceleration)
11. What is the mass of a truck if it produces a force of 14,000 N while accelerating at a rate of 5 m/s^2 ?
12. What is the acceleration of softball if it has a mass of 0.5 kg and hits the catcher's glove with a force of 25 N?
13. Your own car has a mass of 2000 kg. If your car produces a force of 5000 N, how fast will it accelerate?
14. Alex switches his car to run on nitrous oxide fuel. The nitrous oxide allows his car to develop 10,000 N of force. What is Alex's acceleration if his car has a mass of 500 kg?
15. What changes depending on location in the universe, mass or weight? Explain why it changes.

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CALCULATING FORCE WORKSHEET

Calculate the force in the following problems by using the equation: $1\text{ N} = 1\text{ kg (m/s}^2\text{)}$

Force = mass x acceleration $F = m \times a$

Be sure to (1) ALWAYS write the equation, (2) plug in the numbers and units, and (3) give the answer with the correct units. (Disregard friction) *

Conversion factor - (1000 grams equals 1 kilogram) or (1 gram = .001 kilograms)

Gravity is a force, $\text{Accel} = 9.8\text{ m/s}^2$
Weight is a measure of force. Mass is not.

Force

$$F = m \times A \quad \text{units} = \text{N} \quad \text{Mass} \quad m = F/A \quad \text{units kg} \quad \text{Acceleration} \quad A = F/m \quad \text{units m/s}^2$$

1. A man hits a golf ball (0.2 kg) which accelerates at a rate of 20 m/s^2 . What amount of force acted on the ball?

$$F = m(A) \quad | \quad F = 0.2\text{ kg} (20\text{ m/s}^2) \quad | \quad F = 4\text{ N}$$

2. You give a shopping cart a shove down the aisle. The cart is full of groceries and has a mass of 18 kg. The cart accelerates at a rate of 3 m/s^2 . How much force did you exert on the cart?

$$F = m(A) \quad | \quad F = 18\text{ kg} (3\text{ m/s}^2) \quad | \quad F = 54\text{ N}$$

3. The wind pushes a paper cup along the sand at a beach. The cup has a mass of 0.25 kg and accelerates at a rate of 5 m/s^2 . How much force (in newtons) is the wind exerting on the cup?

$$F = m(A) \quad | \quad F = 0.25\text{ kg} (5\text{ m/s}^2) \quad | \quad F = 1.25\text{ N}$$

4. You push a friend sitting on a swing. She has a mass of 50 kg and accelerates at a rate of 4 m/s^2 . Find the force you exerted.

$$F = m(A) \quad | \quad F = 50\text{ kg} (4\text{ m/s}^2) \quad | \quad F = 200\text{ N}$$

5. How much force would it take to push another, larger friend who has a mass of 70 kg to accelerate at the same rate of 4 m/s^2 ?

$$F = m(A) \quad | \quad F = 70\text{ kg} \times 4\text{ m/s}^2 \quad | \quad F = 280\text{ N}$$

6. A worker drops his hammer off the roof of a house. The hammer has a mass of 2500 grams. Gravity accelerates objects on earth at 9.8 m/s^2 . How much force does the earth apply to the hammer?

$$F = m(A) \quad \Bigg| \quad F = 2.5 \text{ kg} \times 9.8 \text{ m/s}^2 \quad \Bigg| \quad F = 24.5 \text{ N}$$

7. A boy skips a stone (2.5grams) across the surface of a pond. He throws the stone with 5 newton of force. What was the stone's acceleration?

$$A = F/m \quad \Bigg| \quad A = \frac{5 \text{ N}}{0.0025 \text{ kg}} \quad \Bigg| \quad A = 2000 \text{ m/s}^2$$

8. A woman hits a golf ball with a mass of 45g with a force of 5 newton. What is the acceleration rate of the ball?

$$A = F/m \quad \Bigg| \quad A = \frac{5 \text{ N}}{0.045 \text{ kg}} \quad \Bigg| \quad A = 111.1 \text{ m/s}^2$$

9. You give a shopping cart a shove down the second isle. The cart is full of groceries and has a mass of 18 kg. You apply 55N of force. What is the acceleration for the cart full of groceries?

$$A = F/m \quad \Bigg| \quad A = \frac{55 \text{ N}}{18 \text{ kg}} \quad \Bigg| \quad A = 3.05 \text{ m/s}^2$$

10. You push your friend again sitting on a swing with 200N of force. She accelerates at a rate of 5 m/s^2 . What is the friend's mass?

$$M = F/A \quad \Bigg| \quad M = \frac{200 \text{ N}}{5 \text{ m/s}^2} \quad \Bigg| \quad M = 40 \text{ kg}$$

11. A boy drops his toy off the bunk bed. The distance to the floor is 2.5m. It takes one second to reach the floor. Gravity accelerates objects on earth at 9.8 m/s^2 . The earth's gravity applies 50 newton of force to the toy? What is the toy's mass?

$$M = F/A \quad \Bigg| \quad M = \frac{50 \text{ N}}{9.8 \text{ m/s}^2} \quad \Bigg| \quad M = 5.1 \text{ kg}$$

12. Children playing race match box cars across the floor. One car has a final velocity of 5 m/s . From start to finish the race is only a second. The mass of the car 4grams. How hard did the child push the car?

$$F = m(A) \quad \Bigg| \quad F = (4 \text{ g}) (5 \text{ m/s}^2) \quad \Bigg| \quad F = 20 \text{ N} \quad A = 5 \text{ m/s}^2$$

newton (N) international unit of force, $\left\{ \begin{array}{l} 1 \text{ N is required to accelerate} \\ 1 \text{ kg to } 1 \text{ m/s}^2 \end{array} \right.$

Name

Key

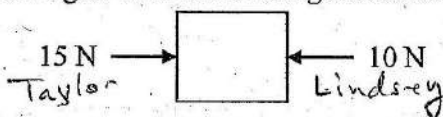
Date

2019

Period

Force Practice Problems

1. Describe Force - the energy or strength required to move an object, (displace) and there by having accelerated it.
2. A box is being pushed by two stellar science students, one on each side of the box. Lindsey is pushing the box with a force of 10 N to the left. Taylor is pushing the box with a force of 15 N to the right. Who is the stronger individual and what is the net force and direction on the box?



Assuming they are pushing w/ max effort... Taylor.

(→ 5 N to the right)

3. What is the force of an object with a mass of 20 kg and an acceleration of 5 m/s²?

$$F = m(A) \quad F = 20 \text{ kg} \times 5 \text{ m/s}^2 \quad F = 100 \text{ N}$$

4. Calculate the acceleration of a 150 kg object that is moved with a force of 300 N.

$$F = m(A) \quad F = 150 \text{ kg} \times A \quad \frac{300 \text{ N}}{150 \text{ kg}} = A \quad A = 3 \text{ m/s}^2$$

↳ $A = \frac{F}{m}$

5. What is the mass of an object that is accelerating 60 m/s² when a force of 3000 N is exerted?

$$F = m(A) \rightarrow m = \frac{F}{A} \quad m = \frac{3000 \text{ N}}{60 \text{ m/s}^2} \quad m = 50 \text{ kg}$$

6. After shot putter throws the shot, she is no longer accelerating it with a force. The shot now falls into the pit. What is the shot's acceleration as it "falls" to the pit?

$$9.8 \text{ m/s}^2$$

7. What net force is required to accelerate a car at a rate of 2 m/s² if the car has a mass of 3,000 kg?

$$F = m(A) \quad F = 2 \text{ m/s}^2 \times 3000 \text{ kg}$$

$$F = 6000 \text{ N}$$

$$\rightarrow F = m(A) \quad F = 10 \text{ kg} (3 \text{ m/s}^2) \quad F = 30 \text{ N}$$

8. A 10 kg bowling ball would require what force to accelerate down an alleyway at a rate of 3 m/s²?
 9. Nathan has a car that accelerates at 5 m/s². If the car has a mass of 1000 kg, how much force does the car produce?

$$F = 1000 \text{ kg} (5 \text{ m/s}^2) \quad F = 5000 \text{ N}$$

10. What is the mass of a falling rock if it produces a force of 147 N? (Hint: Gravities Acceleration) 9.8 m/s^2

$$m = \frac{F}{A} \quad m = \frac{147 \text{ N}}{9.8 \text{ m/s}^2} \quad m = 15 \text{ kg}$$

11. What is the mass of a truck if it produces a force of 14,000 N while accelerating at a rate of 5 m/s²?

$$m = \frac{F}{A} \quad m = \frac{14,000 \text{ N}}{5 \text{ m/s}^2} \quad m = 2800 \text{ kg}$$

12. What is the acceleration of softball if it has a mass of 0.5 kg and hits the catcher's glove with a force of 25 N?

$$A = \frac{F}{m} \quad A = \frac{25 \text{ N}}{0.5 \text{ kg}} \quad A = 50 \text{ m/s}^2$$

13. Your own car has a mass of 2000 kg. If your car produces a force of 5000 N, how fast will it accelerate?

$$A = \frac{F}{m} \quad A = \frac{5000 \text{ N}}{2000 \text{ kg}} \quad A = 2.5 \text{ m/s}^2$$

14. Alex switches his car to run on nitrous oxide fuel. The nitrous oxide allows his car to develop 10,000 N of force. What is Alex's acceleration if his car has a mass of 500 kg?

$$F = m(A) \rightarrow A = \frac{F}{m} \rightarrow A = \frac{10,000 \text{ N}}{500 \text{ kg}} \quad A = 20 \text{ m/s}^2$$

15. What changes depending on location in the universe, mass or weight? Explain why it changes.

mass cannot change -- weight however
is the force of gravity on object, &
changes dependent on the planet.