

### Question 1

A uniform solid disk of radius 1.60 m and mass 2.30 kg rolls without slipping to the bottom of an inclined plane. If the angular velocity of the disk is 5.35 rad/s at the bottom, what is the height of the inclined plane?

- A) 5.61 m
- B) 4.21 m
- C) 4.94 m
- D) 6.73 m

Answer: <https://biology-forums.com/index.php?topic=683454>

### Question 2

What is the result of  $1.58 \div 3.793$  written with the correct number of significant figures?

- A)  $4.1656 \times 10^{[sup]-1[/sup]}$
- B)  $4.166 \times 10^{[sup]-1[/sup]}$
- C)  $4.17 \times 10^{[sup]-1[/sup]}$
- D)  $4.2 \times 10^{[sup]-1[/sup]}$
- E)  $4 \times 10^{[sup]-1[/sup]}$

Answer: <https://biology-forums.com/index.php?topic=682113>

### Question 3

From what height above the surface of the earth should an object be dropped to initially experience an acceleration of 0.9200g? The radius of the earth is  $6.38 \times 10^6$  m.

- A) 272 km
- B) 260 km
- C) 554 km
- D) 510 km

Answer: <https://biology-forums.com/index.php?topic=683540>

### Question 4

If two vectors are perpendicular to each other, their cross product must be zero.

- A) True
- B) False

Answer: <https://biology-forums.com/index.php?topic=683361>

### Question 5

An object has a position given by  $\mathbf{r} = [2.0 \text{ m} + (5.00 \text{ m/s})t] \mathbf{i} + [3.0 \text{ m} - (2.00 \text{ m/s}^2)t^2] \mathbf{j}$ , where quantities are in SI units. What is the speed of the object at time  $t = 2.00$  s?

- A) 6.40 m/s
- B) 9.43 m/s
- C) 7.00 m/s
- D) 7.65 m/s
- E) 13.0 m/s

Answer: <https://biology-forums.com/index.php?topic=683099>

### Question 6

A slender uniform rod 100.00 cm long is used as a meter stick. Two parallel axes that are perpendicular to the rod are considered. The first axis passes through the 50-cm mark and the second axis passes through the 30-cm mark. What is the ratio of the moment of inertia through the second axis to the moment of inertia through the first axis?

- A)  $I_2/I_1 = 1.5$
- B)  $I_2/I_1 = 1.7$
- C)  $I_2/I_1 = 1.9$
- D)  $I_2/I_1 = 2.1$
- E)  $I_2/I_1 = 2.3$

Answer: <https://biology-forums.com/index.php?topic=683327>

### Question 7

What is the torque about the origin on a particle located at  $\mathbf{r} = 3 \text{ m} \mathbf{i} + 4 \text{ m} \mathbf{j} - 2 \text{ m} \mathbf{k}$  if a force  $\mathbf{F} = 5 \text{ N} \mathbf{i} - 2 \text{ N} \mathbf{j} + 3 \text{ N} \mathbf{k}$  acts on the particle?

- A)  $(8 \mathbf{i} + 26 \mathbf{j}) \text{ N} \cdot \text{m}$
- B)  $(8 \mathbf{i} - 19 \mathbf{j} - 26 \mathbf{k}) \text{ N} \cdot \text{m}$

- C)  $(8 + 2 + ) \text{ N} \cdot \text{m}$   
D)  $(16 - 19 - 26 ) \text{ N} \cdot \text{m}$   
E)  $(8 - 2 + ) \text{ N} \cdot \text{m}$

Answer: <https://biology-forums.com/index.php?topic=683419>

### Question 8

A satellite of mass  $m$  has an orbital period  $T$  when it is in a circular orbit of radius  $R$  around the earth. If the satellite instead had mass  $4m$ , its orbital period would be

- A)  $4T$ .  
B)  $2T$ .  
C)  $T$ .  
D)  $T/2$ .  
E)  $T/4$ .

Answer: <https://biology-forums.com/index.php?topic=683518>

### Question 9

A spring-loaded dart gun is used to shoot a dart straight up into the air, and the dart reaches a maximum height of 24 meters above its point of release. The same dart is shot up a second time from the same gun, but this time the spring is compressed only half as far (compared to the first shot). How far up does the dart go this time? (Neglect friction and assume the spring is ideal and massless.)

- A) 6.0 m  
B) 12 m  
C) 3.0 m  
D) 48 m

Answer: <https://biology-forums.com/index.php?topic=682975>

### Question 10

Which of the following is an accurate statement?

- A) The magnitude of a vector can be zero even though one of its components is not zero.  
B) It is possible to add a scalar quantity to a vector.  
C) Even though two vectors have unequal magnitudes, it is possible that their vector sum is zero.  
D) Rotating a vector about an axis passing through the tip of the vector does not change the vector.  
E) The magnitude of a vector is independent of the coordinate system used.

Answer: <https://biology-forums.com/index.php?topic=682981>

### Question 11

An airplane undergoes the following displacements: First, it flies 66 km in a direction  $30^\circ$  east of north. Next, it flies 49 km due south. Finally, it flies 100 km  $30^\circ$  north of west. Using vector components, determine how far the airplane ends up from its starting point.

- A) 79 km  
B) 81 km  
C) 82 km  
D) 78 km  
E) 76 km

Answer: <https://biology-forums.com/index.php?topic=683057>

### Question 12

A 60.0-kg person drops from rest a distance of 1.20 m to a platform of negligible mass supported by an ideal stiff spring of negligible mass. The platform drops 6.00 cm before the person comes to rest. What is the spring constant of the spring?

- A)  $2.56 \times 10^5 \text{ N/m}$   
B)  $3.92 \times 10^5 \text{ N/m}$   
C)  $5.45 \times 10^4 \text{ N/m}$   
D)  $4.12 \times 10^5 \text{ N/m}$   
E)  $8.83 \times 10^4 \text{ N/m}$

Answer: <https://biology-forums.com/index.php?topic=682973>

### Question 13

A 150-N box is being pulled horizontally in a wagon accelerating uniformly at  $3.00 \text{ m/s}^2$ . The box does not move relative to the wagon, the coefficient of static friction between the box and the wagon's surface is 0.600, and the coefficient of kinetic friction is 0.400. The friction force on this box is closest to

- A) 450 N.  
B) 90.0 N.

C) 60.0 N.

D) 45.9 N.

Answer: <https://biology-forums.com/index.php?topic=683150>

### Question 14

If the magnitude of the cross product of two vectors is one-half the dot product of the same vectors, what is the angle between the two vectors?

Answer: <https://biology-forums.com/index.php?topic=683399>

### Question 15

A hockey puck slides off the edge of a table at point A with an initial velocity of 20.0 m/s and experiences no air resistance. The height of the tabletop above the ground is 2.00 m.

(a) What is the speed (not the velocity) of the puck just before it touches the ground?

(b) What is the distance between point A and the point where the puck hits the ground?

Answer: <https://biology-forums.com/index.php?topic=683108>

### Question 16

A baseball is located at the surface of the earth. Which statements about it are correct? (There may be more than one correct choice.)

A) The earth exerts a much greater gravitational force on the ball than the ball exerts on the earth.

B) The ball exerts a greater gravitational force on the earth than the earth exerts on the ball.

C) The gravitational force on the ball due to the earth is exactly the same as the gravitational force on the earth due to the ball.

D) The gravitational force on the ball is independent of the mass of the ball.

E) The gravitational force on the ball is independent of the mass of the earth.

Answer: <https://biology-forums.com/index.php?topic=683500>

### Question 17

A planet has two small satellites in circular orbits around the planet. The first satellite has a period 12.0 hours and an orbital radius  $6.00 \times 10^7$  m. The second planet has a period 16.0 hours. What is the orbital radius of the second satellite?

A)  $4.50 \times 10^7$

B)  $3.90 \times 10^7$

C)  $9.24 \times 10^7$

D)  $8.00 \times 10^7$

E)  $7.27 \times 10^7$

Answer: <https://biology-forums.com/index.php?topic=683578>

### Question 18

If the magnitude of vector  $\vec{a}$  is less than the magnitude of vector  $\vec{b}$ , then the x component of  $\vec{a}$  is less than the x component of  $\vec{b}$ .

A) True

B) False

Answer: <https://biology-forums.com/index.php?topic=682993>

### Question 19

Find the net work done by friction on the body of a snake slithering in a complete circle of 3.93 m radius. The coefficient of friction between the ground and the snake is 0.25, and the snake's weight is

54.0 N.

A) -330 J

B) 0 J

C) -3300 J

D) -670 J

Answer: <https://biology-forums.com/index.php?topic=683208>

### Question 20

A record is dropped vertically onto a freely rotating (undriven) turntable. Frictional forces act to bring the record and turntable to a common angular speed. If the rotational inertia of the record is 0.54 times that of the turntable, what percentage of the initial kinetic energy is lost?

A) 35%

B) 18%

C) 46%

D) 60%

Answer: <https://biology-forums.com/index.php?topic=683353>