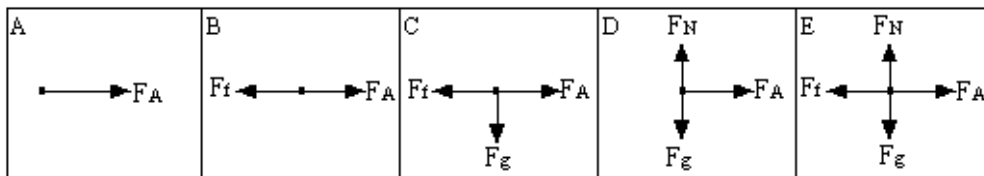


- D) 9.7 km 21 km
 E) 0 km 23 km

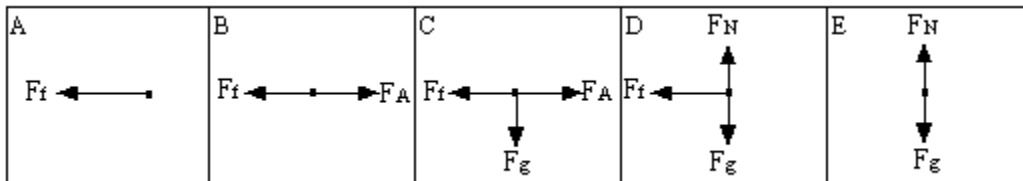
- 8 A boat that can travel at 4.0 km/h in still water crosses a river with a current of 2.0 km/h. At what angle must the boat be pointed upstream (that is, relative to its actual path) to go straight across the river?
 A) 27° B) 30° C) 60° D) 63° E) 90°
- 9 Which of the following fundamental forces is the strongest?
 A. gravitational C. weak nuclear
 B. electrostatic D. strong nuclear

- 10 A curling stone is pushed along the ice surface during its delivery. Which of the following free-body diagrams best represents the curling stone?



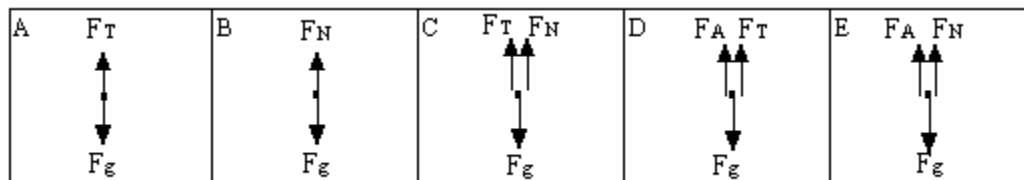
- A. A D. D
 B. B E. E
 C. C

- 11 A hockey puck slides along an ice surface shortly after it has left the hockey stick that propelled it. Which of the following free-body diagrams best represents the hockey puck?



- A. A D. D
 B. B E. E
 C. C

- 12 An elevator is suspended by a cable and moves upward. Which of the following free-body diagrams best represents the forces acting on the elevator?

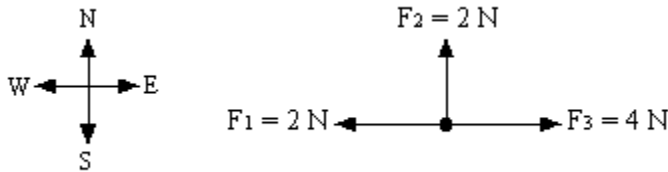


- A. A D. D

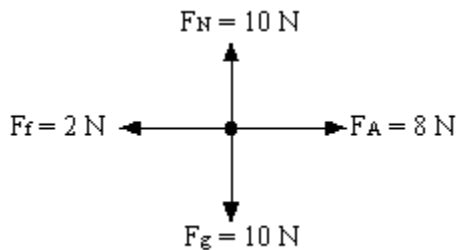
- B. B
- C. C

E. E

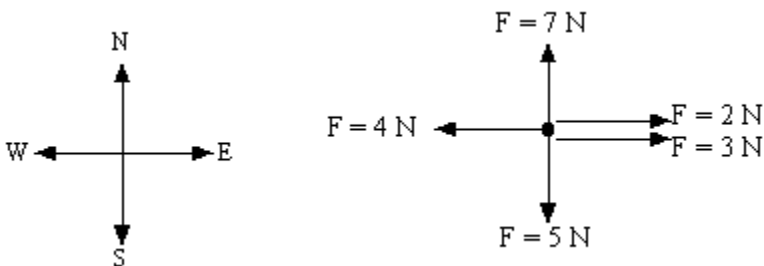
- 13 Study the free-body diagram below and choose the statement that best describes the object's motion.



- A. The object will accelerate north.
 - B. The object will be motionless.
 - C. The object will accelerate northeast.
 - D. The object will travel with uniform motion.
- 14 Study the free-body diagram below and choose the statement that best describes the dynamics of the situation.



- A. There is no net horizontal force.
 - B. The net force acting is 30 N.
 - C. The net horizontal force is 10 N.
 - D. The net force acting is 6 N.
- 15 Study the free-body diagram below and determine what additional force(s) would be required for the object to achieve uniform motion.



- A. 2 N [N] and 1 N [W]
 - B. 2 N [S] and 1 N [W]
 - C. 2 N [S] and 1 N [E]
 - D. 1 N [E]
- 16 Which one of nature's basic forces accounts for the ordinary force that you provide to push your little sister in a stroller?
 (a) gravitational (b) electrical/magnetic (c) strong nuclear (d) weak nuclear

- 17 Suppose that you were transported to a place where $g = 20 \text{ N/kg}$. Which statement would be correct?
- (a) You would have the same mass but would weigh more.
 - (b) You would have the same mass but would weigh less.
 - (c) You would have the same mass and weight.
 - (d) You would have less mass but would weigh more.
- 18 At the Earth's surface a person has a weight of 670 N. What is her mass?
- (a) 0 kg
 - (b) 68.4 kg
 - (c) 670 kg
 - (d) 6566 kg
- 19 The gravitational field strength on Planet SCISYHP is 5.0 flims/flam where on this strange planet the unit of weight is the flim, and the unit of mass is the flam. What is the weight of a 2.0 flam rock on SCISYHP?
- (a) 0.4 flims
 - (b) 2.5 flims
 - (c) 7 flims
 - (d) 10 flims
- 20 What does a free body diagram show?
- (a) an object floating in space
 - (b) all of the forces acting on an object
 - (c) an object as if there were no friction
 - (d) an object that you didn't have to pay for (hee! hee!)
- 21 What is the total displacement of a trip in which a person walks 17 km [N] and then a displacement of 29 km [E]? **Use Pythagorean Theorem and Trigonometry.**
- 22 The water in a river is moving downstream at 4.2 m/s with respect to the river bank. A fly is sitting on a cork that is moving with the stream. A boat is moving upstream. The boat can travel at 5.0 m/s in still water (or 5.0 m/s with respect to the stream). What is the velocity of the boat with respect to the fly?
- 23 You are in a car travelling at 13.0 m/s toward the North. A snowmobile located in front of you is also going North but at 7.2 m/s. Relative to a passenger on the snowmobile, what is your velocity?
- 24 If a person's displacement relative to the earth is 8.0 m [W] and a car's displacement relative to that person is 3.0 m [E], then what is the car's displacement relative to the earth?
- 25 A motorboat heads due east at 18 m/s across a river that flows due north at 11.0 m/s.
- (A) What is the resultant velocity of the boat?
 - (B) If the river is 136 m wide, how long does it take the motorboat to reach the other side?
 - (C) How far downstream is the boat when it reaches the other side of the river?
- 26 The current in a river moves at 3.6 m/s [N]. How fast and in what direction must a swimmer move through the water in order to have a resultant velocity relative to the river bank of 7.2 m/s [W]?

- 27 A pilot in a solar powered air plane has an air speed of 125 km/h. The pilot wants to fly directly North from Corner Brook to St. Anthony, a distance of 425 km. When she takes off, the wind is blowing from the East with a speed of 45 km/h.
- (A) In what direction should the pilot fly in order to seek her destination?
 - (B) What is her velocity with respect to the ground?
 - (C) How long did it take the pilot to fly to St. Anthony?
- 28 A man attempts to swim at 6.2 m/s due west across a river which flows south with a 2.8 m/s current.
- (A) What will be his resultant velocity?
 - (B) How long does it take him to cross the river, if the river is 1500 m wide?
 - (C) How far down stream does he land?
- 29
- (A) In what direction must the man in the previous question swim at his 6.2 m/s speed to get directly across the river?
 - (B) If he does get directly across the river, what was his resultant velocity in crossing the river?
 - (C) If the river is 1500 m wide, how long will it take him to cross the river?
- 30 A helicopter is traveling north at 210 km/h relative to a car. The car is traveling at 30.0 km/h southward relative to the earth. Find the velocity of the helicopter relative to the earth.
- 31 The current in a river is traveling southward at 3.1 m/s. A barge in the current is traveling northwards at a speed of 5.2 m/s relative to the water. The skipper on the barge is traveling west, relative to the barge, at 2.2 m/s. Find the velocity of the skipper relative to the earth.
- 32 A rowboat is able to move at 1.50 m/s in still water. It is pointed directly east. The current in the river is moving at 0.75 m/s, due South and is carrying the boat off course.
- (A) Calculate the velocity of the rowboat relative to the Earth.
 - (B) If the river is 250 m long, how long will it take to cross the river?
 - (C) How far downstream will the rowboat land?
- 33 Suppose that the rower in the boat in the previous question wished to actually move the boat directly East.
- (A) In what direction would she have to aim the boat to compensate for the current?
 - (B) What would be her resultant velocity?
 - (C) How long would it take to cross the river?
- 34 A small aircraft heads North from Southern Hr. to Clarenville, a distance of approximately 45 km, with an air speed of 190 km/hr. The pilot does not adjust for a Westerly wind which is blowing at 55 km/hr. Determine
- (A) the resultant speed of the plane,
 - (B) how much (in degrees) the plane will be blown off course,
 - (C) how many kilometers the pilot will be away from Clarenville if she lands directly East of the community.

- 35 A boat sets out from the north shore of a 200.0 m wide east-flowing river. The boat always faces due south but the current carries it 300.0 m downstream while crossing. The trip takes 2.0 min. Assume three significant digits.
- (A) What is the boat's displacement during the trip?
 - (B) What is the boat's average velocity during the trip?
 - (C) If the boat's velocity relative to the water is 1.7 m/s [S], what is the velocity of the current?
- 36 Use the component method of vector addition to find the resultant of the following three forces:
- A = 56 km, east
 - B = 11 km, 22° south of east
 - C = 88 km, 44° west of south
- 37 Chantal applied a force of 63 N [S 35° W] and David applied a force of 58 N [W 29° N]. Find the net force. **Use the component method.**
- 38 Three forces were applied to an object: 185 N [E], 165 m [N 60° E] and 195 m [E 60° S]. What is the unbalanced force acting on the object?

