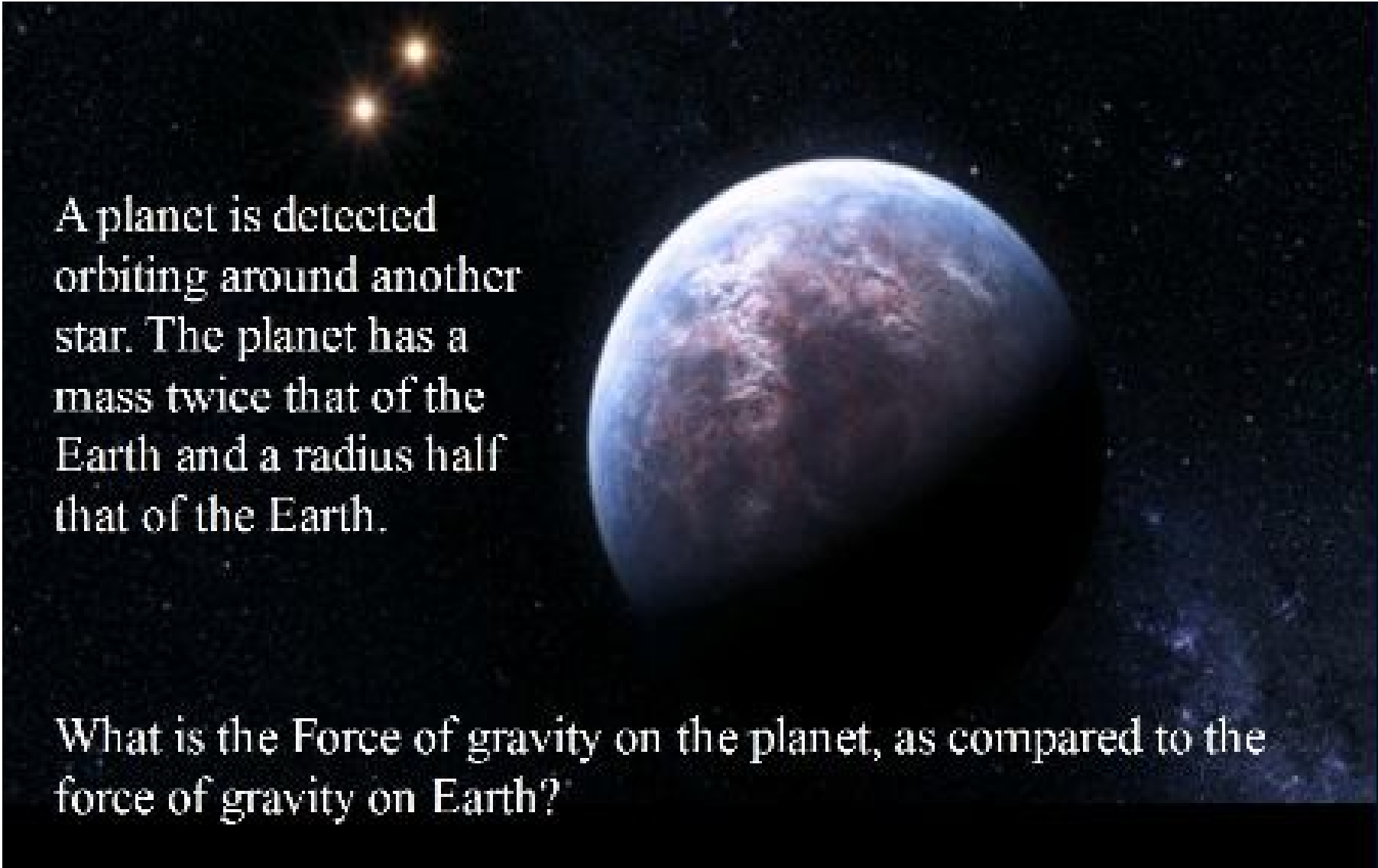


Snow day! Matt is pulling his sister on a sled at a constant velocity  $v$  with a force  $F$ , which acts an angle of  $\theta$  to the horizontal. The normal force exerted on the sled by the ground has magnitude:

- A)  $W - F\cos\theta$
- B)  $W - F\sin\theta$
- C)  $W$
- D)  $W + F\sin\theta$
- E)  $W + F\cos\theta$





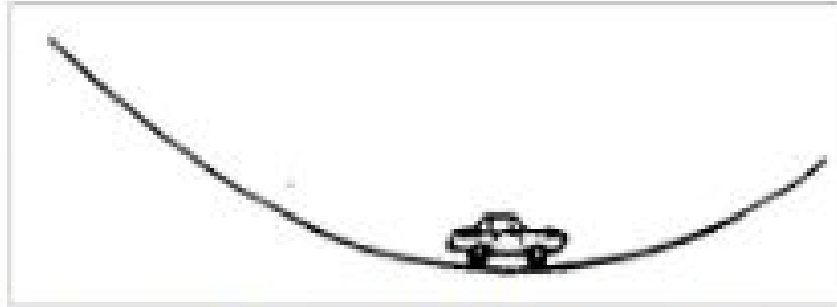
A planet is detected orbiting around another star. The planet has a mass twice that of the Earth and a radius half that of the Earth.

What is the Force of gravity on the planet, as compared to the force of gravity on Earth?

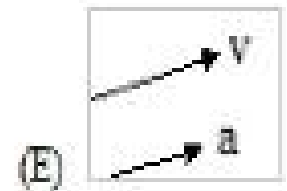
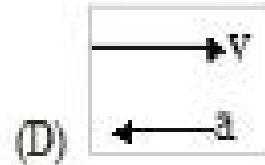
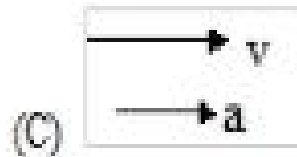
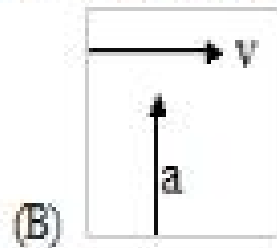
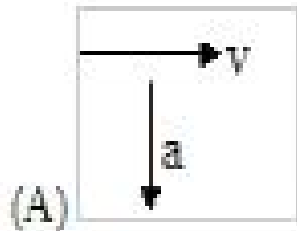


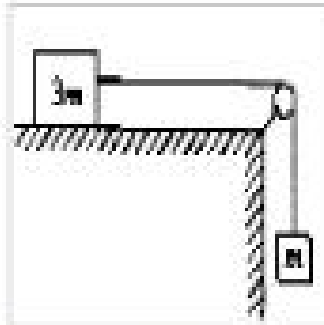
## The Millennium

Falcon accelerates to a top speed of  $180,000 \text{ m/s}$  in three seconds. If the engines apply a force of  $7,500,000,000 \text{ N}$ , what is the mass of the Millennium Falcon?



An automobile moves at constant speed down one hill and up another hill along the smoothly curved surface shown above. Which of the following diagrams best represents the directions of the velocity and the acceleration of the automobile at the instant that it is at the lowest position, as shown?





A block of mass  $3m$  can move without friction on a horizontal table. This block is attached to another block of mass  $m$  by a cord that passes over a frictionless pulley, as shown above. If the masses of the cord and the pulley are negligible, what is the magnitude of the acceleration of the descending block?

- (A) Zero    (B)  $g/4$     (C)  $g/3$     (D)  $2g/3$     (E)  $g$

A Smart car is moving east when the driver presses on the brake and the car slows down.

What is the direction of the acceleration?

And what is the direction of the net force?



- a) Acceleration is east and net force is east.
- b) Acceleration is east and net force is west.
- c) Acceleration is west and net force is east.
- d) Acceleration is west and net force is west.

A force of 100 N applied horizontally is required to push a 40 kg box at constant velocity across the floor. The coefficient of friction between the box and the floor is

- a) 0.25
- b) 2.5
- c) 0.5
- d) 5



Father Christmas ("Santa") is riding a 5 kg bicycle along a horizontal surface at 150 m/s. He is acted upon by a 10 N force of friction. If he stops peddling, how long will it take for the force to bring him to rest?



- a) 7500 seconds
- b) 75 seconds
- c) 300 seconds
- d) 2 seconds
- e) 3 seconds



If you eat *far* too much over Christmas, and your mass increases from  $M$  to  $1.5M$ , your acceleration due to gravity will be:

- a) 1.5 times as great
- b) 3 times as great
- c) 0.66 times as great
- d) Unchanged



A 10 kg computer and a 1 kg textbook are located 1 meter apart. The gravitational force that each mass exerts on the other is

- a)  $6.7 \times 10^{-9} \text{ N}$
- b)  $6.7 \times 10^{-10} \text{ N}$
- c)  $6.7 \times 10^{-11} \text{ N}$
- d)  $6.7 \times 10^{-12} \text{ N}$



A shopping cart is being pushed down an empty supermarket aisle at a constant velocity. If the shopping cart is being pushed with a force of 600N, what is the magnitude of the force of static friction?

- a) Greater than 600 N
- b) Exactly 600 N
- c) Less than 600 N



A Smart car is moving east when the driver presses on the brake and the car slows down.

Compared to the driving force of the car, the magnitude of frictional force is:



- a) Less
- b) The Same
- c) Greater

# Answers in Order

- 1) B
- 2) 8Fg
- 3) 125,000 kg
- 4) B
- 5) B
- 6) D
- 7) A
- 8) B
- 9) D
- 10) B
- 11) B
- 12) C