

Mechanics - pretest (10795903)

Current Score: 0/32

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total	
Points	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/32

Description

This assignment has some questions to which you should not know the answers (in this case just use your intuition), but some questions should be very obvious for you. Please, apply your best effort, but do not spend more than one hour or an hour and a half (or 2 -3 minutes per a problem). Please, note => each question can be answered only ONCE!! After you submit your answer you cannot change it any more. It is useful to save your answers from time to time during the test (scroll down and click SUBMIT for Testing).

Instructions

For this test you are given ONLY ONE submission for each question. During this test you will NOT know if your answer is correct or wrong, you will NOT see the check mark (neither correct nor wrong). This test has 32 questions, you will see them one at a time.

1. 0/1 points

FCI1 [3230571]

Two metal balls are of the same size but one weighs twice as much as the other. The balls are dropped from the roof of a single story building at the same instant of time. The time it takes for the balls to reach the ground will be:

- (A) about half as long for the heavier ball as for the lighter one.
- (B) about half as long for the lighter ball as for the heavier one.
- (C) about the same for both balls.
- (D) considerably less for the heavier ball, but not necessarily half as long.
- (E) considerably less for the lighter ball, but not necessarily half as long.



2. 0/1 points

FCI2 [3230574]

The two metal balls from the previous problem roll off a horizontal table with the same speed. In this situation:

- (A) both balls hit the floor at approximately the same horizontal distance from the base of the table.
- (B) the heavier ball hits the floor at about half the horizontal distance from the base of the table than does the lighter ball.
- (C) the lighter ball hits the floor at about half the horizontal distance from the base of the table than does the heavier ball.
- (D) the heavier ball hits the floor considerably closer to the base of the table than the lighter ball, but not necessarily at half the horizontal distance.
- (E) the lighter ball hits the floor considerably closer to the base of the table than the heavier ball, but not necessarily at half the horizontal distance.



3. 0/1 points

FCI3 [3230576]

A stone is released from rest from the roof of a single story building and moving to the surface of the earth. The stone:

- (A) reaches the maximum speed quite soon after release and then falls at a constant speed thereafter.
- (B) speeds up as it falls because the gravitational attraction gets considerably stronger as the stone gets closer to earth.
- (C) constantly speeds up because of an almost constant force of gravity acting upon it.
- (D) falls because of the natural tendency of all objects to rest on the surface of the earth.
- (E) falls because of the combined effects of the force of gravity pushing it downward and the force of the air pushing it downward.

✘

4. 0/1 points

FCI4 [3230580]

A large truck collides head-on with a small compact car. During the collision:

- (A) the truck exerts a greater amount of force on the car than the car exerts on the truck.
- (B) the car exerts a greater amount of force on the truck than the truck exerts on the car.
- (C) neither exerts a force on the other, the car gets smashed simply because it gets in the way of the truck.
- (D) the truck exerts a force on the car but the car does not exert a force on the truck.
- (E) the truck exerts the same amount of force on the car as the car exerts on the truck.

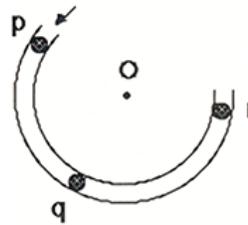
✘

5. 0/1 points

FCI5 [3230581]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THE QUESTION.

The accompanying figure shows a frictionless channel in the shape of a segment of a circle with center at "O". The channel has been anchored to a frictionless horizontal table top. You are looking down at the table. Forces exerted by the air are negligible. A ball is shot at high speed into the channel at "p" and exits at "r."



Consider the following distinct forces.

1. A downward force of gravity (points away from you).
2. A force exerted by the channel pointing from q to O.
3. A force in the direction of motion.
4. A force pointing from O to q.

Which of the above forces is (are) acting on the ball when it is within the frictionless channel at position "q"?

- (A) 1 only.
- (B) 1 and 2.
- (C) 1 and 3.
- (D) 1, 2, and 3.
- (E) 1, 3, and 4.

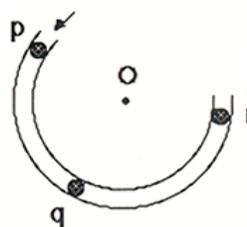
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6. 0/1 points

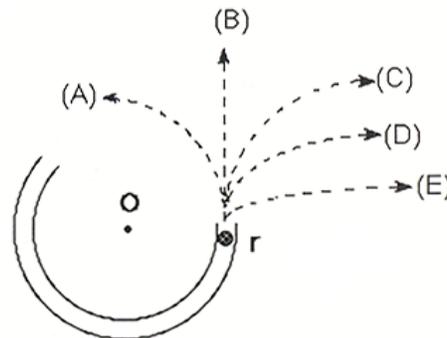
FCI6 [3230583]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THE QUESTION.

The accompanying figure shows a frictionless channel in the shape of a segment of a circle with center at "O". The channel has been anchored to a frictionless horizontal table top. You are looking down at the table. Forces exerted by the air are negligible. A ball is shot at high speed into the channel at "p" and exits at "r."



Which path in the figure at right would the ball most closely follow after it exits the channel at "r" and moves across the frictionless table top?



- (A)
- (B)
- (C)
- (D)
- (E)



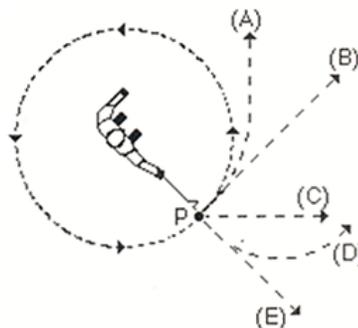
7. 0/1 points

FCI7 [3230584]

A steel ball is attached to a string and is swung in a circular path in a horizontal plane as illustrated in the accompanying figure.

At the point P indicated in the figure, the string suddenly breaks near the ball.

If these events are observed from directly above as in the figure, which path would the ball most closely follow after the string breaks?



- (A)
- (B)
- (C)
- (D)
- (E)



8. 0/1 points

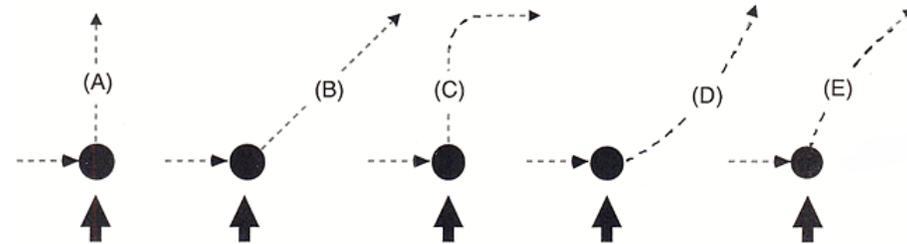
FC18 [3230587]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THIS QUESTION (AND THE FOLLOWING THREE).

The figure depicts a hockey puck sliding with a constant speed v_0 in a straight line from point "a" to point "b" on a frictionless horizontal surface. Forces exerted by the air are negligible. You are looking down on the puck. When the puck reaches point "b," it receives a swift horizontal kick in the direction of the heavy print arrow. Had the puck been at rest at point "b," then the kick would have set the puck in horizontal motion with a speed v_k in the direction of the kick.



Which of the paths below would the puck most closely follow after receiving the kick?



- (A)
- (B)
- (C)
- (D)
- (E)



9. 0/1 points

FC19 [3230588]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THIS QUESTION (AND THE FOLLOWING TWO).

The figure depicts a hockey puck sliding with a constant speed v_0 in a straight line from point "a" to point "b" on a frictionless horizontal surface. Forces exerted by the air are negligible. You are looking down on the puck. When the puck reaches point "b," it receives a swift horizontal kick in the direction of the heavy print arrow. Had the puck been at rest at point "b," then the kick would have set the puck in horizontal motion with a speed v_k in the direction of the kick.



The speed of the puck just after it receives the kick is:

- (A) equal to the speed " v_0 " it had before it received the kick.
- (B) equal to the speed " v_k " resulting from the kick and independent of the speed " v_0 ".
- (C) equal to the arithmetic sum of the speeds " v_0 " and " v_k ".
- (D) smaller than either of the speeds " v_0 " or " v_k ".
- (E) greater than either of the speeds " v_0 " or " v_k ", but less than the arithmetic sum of these two speeds.



10. 0/1 points

FC110 [3230590]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THIS QUESTION (AND THE FOLLOWING ONE).

The figure depicts a hockey puck sliding with a constant speed v_0 in a straight line from point "a" to point "b" on a frictionless horizontal surface. Forces exerted by the air are negligible. You are looking down on the puck. When the puck reaches point "b," it receives a swift horizontal kick in the direction of the heavy print arrow. Had the puck been at rest at point "b," then the kick would have set the puck in horizontal motion with a speed v_k in the direction of the kick.



Along the frictionless path you have chosen in question 8 (I.E. after receiving the kick), the speed of the puck after receiving the kick:

- (A) is constant.
- (B) continuously increases.
- (C) continuously decreases.
- (D) increases for a while and decreases thereafter.
- (E) is constant for a while and decreases thereafter.

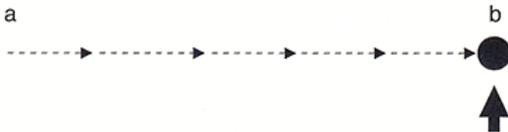


11. 0/1 points

FC111 [3230592]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THE QUESTION.

The figure depicts a hockey puck sliding with a constant speed v_0 in a straight line from point "a" to point "b" on a frictionless horizontal surface. Forces exerted by the air are negligible. You are looking down on the puck. When the puck reaches point "b," it receives a swift horizontal kick in the direction of the heavy print arrow. Had the puck been at rest at point "b," then the kick would have set the puck in horizontal motion with a speed v_k in the direction of the kick.



Along the frictionless path you have chosen in question 8, the main force(s) acting on the puck after receiving the kick is (are):

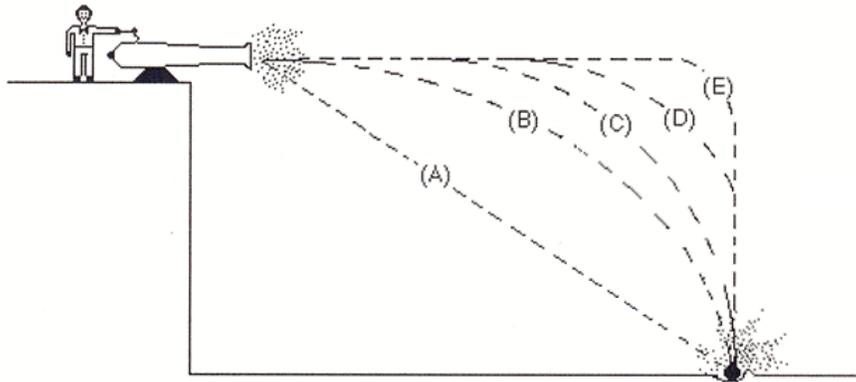
- (A) only a downward force of gravity (directed away from you watching down on the puck).
- (B) a downward force of gravity and a horizontal force in the direction of motion.
- (C) a downward force of gravity, an upward force exerted by the surface (directed at you), and a horizontal force in the direction of motion.
- (D) a downward force of gravity and an upward force exerted by the surface.
- (E) none. (No forces act on the puck.)



12. 0/1 points

FCI12 [3230593]

A ball is fired by a cannon from the top of a cliff as shown in the figure below. Which of the paths would the cannon ball most closely follow?



- (A)
- (B)
- (C)
- (D)
- (E)



13. 0/1 points

FCI13 [3230594]

A boy throws a steel ball straight up. Consider the motion of the ball only after it has left the boy's hand but before it touches the ground, and assume that forces exerted by the air are negligible. For these conditions, the force(s) acting on the ball is (are):

- (A) a downward force of gravity along with a steadily decreasing upward force.
- (B) a steadily decreasing upward force from the moment it leaves the boy's hand until it reaches its highest point; on the way down there is a steadily increasing downward force of gravity as the object gets closer to the earth.
- (C) an almost constant downward force of gravity along with an upward force that steadily decreases until the ball reaches its highest point; on the way down there is only a constant downward force of gravity.
- (D) an almost constant downward force of gravity only.
- (E) none of the above. The ball falls back to the ground because of its natural tendency to rest on the surface of the earth.

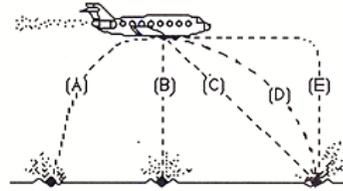


14. 0/1 points

FCI14 [3230595]

A bowling ball accidentally falls out of the cargo bay of an airliner as it flies along in a horizontal direction.

As observed by a person standing on the ground and viewing the plane as in the figure at right, which path would the bowling ball most closely follow after leaving the airplane?



- (A)
- (B)
- (C)
- (D)
- (E)



15. 0/1 points

FCI15 [3230596]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THE QUESTION .

A large truck breaks down on the road and receives a push back into town by a small compact car as shown in the figure below.



While the car, still pushing on the truck, is speeding up to get up to cruising speed:

- (A) the amount of force with which the car pushes on the truck is equal to that with which the truck pushes back on the car.
- (B) the amount of force with which the car pushes on the truck is smaller than that with which the truck pushes back on the car.
- (C) the amount of force with which the car pushes on the truck is greater than that with which the truck pushes back on the car.
- (D) the car's engine is running so the car pushes against the truck, but the truck's engine is not running so the truck cannot push back against the car. The truck is pushed forward simply because it is in the way of the car.
- (E) neither the car nor the truck exert any force on the other. The truck is pushed forward simply because it is in the way of the car.



16. 0/1 points

FC116 [3230598]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THE QUESTION .

A large truck breaks down on the road and receives a push back into town by a small compact car as shown in the figure below.



After the car reaches the constant cruising speed at which its driver wishes to push the truck:

- (A) the amount of force with which the car pushes on the truck is equal to that with which the truck pushes back on the car.
- (B) the amount of force with which the car pushes on the truck is smaller than that with which the truck pushes back on the car.
- (C) the amount of force with which the car pushes on the truck is greater than that with which the truck pushes back on the car.
- (D) the car's engine is running so the car pushes against the truck, but the truck's engine is not running so the truck cannot push back against the car. The truck is pushed forward simply because it is in the way of the car.
- (E) neither the car nor the truck exert any force on the other. The truck is pushed forward simply because it is in the way of the car.

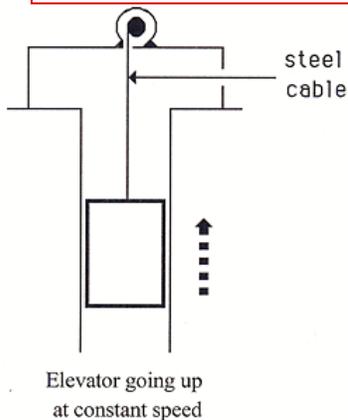


17. 0/1 points

FC117 [3230599]

An elevator is being lifted up an elevator shaft at a constant speed by a steel cable as shown in the figure below. All frictional effects are negligible (including air friction). In this situation, forces acting on the elevator are such that (considering their magnitudes):

- (A) the upward force by the cable is greater than the downward force of gravity.
- (B) the upward force by the cable is equal to the downward force of gravity.
- (C) the upward force by the cable is smaller than the downward force of gravity.
- (D) the upward force by the cable is greater than the sum of the downward force of gravity and a downward force due to the air.
- (E) none of the above. (The elevator goes up because the cable is being shortened, not because an upward force is exerted on the elevator by the cable.)



18. 0/1 points

FCI18 [3230600]

The figure below shows a boy swinging on a rope, starting at a point higher than A.

Consider the following possible individual forces:

1. A downward force of gravity.
2. A force exerted by the rope pointing from A to O.
3. A force in the direction of the boy's motion.
4. A force pointing from O to A.

Which of the above forces is (are) acting on the boy when he is at position A?



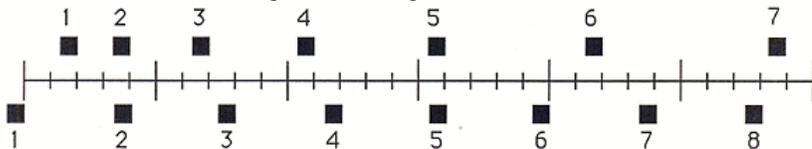
- (A) 1 only.
- (B) 1 and 2.
- (C) 1 and 3.
- (D) 1, 2, and 3.
- (E) 1, 3, and 4.



19. 0/1 points

FCI19 [3230602]

The positions of two blocks at successive 0.20-second time intervals are represented by the numbered squares in the figure below. The blocks are moving toward the right.



Do the blocks ever have the same speed?

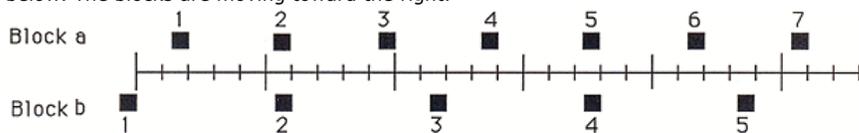
- (A) No.
- (B) Yes, at instant 2.
- (C) Yes, at instant 5.
- (D) Yes, at instants 2 and 5.
- (E) Yes, at some time during interval 3 to 4.



20. 0/1 points

FCI20 [3230603]

The positions of two blocks at successive 0.20-second time intervals are represented by the numbered squares in the figure below. The blocks are moving toward the right.



The accelerations of the blocks are related as follows:

- (A) The acceleration of "a" is greater than the acceleration of "b".
- (B) The acceleration of "a" equals the acceleration of "b". Both accelerations are greater than zero.
- (C) The acceleration of "b" is greater than the acceleration of "a".
- (D) The acceleration of "a" equals the acceleration of "b". Both accelerations are zero.
- (E) Not enough information is given to answer the question.

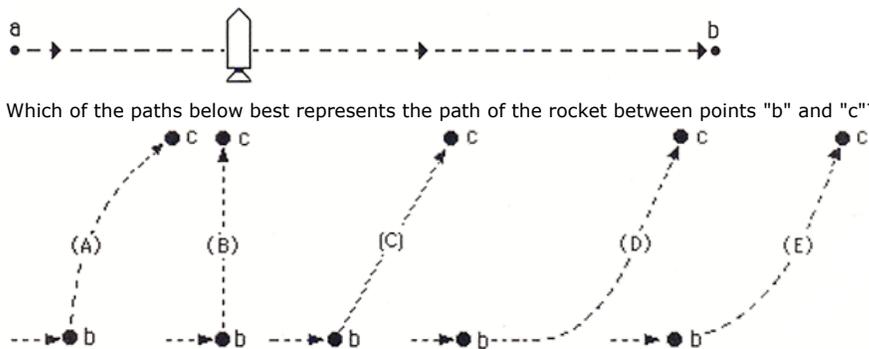


21. 0/1 points

FCI21 [3230605]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THE QUESTION (and the following three).

A rocket drifts sideways in outer space from point "a" to point "b" as shown below. The rocket is subject to no outside forces. Starting at position "b", the rocket's engine is turned on and produces a constant thrust (force on the rocket) at the right angle to the line "ab". The constant thrust is maintained until the rocket reaches a point "c" in space (see the pictures below).



- (A)
- (B)
- (C)
- (D)
- (E)

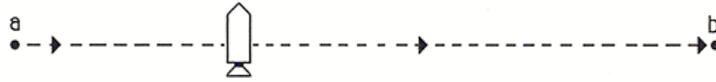


22. 0/1 points

FCI22 [3230608]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THE QUESTION (and the following two).

A rocket drifts sideways in outer space from point "a" to point "b" as shown below. The rocket is subject to no outside forces. Starting at position "b", the rocket's engine is turned on and produces a constant thrust (force on the rocket) at the right angle to the line "ab". The constant thrust is maintained until the rocket reaches a point "c" in space.



As the rocket moves from position "b" to position "c" (as in your answer to question 21), its speed is:

- (A) constant.
- (B) continuously increasing.
- (C) continuously decreasing.
- (D) increasing for a while and constant thereafter.
- (E) constant for a while and decreasing thereafter.

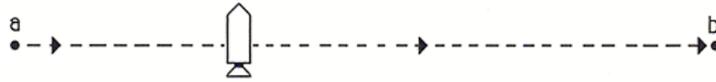


23. 0/1 points

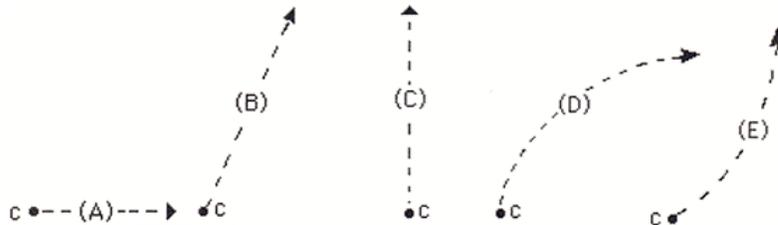
FCI23 [3230609]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THE QUESTION (and the following one).

A rocket drifts sideways in outer space from point "a" to point "b" as shown below. The rocket is subject to no outside forces. Starting at position "b", the rocket's engine is turned on and produces a constant thrust (force on the rocket) at the right angle to the line "ab". The constant thrust is maintained until the rocket reaches a point "c" in space.



At point "c" the rocket's engine is turned off and the thrust immediately drops to zero. Which of the paths below will the rocket follow beyond point "c"?



- (A)
- (B)
- (C)
- (D)
- (E)



24. 0/1 points

FCI24 [3230611]

USE THE STATEMENT AND FIGURE BELOW TO ANSWER THE QUESTION (and the following one).

A rocket drifts sideways in outer space from point "a" to point "b" as shown below. The rocket is subject to no outside forces. Starting at position "b", the rocket's engine is turned on and produces a constant thrust (force on the rocket) at the right angle to the line "ab". The constant thrust is maintained until the rocket reaches a point "c" in space.



At point "c" the rocket's engine is turned off and the thrust immediately drops to zero. Beyond position "c" the speed of the rocket is:

- (A) constant.
- (B) continuously increasing.
- (C) continuously decreasing.
- (D) increasing for a while and constant thereafter.
- (E) constant for a while and decreasing thereafter.



25. 0/1 points

FCI25 [3230612]

A woman exerts a constant horizontal force on a large box. As a result, the box moves across a horizontal floor at a constant speed " v_0 ".

The constant horizontal force applied by the woman:

- (A) has the same magnitude as the weight of the box.
- (B) is greater than the weight of the box.
- (C) has the same magnitude as the total force which resists the motion of the box.
- (D) is greater than the total force which resists the motion of the box.
- (E) is greater than either the weight of the box or the total force which resists its motion.



26. 0/1 points

FCI26 [3230613]

If the woman in the previous question doubles the constant horizontal force that she exerts on the box to push it on the same horizontal floor, the box then moves:

- (A) with a constant speed that is double the speed " v_0 " in the previous question.
- (B) with a constant speed that is greater than the speed " v_0 " in the previous question, but not necessarily twice as great.
- (C) for a while with a speed that is constant and greater than the speed " v_0 " in the previous question, then with a speed that increases thereafter.
- (D) for a while with an increasing speed, then with a constant speed thereafter.
- (E) with a continuously increasing speed.



27. 0/1 points

FCI27 [3230615]

If the woman in question 25 suddenly stops applying a horizontal force to the box, then the box will:

- (A) immediately come to a stop.
- (B) continue moving at a constant speed for a while and then slow to a stop.
- (C) immediately start slowing to a stop.
- (D) continue at a constant speed.
- (E) increase its speed for a while and then start slowing to a stop.



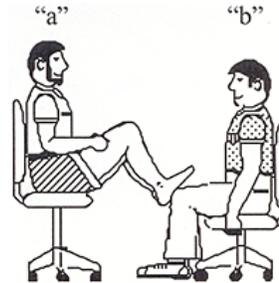
28. 0/1 points

FCI28 [3230616]

In the figure at right, student "a" has a mass of 95 kg and student "b" has a mass of 77 kg. They sit in identical office chairs facing each other.

Student "a" places his bare feet on the knees of student "b", as shown. Student "a" then suddenly pushes outward with his feet, causing both chairs to move.

During the push and while the students are still touching one another:



- (A) neither student exerts a force on the other.
- (B) student "a" exerts a force on student "b", but "b" does not exert any force on "a".
- (C) each student exerts a force on the other, but "b" exerts the larger force.
- (D) each student exerts a force on the other, but "a" exerts the larger force.
- (E) each student exerts the same amount of force on the other.



29. 0/1 points

FCI29 [3230617]

An empty office chair is at rest on a floor. Consider the following forces:

1. A downward force of gravity.
2. An upward force exerted by the floor.
3. A net downward force exerted by the air.

Which of the forces is (are) acting on the office chair?

- (A) 1 only.
- (B) 1 and 2.
- (C) 2 and 3.
- (D) 1, 2, and 3.
- (E) none of the forces. (Since the chair is at rest there are no forces acting on it.)



30. 0/1 points

FCI30 [3230619]

Despite a very strong wind, a tennis player manages to hit a tennis ball with her racquet so that the ball passes over the net and lands in her opponent's court.

Consider the following forces:

1. A downward force of gravity.
2. A force by the "hit".
3. A force exerted by the air.

Which of these forces is (are) acting on the tennis ball after it has left contact with the racquet and before it touches the ground?

- (A) 1 only.
- (B) 1 and 2.
- (C) 1 and 3.
- (D) 2 and 3.
- (E) 1, 2, and 3.



31. 0/1 points

FCI31 [3230623]

When a rubber ball dropped from rest bounces off the floor, its direction of motion is reversed because;

- (A) energy of the ball is conserved.
- (B) momentum of the ball is conserved.
- (C) the floor exerts a force on the ball that stops its fall and then drives it upward.
- (D) the floor is in the way but the ball has to keep moving.
- (E) none of the above.



32. 0/1 points

FCI32 [3230624]

Two people, a large man and a boy, are pulling as hard as they can on two ropes attached to a crate as illustrated in the

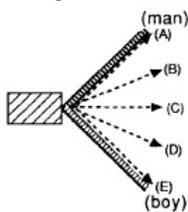


diagram. as they pull it along?

Which of the indicated paths (A-E) would most likely correspond to the path of the crate

- (A)
- (B)
- (C)
- (D)
- (E)



Assignment Details

Name (AID): **Mechanics - pretest (10795903)**

Submissions Allowed: 1

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Category: **Poll**

Code:

Locked: **No**

Author: **Voroshilov, Valentin** (valbu@bu.edu)

Last Saved: **Jul 2, 2017 04:29 PM EDT**

Permission: **Private**

Randomization: **Assignment**

Which graded: **Last**

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Nothing