

# Physical Science Chapter 6 Calculating Force-B

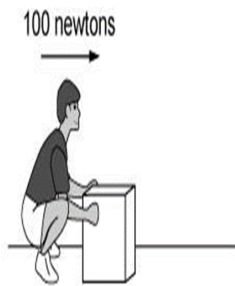
(Do not write on this sheet)

Show the set up in the equation for each problem

Force equals mass times distance, or  $F = m \times a$

## Problems:

1. Assume that a catcher in a professional baseball game exerts a force of 65.0 N to stop the ball. If the baseball has a mass of 0.145 kg, what is its acceleration as it is being caught?
2. A 214 kg boat is sinking in the ocean. The force of gravity that draws the boat down is partially offset by the buoyant force of the water, so that the net unbalanced force on the boat is 1310 N. What is the acceleration of the boat?
3. The gravitational force that Earth exerts on the moon equals  $2.03 \times 10^{20}$  N. The moon's mass equals  $7.35 \times 10^{22}$  kg. What is the acceleration of the moon due to Earth's gravitational pull?
4. A type of elevator called a cage is used to raise and lower miners in a mine shaft. Suppose the cage carries a group of miners down the shaft. If the unbalanced force on the cage is 60 N, and the mass of the loaded cage is  $1.50 \times 10^2$  kg, what is the acceleration of on the cage?
5. The tallest man-made structure at the present is the Warszawa Radio mast in Warsaw, Poland. The radio mast rises 646 m above the ground, nearly 200m more that the Sears tower in Chicago. Suppose a worker at the top of the Warszawa Radio mast accidentally knocks a tool off the tower. If the force action on it is 3.6 N, and its acceleration is  $9.8\text{m/s}^2$ , what is the tool's mass?



6. The picture below shows Jamal pushing with a 100-Newton (N) force on a large box. Neither Jamal nor the box move when he pushes on it. What force is the box applying on Jamal?

- A. a 0 N force in the opposite direction that Jamal is pushing it
- B. a 20 N force in the opposite direction that Jamal is pushing it
- C. a 100 N force in the opposite direction that Jamal is pushing it
- D. a 60 N force in the opposite direction that Jamal is pushing it

7. Newton's third law explains why a balloon rocket moves as air escapes. Which of the following is Newton's third law?

- A. Objects at rest remain at rest, unless acted upon by an outside force.
- B. The force of impact will increase with mass and acceleration.
- C. For every force there is an equal and opposite reaction force.
- D. Acceleration is always proportional to the force applied.

8. Jordan has a twin sister, Kathy. Jordan weighs 56 kilograms, and Kathy weighs 25 kilograms. Jordan and Kathy like to play on the swing set at the park. Their father pushes each of them until they are swinging to the same height. Which is true about the forces at work?

- A. Kathy applied more force to the swing set than to Jordan.
- B. Their father applied more force to Kathy than to Jordan.
- C. Their father applied less force to Kathy than to Jordan.
- D. Kathy applied more force to her father than to Jordan.

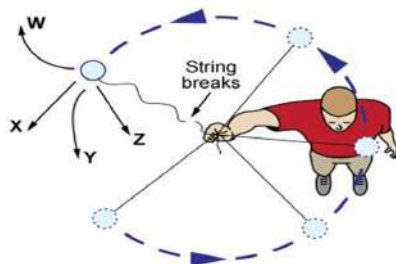
9. Wayne wants to become a lifeguard. One part of the lifeguard test, he has to float in the pool for five minutes. Why does Wayne float instead of sinking to the bottom of the pool?

- E. The water pushes Wayne up against gravity.
- F. Gravity pushes Wayne up against the water.
- G. Wayne does not weigh very much.
- H. Wayne weighs too much.

10. A 15-kilogram mass weighs 60.0 newtons on planet X. The mass is allowed to fall freely from rest near the surface of the planet. What is the acceleration of the mass after falling for 6.0 seconds?

- A.  $0.25 \text{ m/s}^2$
- B.  $4.0 \text{ m/s}^2$
- C.  $10.0 \text{ m/s}^2$
- D.  $24 \text{ m/s}^2$

11.



Assume that the force of gravity is not operating on the ball. According to Newton's law of inertia, which letter represents the direction the ball will travel when the string breaks?

- A. W
- B. X
- C. Y
- D. Z



17 The Ortiz family has arrived at the beach. The table below shows their items and the mass of each item.

**Beach Items**

Items to Carry (in kilograms)	Mass
Cooler	8
Books	4
Towels	2
Chair	3
Umbrella	3

The parents have to carry the two things that take the **most** force to lift. The children have to carry the things that take the **least** force to lift. Which two items should the parents carry?

- A. umbrella and cooler
- B. towels and umbrella
- C. books and chair
- D. books and cooler

18.

An eighth-grade science teacher wants to demonstrate Newton's laws. She moves the lab tables to the side of the classroom and sets up two rolling office chairs at the back of the room. She asks one student who weighs 85 pounds to sit in one chair, and another student who weighs 130 pounds to sit in the other chair. The teacher then asks a third student to give each seated student a push with an equal force.

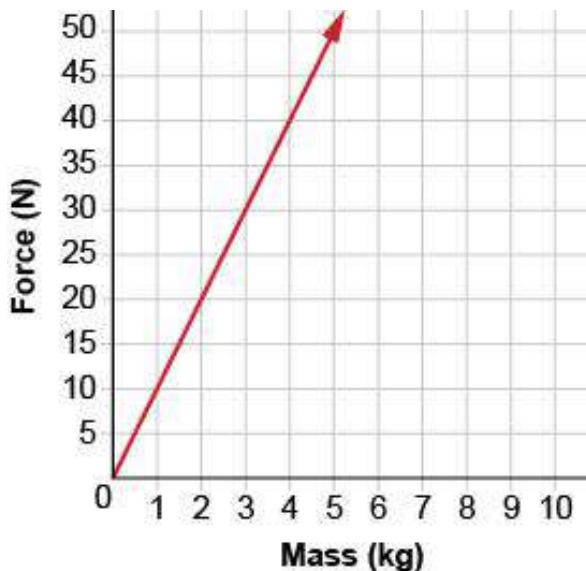
If the students are pushed for the same amount of time, select all that would happen to the students in the office chairs.

- A. The lighter student travels a shorter distance than the heavier student,
- B. The lighter student travels a longer distance than the heavier student.
- C. The lighter student's weight causes more frictional force on the chair.
- D. The heavier student requires a larger force to stop moving.
- E. Both students thrust forward for a short period of time when the chairs stop.
- F. The force of gravity works more on the heavier student than on the lighter student.



19.

The graph shows the relationship between mass (in kilograms) and gravitational force (in newtons).



How does the force change as an object's mass increases?

- A. the force fluctuates
- B. the force increases
- C. the force decreases
- D. the force stays constant

20 A girl weighing 400 newtons is on a dock and exerts a force of 100 newtons on a sailboat weighing 10,000 newtons as she pushes it away from the dock. How much force does the sailboat exert on the girl?

- A. 25 N
- B. 100 N
- C. 400 N
- D. 10,000