1.1

1. What is the approximate size of an atom?

满分：100.00 分
得分：100.00 分

A. 10^{-8} m

B. 10^{-10} m

C. 10^{-12} m

D. 10^{-15} m

你的答案： B

教师评语： 暂无

1.2

1. Which of the following people might observe something that appears not to agree with Newton's first law of motion?

满分：100.00 分
得分：100.00 分

A. A person sitting still in a chair

B. A person driving a car along a straight road at a constant speed of 60 km/hr

C. A person riding a roller coaster (过山车)

D. A person traveling in a spacecraft (宇宙飞船) moving at 0.9 times the speed of light, in a straight line

你的答案： C

教师评语： 暂无

1.3

1. What is the magnitude of the vector <-2, 7, 3>?

满分：100.00 分
得分：100.00 分

A. 7.87

B. 7.34

C. 58.00

D. 62.00

你的答案： A

教师评语： 暂无

1.4

1. Which of the following expressions is not meaningful?

满分：100.00 分
得分：100.00 分

A. $< 2, 0, 0 > + < 0, -6, 3 >$

B. $< 3, 0, 3 > \bullet < -2, 7, 0 >$

C. $\dfrac{< 1, -2, 4 >}{|< 0, 5, 1 >|}$

D. $< 1, 7, -2 > -5$

你的答案： D

教师评语： 暂无

1.5

1. What is the unit vector in the direction of <3, 3, 3>?

满分：100.00 分
得分：100.00 分

A. $< 3, 3, 3 >$

B. $< 1, 1, 1 >$

C. $< 0.577, 0.577, 0.577 >$

D. $< 0.333, 0.333, 0.333 >$

你的答案： C

教师评语： 暂无

1.6

1. A proton is at location $\vec{A}$, and an electron is at location $\vec{B}$. How would you calculate the vector that goes from the proton to the electron?

满分：100.00 分
得分：100.00 分

A. $\vec{A} + \vec{B}$

B. $\vec{A} - \vec{B}$

C. $\vec{B} - \vec{A}$

D. $\left|\vec{B}\right| - \left|\vec{A}\right|$

你的答案： C

教师评语： 暂无

1.7

1.   At the time 43 seconds after 8am, your bicycle is located at <3,0,20> m, relative t
      o an origin at the front gate of your dormitory (宿舍). At the time 48 seconds after
      8am, your bicycle is located at <2, -3, 35> m.

      满分：100.00 分
      得分：100.00 分

      What is the average velocity of your bicycle?

      A. $< -1, -3, 15 >$ m/s

      B. $< -0.2, -0.6, 3.0 >$ m/s

      C. 3.07 m/s

      D. $< -0.04, -0.12, 0.99 >$ m/s

      你的答案： B

      教师评语： 暂无

1.8

1.   At the time 51 seconds after 8am, your bicycle is located at <2, -4, 40> m. Its vel
      ocity at that moment is <0, -0.5, 4> m/s. What is the position of the bicycle at 51.
      5 seconds after 8am?

      满分：100.00 分
      得分：100.00 分

      A. $< 2, -4.25, 42 >$ m

      B. $< 2, -4.5, 44 >$ m

      C. $< 2, -3.5, 36 >$ m

      D. $< 2, -3.75, 38 >$ m

      你的答案： A

      教师评语： 暂无

1.9

1. The position of an object is described by a vector $\vec{r}(t)$, as a function of time. Which of the following expressions gives the instantaneous velocity of the object?

满分：100.00 分
得分：100.00 分

A. $\dfrac{\Delta \vec{r}}{\Delta t}$

B. $\dfrac{d\vec{r}}{dt}$

C. $\Delta \vec{r} \Delta t$

D. $\lim_{\Delta t \to 0} \Delta \vec{r} \Delta t$

你的答案： B

教师评语： 暂无

1.10

1. Suppose the position of an object at time t is $< -4t^3, 2+t, -3t+2t^2 >$. What is the acceleration of the object at time t = 0?

满分：100.00 分
得分：100.00 分

A. $< 0, 2, 0 >$ m/s^2

B. $< 0, 1, -3 >$ m/s^2

C. $< 0, 0, 4 >$ m/s^2

D. $< -24, 2, 2 >$ m/s^2

你的答案： C

教师评语： 暂无

1.11

1. What is the momentum of a proton traveling at a velocity of $< 0, 2 \times 10^8, 0 >$ m/s? [The mass of a proton is 1.7×10^{-27} kg.]

满分：100.00 分
得分：100.00 分

A. $< 0, 7.90 \times 10^{-19}, 0 >$ kg m/s

B. $< 0, 4.56 \times 10^{-19}, 0 >$ kg m/s

C. $< 0, 3.40 \times 10^{-19}, 0 >$ kg m/s

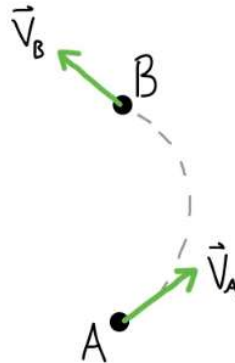D. $< 0, 2.53 \times 10^{-19}, 0 >$ kg m/s

你的答案： B

教师评语： 暂无

1.12

1. As you turn a corner on your bicycle, you move from location A to location B, as shown in the figure.

满分：100.00 分
得分：100.00 分

What is the direction of $\Delta\vec{p}$, the change in momentum between these two locations?

A. ↑

B. ↓

C. →

D. ←

你的答案： D

教师评语： 暂无

2.1

1. Which of the following statements is correct?

满分：100.00 分
得分：100.00 分

A. The definition (定义) of momentum is $\vec{p} = \vec{F}_{net}\Delta t$.

B. Newton's 2nd Law can be written as $\Delta\vec{p} = F_{net}\Delta t$.

C.
$$\vec{p} = \frac{1}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}mv$$
The definition of momentum is _____.

D. Newton's 2nd Law can be written as $\vec{p}_f - \vec{p}_i = \vec{F}_{net}\Delta t$.
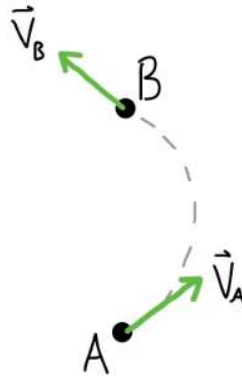
你的答案： D

教师评语： 暂无

2.2

1. As you turn a corner on your bicycle, you move from location A to location B, as shown in the figure.

满分：50.00 分
得分：50.00 分

What is the direction of $\Delta \vec{p}$, the change in momentum between these two locations?

A. ↑

B. ↓

C. →

D. ←

你的答案： D

教师评语： 暂无

2. It took 1.5 seconds for the bicycle to move from A to B. weight of the bicycle is 20 kg, the bicycle's velocity is < 20, 7.5, 0 > m/s at A and < -10, 7.5, 0 >m/s at B. What was the net force acting on the system during this time interval?

满分：50.00 分
得分：50.00 分

A. $< 400, 0, 0 >$ N

B. $< -600, 0, 0 >$ N

C. $< 0, 0, 400 >$ N

D. $< -400, 0, 0 >$ N

你的答案： D

教师评语： 暂无

2.3

1. An electron is moving through space at a speed close to the speed of light. At one instant in time, its momentum is $< 1 \times 10^{-21}, 0, 2 \times 10^{-21} >$ kg m/s. It experiences an electric force of $< 2 \times 10^{-12}, 0, 0 >$ N. After a time of 3 ns (3×10^{-9} s), what is the new momentum of the electron?

   A. $< 2 \times 10^{-12}, 0, 2 \times 10^{-21} >$ kg m/s

   B. $< 7 \times 10^{-21}, 0, 2 \times 10^{-21} >$ kg m/s

   C. $< 4 \times 10^{-21}, 0, 2 \times 10^{-21} >$ kg m/s

   D. $< 6 \times 10^{-21}, 0, 2 \times 10^{-21} >$ kg m/s

   满分：100.00 分
   得分：100.00 分

   你的答案： B

   教师评语： 暂无

2.6

1. You throw a basketball across the court with an initial velocity of $< 6, 3, 1 >$ m/s. After 0.4 seconds, the velocity is $< 6, -0.9, 1 >$ m/s. What is the best choice for the y-component of the average velocity during this time interval?

   A. -0.9 m/s

   B. 3.0 m/s

   C. 1.05 m/s

   D. 1.95 m/s

   满分：100.00 分
   得分：100.00 分

   你的答案： C

   教师评语： 暂无

2.8

1. An object hanging from a spring (弹簧) will oscillate (震动) up and down. You perform an experiment on a particular mass-spring system, and observe that it oscillates once every 3 seconds. Which of the following would not be a good choice for Δt, if you used a computer to predict the motion iteratively?

   A. 0.01 s

   B. 0.05 s

   C. 0.1 s

   D. 1 s

   满分：100.00 分
   得分：100.00 分

   你的答案： D

   教师评语： 暂无

2.12

1. A car traveling at 20 m/s crashes into a wall, coming to a complete stop. After the crash, the car is 50 cm shorter than before. About how long did the collision last? (In other words, how much time passed between the car first touching the wall and finally stopping?)

满分：100.00 分
得分：100.00 分

A. 0.01 s

B. 0.05 s

C. 0.1 s

D. 0.5 s

你的答案： B

教师评语： 暂无

test1-2

一、单选题 (共 100.00 分)

1.

Which of the following can NOT be true for an object moving in a straight line at a constant speed?
A.

Nothing is interacting with the object (it is in interstellar space, far from all other objects).
B.

The object is experiencing a net interaction.

C.

The object is experiencing multiple interactions, and these interactions add up to zero.
D.

The object has no net interaction with the rest of the world.
满分：10.00 分
得分：10.00 分

你的答案：

B

教师评语：

暂无

2.

A bee flies in a straight line at constant speed. At 15 s after 9 AM, the bee's position is < 2, 4, 0> m. At 15.5 s after 9 AM, the bee's position is < 3, 3.5, 0> m.
What is the average velocity of the bee?

A.

< 6, 7, 0 > m/s

B.

 < 0.193, 0.225, 0 > m/s

C.

 2.236 m/s

D.

 < 0.500, −0.250, 0 > m/s

E.

  < 2.000, −1.000, 0 > m/s

满分：10.00 分
得分：**10.00** 分

你的答案：

E

教师评语：

暂无

3.

 At 12.18 s after 1:30 PM, a ball's position is < 20, 8, −12> m, and the ball's velocity is < 9, −4, 6 > m/s.
What is the (vector) position of the ball at 12.21 s after 1:30 PM?
Assume that the ball's velocity does not change significantly in this short time interval.

A.

 24.75 m

B.

 < 20.27, 7.88, −11.82 > m

C.

 < 0.27, −0.12, 0.18 > m

D.

 < 129.62, −40.72, 61.08 > m

E.

  < 129.89, −40.84, 61.26 > m

满分：10.00 分
得分：**10.00** 分

你的答案：

B

教师评语：

暂无

4.

Three protons travel through space at three different speeds.
Proton A: 290 m/s

Proton B: 2.9×10^6 m/s

Proton C: 2.9×10^8 m/s

For which proton(s) is it reasonable to use the approximation $\gamma \approx 1$ when calculating its momentum?

A.

A only

B.

A and B

C.

A and B and C

D.

none of the protons

满分：10.00 分
得分：10.00 分

你的答案：

B

教师评语：

暂无

5.

An object is moving in the +x direction. Which of the following statements about the net force acting on the object could be true?
A. The net force is in the +x direction
B. The net force is in the –x direction
C. The net force is zero

A.

A only

B.

B only

C.

C only

D.

A and B

E.

A and C
F.

 B and C
G.

 A and B and C
满分：10.00 分
得分：10.00 分

你的答案：

G

教师评语：

暂无

6.

 Cart A moves to the left at nearly constant speed. Cart B moves to the left, gradually speeding up. Cart C m
oves to the left, gradually slowing down.
 Which cart(s) experience a net force to the left?
A.

 A only
B.

 B only
C.

 C only
D.

 A and B
E.

 A and C
F.

 B and C
G.

 A and B and C
满分：10.00 分
得分：10.00 分

你的答案：

B

教师评语：

暂无

7.

You push a book across a table. In order to keep the book moving with constant momentum, you have to k
eep pushing with a constant force.

Which statement explains this?

A.

 A net force is necessary to keep an object moving.

B.

 To make the net force on the book zero, you must push with a force equal and opposite
 to the friction force on the book.

C.

 The force you exert must be slightly larger than the friction force.

满分：10.00 分

得分：**10.00** 分

你的答案：

B

教师评语：

暂无

8.

 Two running students collide head-on. One student exerts a force of magnitude Fon the
other student. Suppose we choose BOTH students as the "system" to which to apply the
momentum principle. What is the net force acting on this system?

A.

  < F, 0, 0 >

B.

  < 2F, 0, 0 >

C.

  < 0, 0, 0 >

满分：10.00 分

得分：**10.00** 分

你的答案：

C

教师评语：

暂无

9.

 A ball is initially on the ground, and you kick it with initial velocity < 3,7,0> m/s. At this speed air resistance
   is negligible. Assume the x axis is to the right, the y axis is up, the z axis is out the screen.

Which components of the ball's momentum will change in the next half second?

A.

p_x

B.

p_y

C.

p_z

D.

p_x & p_y

E.

p_y & p_z

F.

p_z & p_x

G.

p_x, p_y, & p_z

满分：10.00 分
得分：10.00 分

你的答案：

B

教师评语：

暂无

10.

The mass of the ball is 500 g, and its initial velocity is < 3,7,0> m/s. What is the net impulse acting on the ball during the next 0.5 seconds after you kicked it?

A.

< 0, 2.45, 0 > N*s

B.

< 0, −2.45, 0 > N*s

C.

< 0, 9.8, 0 > N*s

D.

< 0, −9.8, 0 > N*s

E.

< 0, 4.9, 0 > N*s

F.

< 0, −4.9, 0 > N*s

满分：10.00 分
得分：10.00 分

你的答案：

B

教师评语：

暂无

3.1

一、单选题 (共 100.00 分)

1. Touch the table in front of you with your hand. The force that you feel with your hand is due to which fundamental interaction?

满分：100.00 分
得分：100.00 分

A. gravitational

B. electromagnetic

C. strong

D. weak

你的答案： B

教师评语： 暂无

3.2

一、单选题 (共 100.00 分)

1. The   gravitational force exerted by a planet on one of its moons is 3e23 newtons   when the moon is at a particular location. If the mass of the moon were three times as large, what   would the force on the moon be?

满分：100.00 分
得分：100.00 分

A. $1 \times 10^{23} N$

B. $3 \times 10^{23} N$

C. $6 \times 10^{23} N$

D. $9 \times 10^{23} N$

你的答案： D

教师评语： 暂无

3.3

一、单选题 （共 100.00 分）

1.

Distance from star to planet: 1.58×10^{11} m

Star's mass: 1×10^{30} kg

Planet's mass: 5×10^{24} kg

$G = 6.7 \times 10^{-11}$ N·m²/kg²

Calculate the magnitude of the gravitational force that the star exerts on the planet.

满分：100.00 分
得分：100.00 分

A. $1.34 \times 10^{-8} N$

B. $2.68 \times 10^{-2} N$

C. $1.34 \times 10^{22} N$

D. $2.12 \times 10^{33} N$

E. $5.3 \times 10^{55} N$

你的答案： C

教师评语： 暂无

3.4

一、单选题 （共 100.00 分）

1.

The Earth has a mass of 6×10^{24} kg. The Sun is much more massive; its mass is 2×10^{30} kg. Which of the following statements is correct?

满分：100.00 分
得分：100.00 分

A. The gravitational force on the Sun by the Earth is smaller in magnitude than the gravitational force on the Earth by the Sun.

B. The gravitational force on the Sun by the Earth is exactly the same in magnitude as the gravitational force on the Earth by the Sun.

C. Neither A nor B is correct.

你的答案： B

教师评语： 暂无

3.5

一、单选题　(共 100.00 分)

1. The mass of Mercury is eleven over two hundred the mass of earth, and the Mercury radius is eight over twenty-one of the earth, is the g on Mercury larger or smaller than on earth?
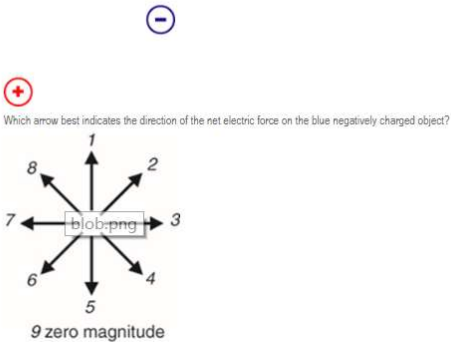
   A. smaller.

   B. larger.

   C. same.

   你的答案：　A

   教师评语：　暂无

满分：100.00 分
得分：100.00 分

3.6

一、单选题　(共 100.00 分)

1. ⊕

   ⊖

   ⊕

   Which arrow best indicates the direction of the net electric force on the blue negatively charged object?

   A. 1
   B. 2
   C. 3
   D. 4
   E. 5
   F. 6
   G. 7
   H. 8
   I. 9

   你的答案：　G
   正确答案：　G
   教师评语：　暂无

满分：100.00 分
得分：100.00 分

3.7

一、单选题 （共 100.00 分）

1. A sodium ion exerts a force of 3e–8 N on a proton that is a distance d away. If the sodium ion were moved to a distance 3d from the proton, what would the magnitude of the force on the proton be?

满分：100.00 分
得分：100.00 分

A. 9e–8 N

B. 3e–8 N

C. 1e–8 N

D. 0.33e–8 N

你的答案：D

正确答案：D

答案解析：0.11e–8 N

教师评语：暂无

3.8

一、单选题 （共 100.00 分）

1. A bullet of mass 0.04 kg traveling horizontally at a speed of 800 m/s embeds it self in a block of mass 0.5kg that is sitting at rest on a very slippery sheet of ice. You want to find the speed of the block just after the bullet embeds itself in the block. What should you choose as the system?

满分：100.00 分
得分：100.00 分

A. the bullet

B. the block

C. the bullet and the block

你的答案：C

教师评语：暂无

3.9

一、单选题 （共 100.00 分）

1. When a ping pong ball collides with a bowling ball, why is the effect on the ping pong ball more noticeable than the effect on the bowling ball?

满分：100.00 分
得分：100.00 分

A. The momentum of the bowling ball does not change.

B. The change in the bowling ball's momentum is less than the change in the ping pong ball's momentum.

C. The change in the bowling ball's velocity is less than the change in the ping pong ball's velocity.

你的答案： C

正确答案： C

教师评语： 暂无

3.10

一、单选题 （共 100.00 分）

1. When a ping pong ball collides with a bowling ball, why is the effect on the ping pong ball more noticeable than the effect on the bowling ball?

满分：100.00 分
得分：100.00 分

A. The momentum of the bowling ball does not change.

B. The change in the bowling ball's momentum is less than the change in the ping pong ball's momentum.

C. The change in the bowling ball's velocity is less than the change in the ping pong ball's velocity.

你的答案： C

正确答案： C

教师评语： 暂无

4.1

一、单选题 （共 100.00 分）

1. A space satellite of mass 500 kg has velocity < 12, 0, –8 > m/s just before being struck by a rock of mass 3 kg with velocity < –3000, 0, 900 > m/s. If we choose the space satellite and rock to be system, and just after the collision, the momentum of the system will be

满分：100.00 分
得分：100.00 分

A. the same.

B. larger than before.

C. smaller than before.

你的答案： A

教师评语： 暂无

4.2

一、单选题 (共 100.00 分)

1. As it shows in the vedio, there are two blocks, the mass of bolck1 is 4M and block2 is 2M. the distance between two blocks is r. The center of mass is

满分：100.00 分
得分：100.00 分

A. in the middle of two blocks.

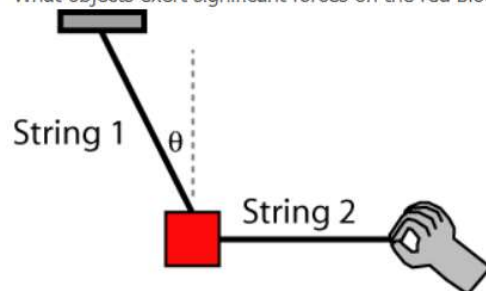B. close to block1.

C. close to block2.

你的答案： B

教师评语： 暂无

4.4

一、单选题 (共 100.00 分)

1. What objects exert significant forces on the red block?

满分：100.00 分
得分：100.00 分

A. Earth, String 1, String 2

B. Earth, String 1, String 2, Hand

C. Earth, String 1, String 2, Hand, Ceiling

D. Earth, Hand, Ceiling

你的答案： A

教师评语： 暂无

4.5

一、单选题　(共 **100.00** 分)

1.　You push a 100 kg mass on the floor with a horizontal force, and it's moving in the direction you are pushing at a constant speed. The coefficient of static friction is 0.3. How much force are you exerting on the block?

满分：100.00 分
得分：**100.00** 分

A. 980N

B. 294N

C. 480N

D. Can't tell.

你的答案：　B

教师评语：　暂无

4.6

一、单选题 (共 100.00 分)

1. A ball hangs from the bottom of a vertical spring. You pull the ball down wards and release it, and the ball oscillates up and down. At the bottom o f each oscillation, where the ball's instantaneous momentum is zero, what is the direction of $d\vec{p}/dt$?

满分：50.00 分
得分：50.00 分

A. up

B. down

C. zero magnitude(no direction)

你的答案： A

教师评语： 暂无

2. Which of the red arrows labeled 1, 2, or 3 represents the vector $\Delta\vec{p}$, the change in the momentum of the comet?

满分：50.00 分
得分：50.00 分
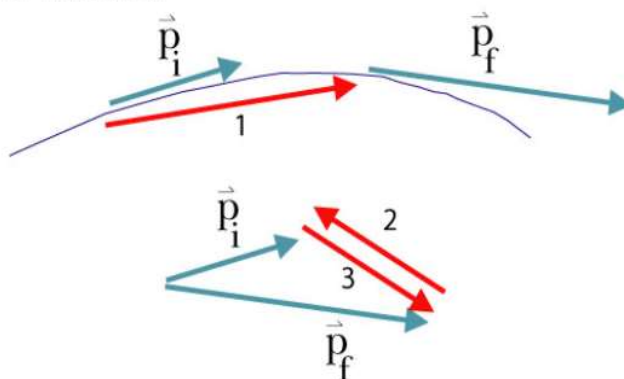
A. 1

B. 2

C. 3

你的答案： C

教师评语： 暂无

4.7

一、单选题 （共 100.00 分)
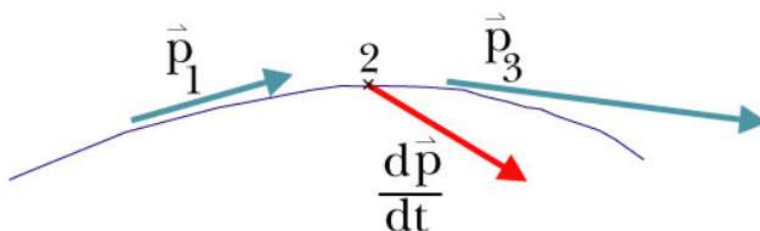
1.   满分：100.00 分
                                                                        得分：100.00 分

The red arrow shows the rate of change of the comet's momentum when it is at lo cation 2.

At this instant, which components of $d\vec{p}/dt$ are zero?

A. The parallel component

B. The perpendicular component

C. Both the parallel and perpendicular components

D. Neither component

你的答案： D

教师评语： 暂无

4.9

一、单选题 （共 100.00 分)

1.   满分：100.00 分
                                                                        得分：100.00 分

Tarzan swings from a vine. At the bottom of the swing, which components of $d\vec{p}/dt$ are zero?
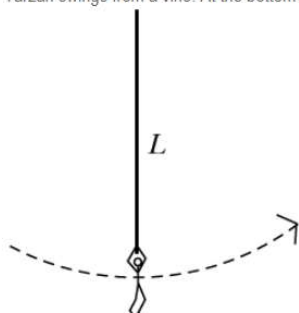
A. The parallel component

B. The perpendicular component

C. Both the parallel and perpendicular components

D. Neither component

你的答案： A
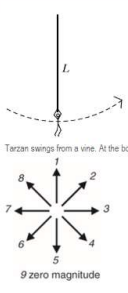
教师评语： 暂无

4.10

1.   满分：100.00 分
                                                        得分：100.00 分

Tarzan swings from a vine. At the bottom of the swing, what is the direction of the net force acting on Tarzan?

A. 1
B. 2
C. 3
D. 4
E. 5
F. 6
G. 7
H. 8
I. no magnitude
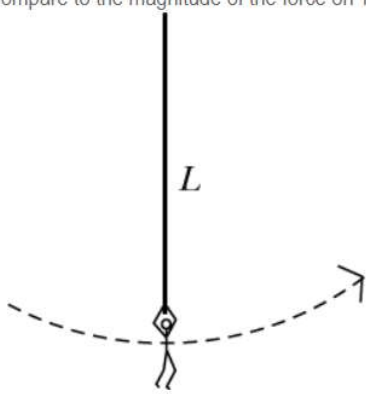
你的答案 A
教师评语 暂无

4.11

一、单选题 （共 100.00 分）

1.   At the bottom of the swing, how does the magnitude of the force on Tarzan by the vine compare to the magnitude of the force on Tarzan by the Earth?

满分：100.00 分
得分：100.00 分

A. $F_{vine} > F_{Earth}$

B. $F_{vine} = F_{Earth}$

C. $F_{vine} < F_{Earth}$

你的答案： A
教师评语： 暂无

4.12

一、单选题 （共 100.00 分）

1. Tarzan swings from a vine.Tarzan's mass: 100 kg. Length of vine: 5 m. Tarzan's speed: 13 m/s. What is the tension in the vine at this instant?

满分：100.00 分
得分：100.00 分

L
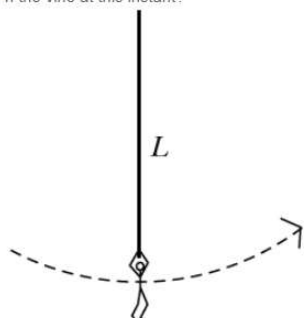
A. 980N

B. 3380N

C. 2400N

D. 4360N

你的答案： D
教师评语： 暂无

Test3-4

一、单选题 (共 **100.00** 分)

1.

Fixed star position: < 0.5e11, 1e11, 0 > m. Initial planet position: < 2e11, 1.5e11, 0 > m. Calculate the vector that points from the star to the planet.

A.

< 1e22, 1.5e22, 0 > m
B.

< 1.5e11, 0.5e11, 0 > m
C.

< -1.5e11, -0.5e11, 0 > m
D.

< 2.5e11, 2.0e11, 0 > m
E.

We don't have enough information to find the vector

满分：10.00 分
得分：**10.00** 分

你的答案：

B

2.

Mass of Mars: 6.4e23 kg; radius of Mars: 3.4e6　m
Mass of Earth: 6e24 kg;　radius of Earth:　6.4e6 m
If the Mars rover measured the value of　g on Mars, it would be:

A.

9.8 N/kg
B.

 less than 9.8 N/kg
C.

 more than 9.8 N/kg
满分：10.00 分
得分：10.00 分

你的答案：

B

3.

An alpha particle contains two protons and two neutrons, and has a net charge of +2　e.
The alpha particle is 0.1 m away from a single proton, which has charge +　e.
 Which statement about the magnitudes of the electric forces between the particles is correct?

A.

 The force on the proton by the alpha particle is equal to the force on the alpha particle by the proton.
B.

The force on the proton by the alpha particle is larger than the force on the alpha particle by the proton.
C.

The force on the proton by the alpha particle is smaller than the force on the alpha particle by the proton.
D.

 There is not enough information to determine this.
满分：10.00 分
得分：10.00 分

你的答案：

A

教师评语：

暂无

4.

The mass of one atom is m (kg/atom). The density of solid copper is ρ (rho) (kg/m³). What is the volume occupied by one atom of copper in a solid?

A.

  m* ρ
B.

  m/ ρ
C.

□ □ρ/ m
D.

  m*(ρ³)
满分：10.00 分
得分：10.00 分

你的答案：

B

教师评语：

暂无

5.

You push an initially stationary 100 kg mass on the floor with a horizontal force. The coefficient of static friction is 0.6. What is the minimum
amount of force you need to exert on the mass in order to get it to move?

A.

980N
B.

588N
C.

400N
D.

Can't tell
满分：10.00 分

得分：**10.00** 分

你的答案：

B

教师评语：

暂无

6.

You push a 100 kg mass on the floor with a horizontal force of 400 N, and it's moving in the direction you are pushing. The coefficient of static friction is 0. 3. What happens to the speed of the block while you push it?

A.

 The speed increases
B.

The speed decreases
C.

 The speed does not change
D.

Can't tell

满分：10.00 分
得分：**10.00** 分

你的答案：

A

教师评语：

暂无

7.
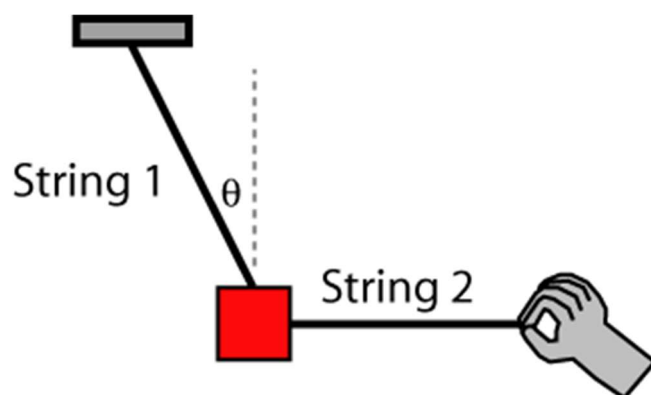
Here is an incomplete force diagram for the system of the red block.
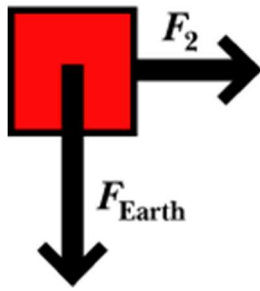
得分：**10.00** 分

To complete it we need to draw the force due to String 1. Which arrow best indicates the direction of this force?

9 zero magnitude

A.

1
B.
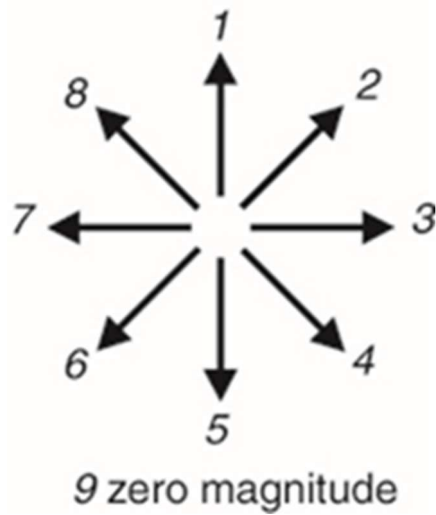
2
C.

3
D.

4
E.

5
F.

6
G.

7
H.

8
I.

9

满分：10.00 分
得分：10.00 分

你的答案：

H

教师评语：

暂无

8.
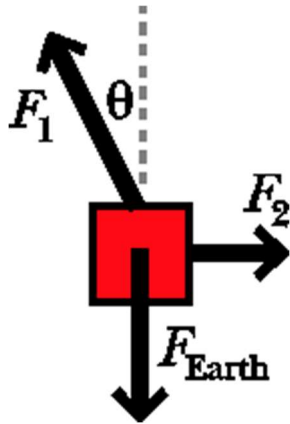
F$_1$ and F$_2$ are magnitudes of forces.What is the unit vector in the direction of the force $\vec{F_1}$?

A.

 < cosθ, cos(90+θ), 0 >

B.

< cosθ, cos(90–θ), 0 >

C.

 < cos(90+θ), cos(θ), 0 >

D.

< cos(90–θ), cos(θ), 0 >

满分：10.00 分

得分：**10.00** 分

你的答案：

C

教师评语：

暂无

9.

String 1

θ

String 2

F_1

θ

F_2
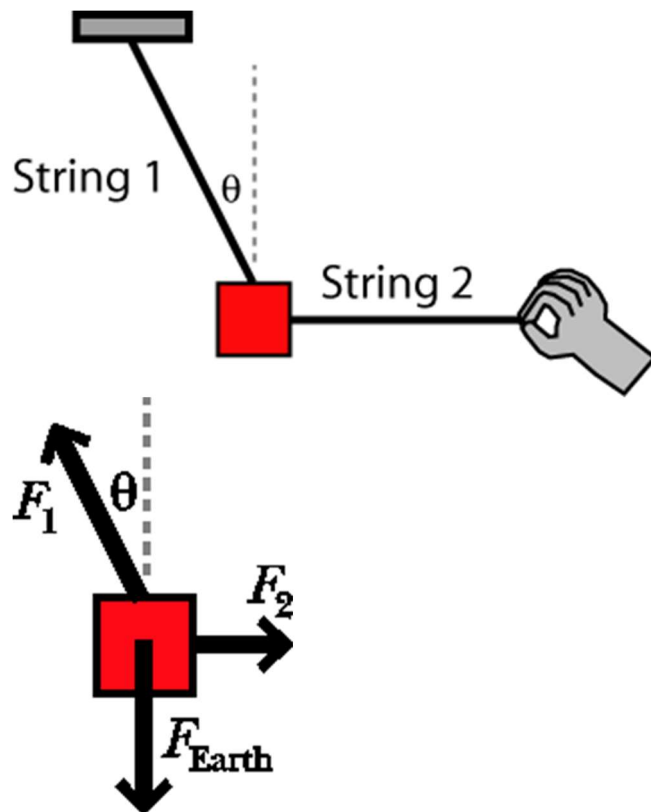
F_{Earth}

F_1 and F_2 are magnitudes of forces.
Which equation correctly states that $dp_x/dt = Fnet_x$?

A.

$0 = - F_1*cos(\theta) + F_2$
B.

$0 = F_1 - F_2$
C.

$0 = F_1 + F_2 - mg$
D.

$0 = F_1*cos(90+\theta) + F_2$
满分：10.00 分
得分：10.00 分

你的答案：

D

教师评语：

暂无

10.

The Moon travels in a nearly circular orbit around the Earth, at nearly constant speed.
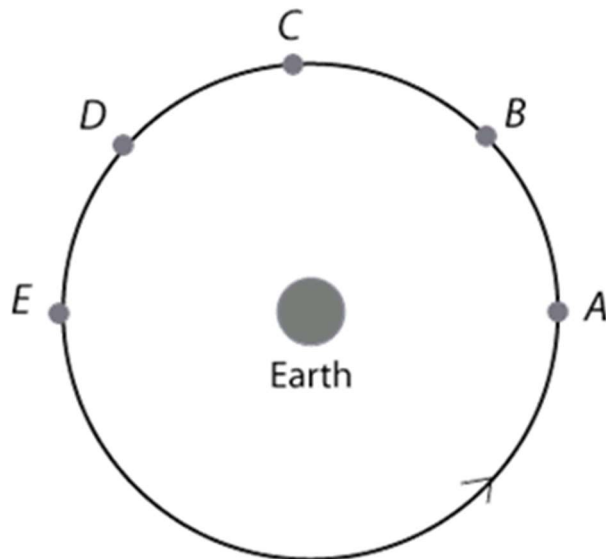
When the Moon is at location   A, which components of $d\vec{p}/dt$ are approximate zero?
A.

The parallel component
B.

The perpendicular component
C.

Both the parallel and perpendicular components
D.

 Neither component
满分：10.00 分
得分：10.00 分

你的答案：

A

教师评语：

暂无

5.1

Suppose that no other energy transfers between the surrounding and the system. According to the Energy Principle, which of the following is right?

If the work done by the surrounding is positive, the energy of the system increases.

5.2

Which of the following is right?

None of the above.

5.3

The mass of an electron at rest is m. The velocity of an electron is v=0.9c. Which of the following is right (c is the speed of light)?

The kinetic energy of the electron is about 1.3mc2

5.4

You drop a ball of mass m at a height h above the ground. The ball falls, speeding up, bounces off the floor, and goes upward, slowing down, until it is once again at the location where you released it (height h).

Initial state: Just after release

Final state: Ball back at original location

What is the work done by the earth on the ball?

0

5.5

An isolated neutron decays: $n \to p^+ + e^- + \bar{v}$

Initial: Neutron at rest   Final: p^+, e^-, and $\bar{v}$ far from each other
System: All particles   Energy principle: $E_f = E_i + W$

What quantities are included in the final energy E_f?

| A: K_n | C: K_e | E: m_nc^2 | G: m_ec^2 |
| B: K_p | D: K_v | F: m_pc^2 | H: m_vc^2 |

1) A, C, E, G   2) B, C, D, F, G, H   3) A, E   4) B, C, D 5) E, F, G

B,C,D,F,G,H

5.6

Which of the following is right?

The energy principle is universally true, whether the velocity is far smaller than or approaching c.

5.7

The position vector of an object of 10 kg in pure translational motion is r=2ti+3j-4*t*t*k, where r is a vector and has the unit of m, t has the unit of s, while i, j and k are unit vectors. During its motion, a force F=3i+3tj+2k exerts on it.F has the unit of N. During the peroid of 1s to 3s, what is the work done by this force.

The work is -52J.

5.8

For a system including the Earth and a ball at rest near its surface, which of the following is right?

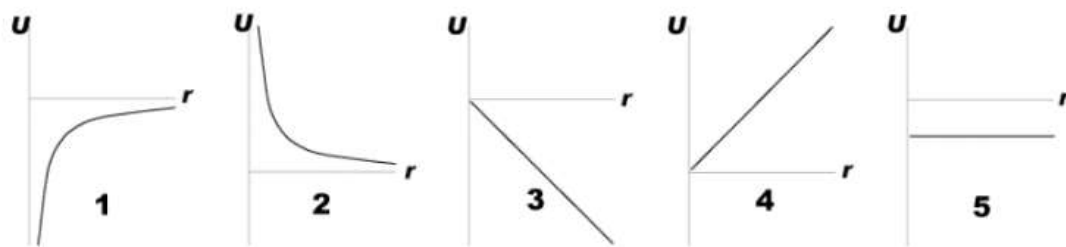The kinetic energy of the ball will increase if the Earth does positive work.

5.9

Two particles has the mass of m1 and m2. The distance between them is r. Which of the following is right?

 If r is infinite, the gravitational potential energy between them will approach zero.

5.10

Which of the following graphs of U vs r represents the gravitational potential energy, $U = -GMm/r$?

1

5.11

Which of the following is a bound system?

The Earth orbiting the sun

5.12

A system includes two point charges with the charge quantity of q1 and q2. Which of the following is right?

If q1q2>0, the electrical potential energy will be larger than 0.

6.1

Which of the following expressions satisfies the requirement that
$F_x = -dU_s / dx = -k_s x$ where x is measured from the equilibrium position (C is a constant)?

1) $U_s = -k_s + C$

2) $U_s = k_s + C$

3) $U_s = k_s x^2 + C$

4) $U_s = -\dfrac{1}{2} k_s x^2 + C$

5) $U_s = \dfrac{1}{2} k_s x^2 + C$

5)

6.2

A horizontal spring with stiffness 3 N/m has a relaxed length of 25 cm (0.25 m). A mass of 50 grams (0.050 kg) is attached and you stretch the spring to a total length of 29 cm (0.29 m). The mass is then released from rest and moves with negligible friction. What is the kinetic energy of the mass at the moment when the spring returns through the position where its length is its relaxed length of 25 cm?

1) 2.4e-3 J

6.3

A horizontal spring has a mass attached which can move with negligible friction. You stretch the spring and release the mass from rest. For the resulting motion, which of the following statements is TRUE?

When K is large, U is small, and vice versa.

6.4

Which of the following forces is not a conservative force?

Friction

6.5

In winter, you rub your hands and feel that your hands are warmer a few minutes later. Which of the following is true about this process?

Your hands have larger thermal energy after rubbing.

6.6

A ball is rolling on a horizontal plane. Its initial speed is v and final speed is 0. Supposing that the air exerts on force no the ball, which of the following is right?

The kinetic energy turns into heat.

6.7

Two balls of mass 0.7 kg are connected by a low mass rigid rod of length 0.4 m. The object rotates around a pivot at its center, with angular speed 13 radians/s. What is the rotational kinetic energy of this object?
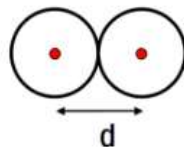
1) 484 J
2) 4.73 J
3) 2.37 J
4) 0.056 J
5) 0 J

4.73J

6.8

A diatomic molecule such as molecular nitrogen (N₂) consists of two atoms each of mass M, whose nuclei are a distance d apart. What is the moment of inertia of the molecule about its center of mass?

1) Md^{2}
2) $2Md^{2}$
3) $\frac{1}{2}Md^{2}$
4) $\frac{1}{4}Md^{2}$
5) $4Md^{2}$

d

3)

6.9

The spokes of a bicycle wheel have low mass, so almost all of the mass of the wheel is concentrated in the rim. What is the moment of inertia of a bicycle wheel of radius R and mass M?

1) MR²
2) 2 π MR²
3) 2 π RM
4) (1/2) MR²
5) π MR²

1)

6.10

A thin cyclic disk has a diameter of 2R and a mass of m. The mass is uniformly distributed. What is the momentum of inertia if the disk rotates aournd an axis which is perpendicular and tangible to the disk?

3/2MR2
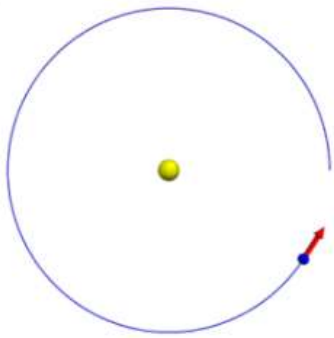
6.11

Ball A is moving on a horizontal plane with the speed of v without rolling. Ball B is rolling without slipping on a horizontal plane with the same speed. Ball A and B are exactly the same. Which of the following is right?

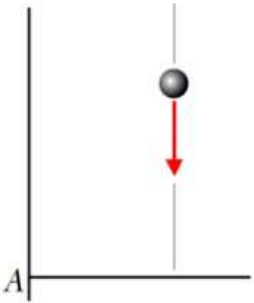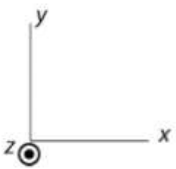The kinetic energy of ball A is smaller than that of ball B.

7.1

A planet orbits a star, in a circular orbit in the xy plane. Its momentum is shown by the red arrow.

What is the direction of the angular momentum of the planet?

1. Same direction as $\vec{p}$

2. Opposite to $\vec{p}$

3. Into the page

4. Out of the page

5. Zero magnitude

4

7.2

A ball falls straight down in the **xy** plane. Its momentum is shown by the red arrow. What is the direction of the ball's **angular momentum** about location A?

1) +x
2) −x
3) +y
4) −y
5) +z
6) −z
7) zero magnitude

(z-axis points out of page)

6
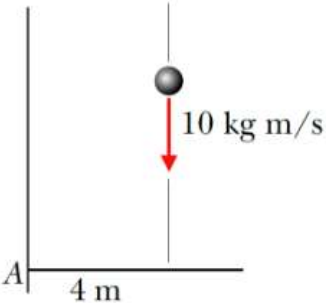
7.3

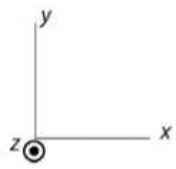| What is the direction of < 0, 4, 0> x < 0, 0, 3>?	1) +x 2) –x 3) +y 4) –y 5) +z 6) –z 7) zero magnitude

1

7.4

A ball falls straight down in the **xy** plane. Its momentum is shown by the red arrow. What is the ball's z component of **angular momentum** about location A?

	1) +10 2) –10 3) +40 4) –40 5) 0	y z⊙ ———— x (z-axis points out of page)

10 kg m/s

A | 4 m

4

7.5

A bicycle wheel has a mass of   m   and a radius of R. If the wheel rotates in the   xz   plane, spinning clockwise when viewed from the +y axis, and making one full revolution in 2 seconds, what is the magnitude of the rotational angular momentum of the wheel (relative to the center of the wheel)?

πMR2

7.6

esides rotating around the Sun, the Earth also spins around the Earth's axis. The Earth's axis is tilted 23° away from a perpendicular to the plane of the rotational orbit. Which of the following is not right?

The Earth's translation angular momentum relative to the location of the Sun and rotational angular momentum relative to the Earth's center of mass are in the same direction.
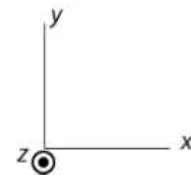
7.7

A yo-yo is in the xy plane. You pull up on the string with a force of magnitude 0.6 N. What is the direction of the torque you exert on the yo-yo?

r = 0.005 m, R= 0.035 m

1) +x
2) −x
3) +y
4) −y
5) +z
6) −z
7) zero magnitude

(z-axis points out of page)

5

7.8

A comet orbits the Sun. Choosing the comet and the Sun as a system and ignoring the interaction between the system and other planets or stars in the universe, which of the following is right?

Both the angular momentum of the comet relative to the location of the Sun and The mechanical energy of the system are conserved.
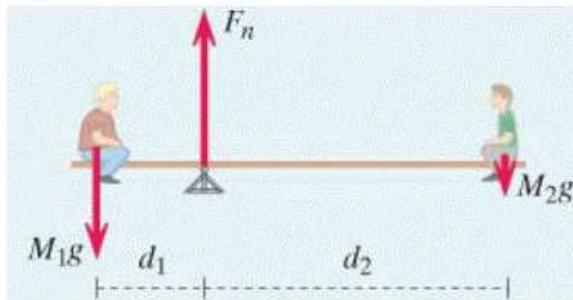
7.9

For a multi-particle system, which of the following is right?
The angular momentum of the system will change if the net external force is not zero

7.10

Two persons are sitting on each side of a seesaw. The person on the left has mass m_1 and sits at a distance d_1 from the nearly frictionless axle. The person on the right has mass m_2 and sits at a distance d_2 from the nearly frictionless axle. The seesaw itself has negligible mass. F_n is the supporting force of the axle. Choose the seesaw and the two persons as a system, which of the following is right?

A. If the magnitude of F_n equals to that of (m_1g+m_2g), the angular moment of the system will not change.

B. The direction of the torques produced by m_1g and m_2g relative to the axle are in the same direction.

C. The torques produced by F_n relative to the axle is not zero.

D. If the torque produced by m_1g and m_2g relative to the axle can cancel each other, the angular moment of the system will not change.


D

7.11

A comet rotates around the Sun. Choosing the comet and the Sun as a system and ignoring the interaction between the system and other planets or stars in the universe, which of the following is right?

If the distance between the comet and the Sun increases, the angular velocity of the comet will decrease according to the angular momentum principle.

7.12

A disk of radius 0.2m and moment of inertia 0.5 kg·m² is mounted on a nearly frictionless axle. A string is wrapped tightly around the disk, and you pull on the string with a constant force of 25 N. Which of the following is right?

A. The angular accelerator will change with time.

B. The angular moment of the disk is conserved.

C. The disk rotates with a constant angular accelerator of 10 rad/s.
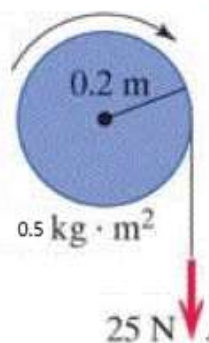
C

5.6.7章 test

1Suppose that no other energy transfers between the surrounding and the system. According to the Energy Principle, which of the following is right?

If the work done by the surrounding is positive, the energy of the system increases.

2Consider an electron (mass 9e-31 kg) moving with speed v = 0.9c. What is its rest energy?

8.1e-14 J

3Consider an electron (mass 9e-31 kg) moving with speed v = 0.9c. What is its total (particle) energy?

1.86×10-13J

4Consider an electron (mass 9e-31 kg) moving with speed v = 0.9c. Its rest energy is 0.81e-13 J, and its (total) particle energy is 1.86e-13 J. What is its kinetic energy?

1.05e-13 J

5

Two balls of mass 0.7 kg are connected by a low mass rigid rod of length 0.4 m. The object rotates around a pivot at its center, with angular speed 13 radians/s. What is the rotational kinetic energy of this object?

1) 484 J
2) 4.73 J
3) 2.37 J
4) 0.056 J
5) 0 J

4.73J

6.

The spokes of a bicycle wheel have low mass, so almost all of the mass of the wheel is concentrated in the rim. What is the moment of inertia of a bicycle wheel of radius R and mass M?

1) MR^2
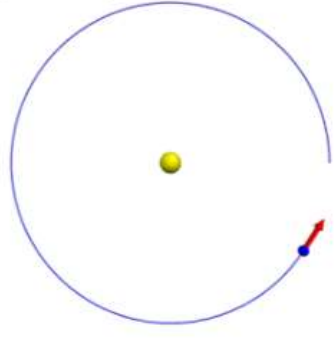2) $2 \pi MR^2$
3) $2 \pi RM$
4) $(1/2) MR^2$
5) πMR^2

7.A thin cyclic disk has a diameter of 2R and a mass of m. The mass is uniformly distributed. What is the momentum of inertia if the disk rotates aournd an axis which is perpendicular and tangible to the disk?

$$\frac{3}{2}m\,R^2$$

8.

A planet orbits a star, in a circular orbit in the xy plane. Its momentum is shown by the red arrow.
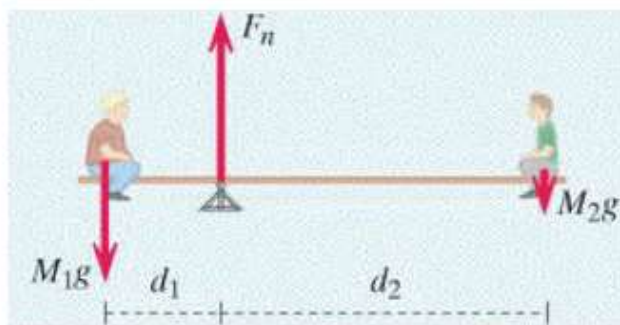

What is the direction of the angular momentum of the planet?

1. Same direction as $\vec{p}$

2. Opposite to $\vec{p}$

3. Into the page

4. Out of the page

5. Zero magnitude

4

9.

Two persons are sitting on each side of a seesaw. The person on the left has mass m_1 and sits at a distance d_1 from the nearly frictionless axle. The person on the right has mass m_2 and sits at a distance d_2 from the nearly frictionless axle. The seesaw itself has negligible mass. F_n is the supporting force of the axle. Choose the seesaw and the two persons as a system, which of the following is right?

A. If the magnitude of F_n equals to that of (m_1g+m_2g), the angular moment of the system will not change.

B. The direction of the torques produced by m_1g and m_2g relative to the axle are in the same direction.

C. The torques produced by F_n relative to the axle is not zero.

D. If the torque produced by m_1g and m_2g relative to the axle can cancel each other, the angular moment of the system will not change.


D

10.

A disk of radius 0.2m and moment of inertia 0.5 kg·m² is mounted on a nearly frictionless axle. A string is wrapped tightly around the disk, and you pull on the string with a constant force of 25 N. Which of the following is right?
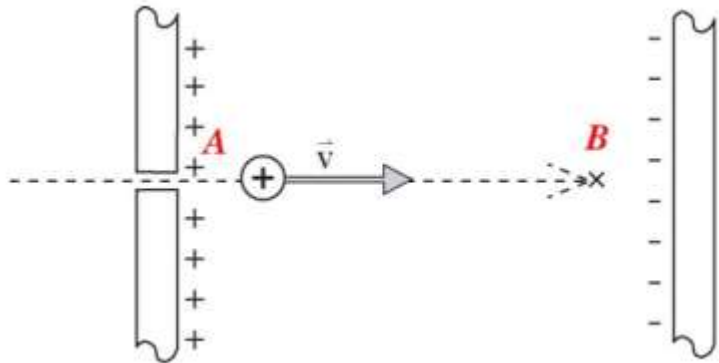
A. The angular accelerator will change with time.

B. The angular moment of the disk is conserved.

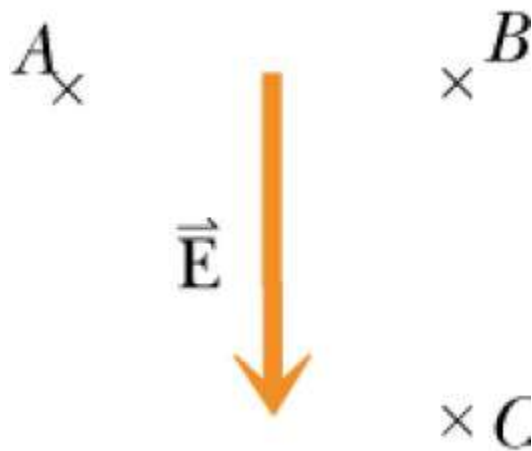C. The disk rotates with a constant angular accelerator of 10 rad/s.
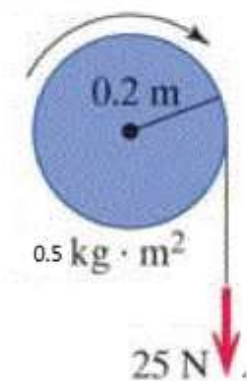
C

11.1

A proton enters a capacitor through a tiny hole. System: everything

$\Delta K > 0$ and $\Delta U < 0$

11.2

What is ΔV along a path from A to B?

0V

11.3

The electric field is uniform in this region. B is at <2, 2, 0> m, C is at <2, 0, 0> m.
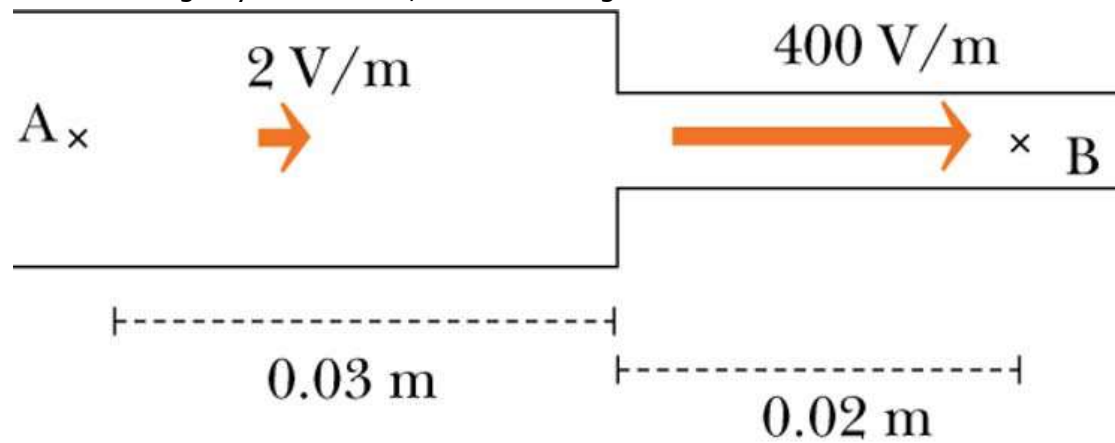
E= <0,–300, 0> N/C

What is ΔV along a path from B to C?
-600 V

11.4

To calculate VB – VA we should use

An integral

11.5

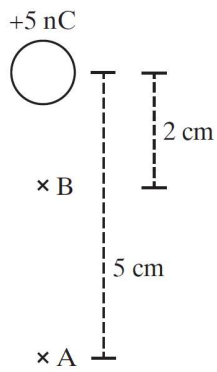Without doing any calculations, what is the sign of VB - VA ?

2 V/m

→

A×

400 V/m

× B

0.03 m

0.02 m

Negative

11.6

Now what is the magnitude of the electric field in the air gaps?

+Q   2 mm   −Q

metal
slab

A   B

1 mm

0.5 mm   0.5 mm
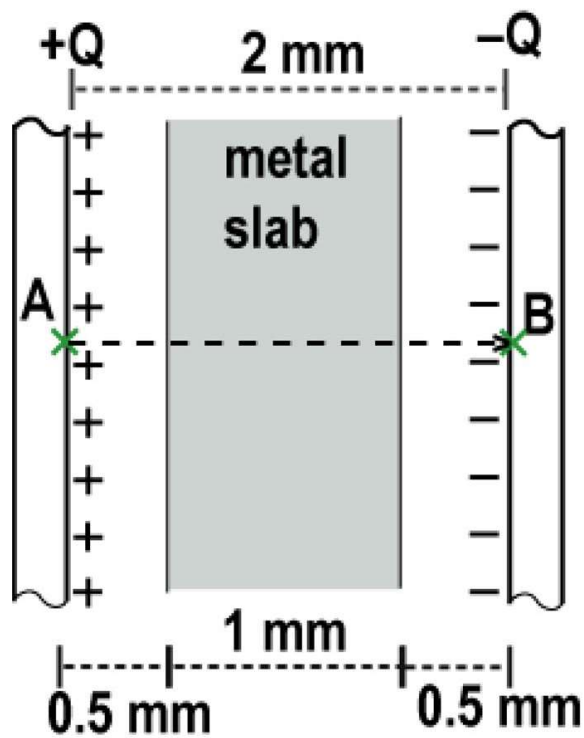
Same as originally

11.7

+5 nC

○

2 cm

× B

5 cm

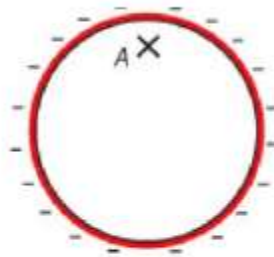× A   What is VB - VA ?   +1350 V

11.8

To calculate VB − VA we should use:

uniformly charged hollow sphere
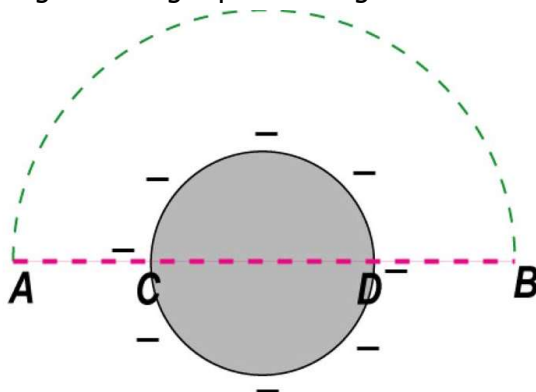
A×

B ×

uniformly charged rod

2 path segments, 2 integrals
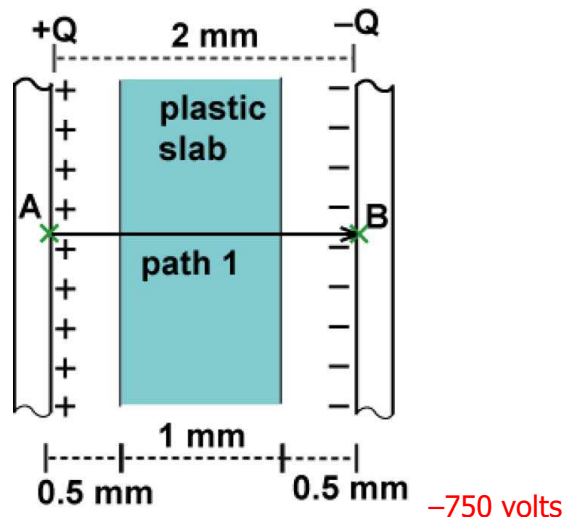
11.9

Along the straight path through the metal sphere, VB-VA is:

A   C   D   B

Zero

11.10

Originally ΔV was −1000 volts. A plastic slab is

inserted into the capacitor. The dielectric constant of

the plastic is 2. Now ΔV = VB − VA=

−750 volts

12.1

Which value is the closest one to the real ampletude of the Earth's magnetic field (unit: Tesla)?

10^(-5)

12.2

A proton is moving in a uniform magnetic field, which of the following statement is right?

The kinetic energy of the proton will not change

12.3

In a metal wire, if the volumn density of the electrons is 8.5*10^(28)/m^3, the current is 15A, radius of the wire is 0.81mm^2, what is the mean velocity of the electrons in the wire?

2m/hour

12.4

When there is a current in a metal wire, what particle is physically moving?

Only electrons

12.5

If n is volumn density of electron, the magnitude of the magnetic field is proportional to

n

12.6

The direction B near a long wire current is ( ) to the wire.

vertical

12.7

There is a current loop. At a position (distance r >> loop radius), the amplitude of B is proportional to

1/r^3

12.8

The magnetic dipole moment of a current loop (area S) is proportional to

S

12.9

Direction of the B inside a magnetic bar is

S to N

12.10

The magnetic field of a magnet comes from

Magnetic moment of each molecule.

13.1

If an electron is moving at constant velocity v in an uniform magnetic field B, the direction of v is () the direction of B.

parallel to

13.2

Two parallel current-carrying wire(with the same direction of current) will

attract each other

13.3

If a moving electron will feel a constant force from
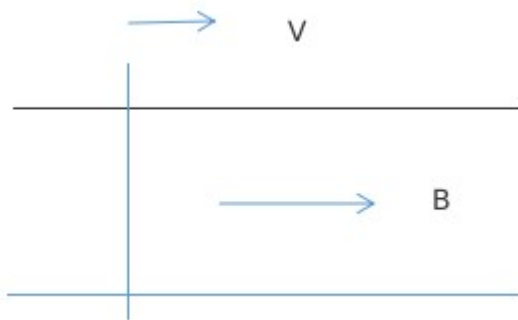
a constant B or E

13.4

The Hall Voltage is proportional to

the external B

13.5

As shown in the above figure, which side has higher voltage?

Equal

13.6

A two dimensional closed wire with current I is in a uniform B, which of the following is true?

The force on the wire is 0.

13.7

A square loop with current I is in a uniform B. The angle between the square's normal direction and B is a, when will the potential energy get the max value?

a=90 degrees

13.8

Two parallel circle wires with the same current I will

attract each other

13.9

In the Stern-Gerlach experiment, the gold atoms will form () bands on the screen.

2

13.10

The generators transform () energy to electric energy.

kinetic

14.4

If the electric flux of volume A is 0, which of the following is right?

There must be one positive and one positive charge inside volume A.

15.3

About the induced emf, which of the following statement is right?

It is determined only by how fast the magnetic flux changes.