

Final review according to the exam outcomes

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Grade 11 A / Ministry of education syllabus

The academic year 2021-2022



This review contains questions from
chapters 10 & 11 only



Chose the correct answer for each of the following questions.

1- Find the polar coordinates for an object has cartesian coordinates of (1.2, 3.5) m?

- A. (1.2 m, 1.2 rad)
- B. (3.7 m, 0.3 rad)
- C. (1.2 m, 0.3 rad)
- D. (3.7 m, 1.2 rad)

2- Find the Y-coordinate for an object has polar coordinates of (3.6 m, 0.70 rad)?

- A. $Y = 2.3$ m
- B. $Y = 2.9$ m
- C. $Y = 3.6$ m
- D. $Y = 0.04$ m

3- What is the angular displacement for an object makes 1.4 rev?

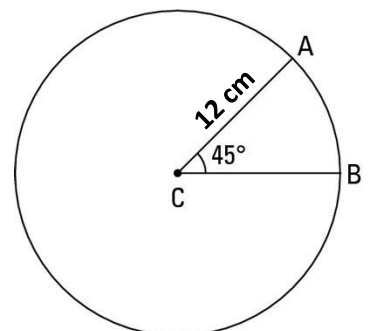
- A. $\Delta\theta = 4.4$ rad
- B. $\Delta\theta = 8.8$ rad
- C. $\Delta\theta = 9.2$ rad
- D. $\Delta\theta = 9.7$ rad

4- What is the angular displacement for an object moves from the position (1.4 m, 0.2 rad) to the position (1.4 m, 2.5 rad)?

- A. $\Delta\theta = 1.4$ rad
- B. $\Delta\theta = 1.9$ rad
- C. $\Delta\theta = 2.3$ rad
- D. $\Delta\theta = 2.7$ rad

5- What is the arc length of the arc (AB) shown in the figure?

- A. 5.4 cm
- B. 6.8 cm
- C. 9.4 cm
- D. 9.7 cm

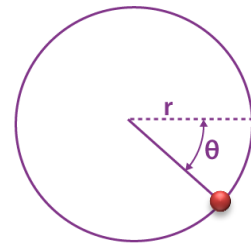


6-What is the average angular velocity of an object makes 6.5 rev in 12 seconds?

- A. 3.4 rad/s
- B. 2.3 rad/s
- C. 1.6 rad/s
- D. 0.54 rad/s

7- An object moves in a circular path and its angle changing relative to time according to this equation $\theta(t) = 2t^3 - 3$, what is the angular speed of this object at $t = 0.50$ s?

- A. $\omega = 1.5$ rad/s
- B. $\omega = 2.0$ rad/s
- C. $\omega = 3.0$ rad/s
- D. $\omega = 4.8$ rad/s



8- Four different objects rotating around different axis, the angular displacement of each of them is given by:

Object 1: $\theta(t) = 2t^2 - 3t$

Object 2: $\theta(t) = 5t^3 + 4$

Object 3: $\theta(t) = 3t - 1$

Object 4: $\theta(t) = 6t^4 + 2t$

Which object moves with constant angular velocity?

- A. Object 1
- B. Object 2
- C. Object 3
- D. Object 4

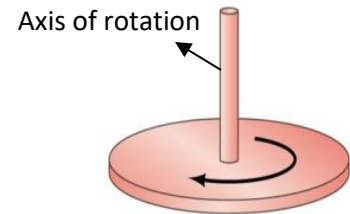
9-What is the frequency of the second arm in the clock?

- A. 1.7×10^{-2} Hz
- B. 2.7×10^{-2} Hz
- C. 2.9×10^{-4} Hz
- D. 3.5×10^{-4} Hz



10- What is the direction of the angular speed for the disk shown in the figure?

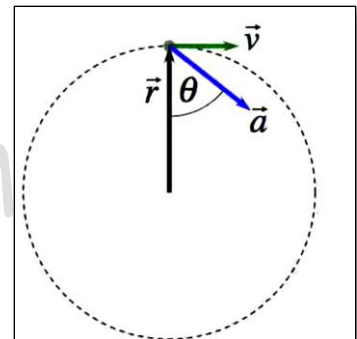
- A. Counterclockwise
- B. Clockwise
- C. Up
- D. Down



11- What is the scalar product of the radial and the tangential unit vectors $(\hat{r} \cdot \hat{t})$, (the unit of measuring each of them is meter)?

- A. $\hat{r} \cdot \hat{t} = 0 \text{ m}$
- B. $\hat{r} \cdot \hat{t} = 1 \text{ m}$
- C. $\hat{r} \cdot \hat{t} = 2 \text{ m}$
- D. $\hat{r} \cdot \hat{t} = 3 \text{ m}$

12- The figure represents the velocity and the acceleration of a particle moving clockwise in a circle of radius 25.0 cm. At a certain instant of time, the magnitude of its acceleration is 16.0 m/s^2 and it makes an angle $\theta = 20^\circ$ with position vector as shown in the figure. What is the magnitude of its angular acceleration at this instant?

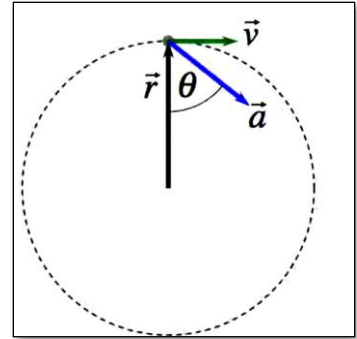


- A. 15.4 rad/s^2
- B. 21.9 rad/s^2
- C. 35.2 rad/s^2
- D. 42.6 rad/s^2

13- What is the centripetal acceleration of an object moving on a circular path of 1.5 m if it has an acceleration of 3.5 m/s^2 and an angular acceleration of 1.2 rad/s^2 ?

- A. 3.0 rad/s^2
- B. 3.3 rad/s^2
- C. 3.7 rad/s^2
- D. 4.5 rad/s^2

- 14- The figure represents the velocity and the acceleration of a particle moving clockwise in a circle of radius 25.0 cm. At a certain instant of time, the magnitude of its acceleration is 16.0 m/s^2 and it makes an angle $\theta = 20^\circ$ with position vector as shown in the figure. At this instant, what is the speed, of the particle?



- A. 1.17 m/s
- B. 1.94 m/s
- C. 2.45 m/s
- D. 3.76 m/s

- 15- To generate 1200 g of centripetal acceleration in a sample rotating at a distance of 23.5 cm from the ultracentrifuge's rotation axis, what is the frequency you have to enter into the controls?

- A. 68 Hz
- B. 57 Hz
- C. 42 Hz
- D. 36 Hz

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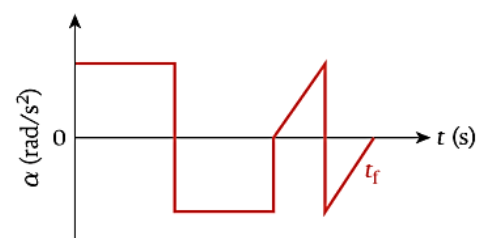


- 16- A disk rotates with rate of 250 rpm, what is the speed of a point 4.5 cm far from the rotation axis?

- A. 1.2 m/s
- B. 2.6 m/s
- C. 3.5 m/s
- D. 6.1 m/s

- 17- The angular acceleration for an object undergoing circular motion is plotted versus time in the figure. If the object started from rest at $t = 0$, the net angular displacement of the object at $t = t_f$

- A. is in the clockwise direction.
- B. is in the counterclockwise direction.
- C. is zero.
- D. cannot be determined.



18- A disk starts from rest and begins to rotate counterclockwise with an angular acceleration of 1.3 rad/s^2 . How long does it take the disk speed to get to 6.0 rad/s ?

- A. 2.1 s
- B. 3.5 s
- C. 4.6 s
- D. 5.8 s

19- A disk with radius 1.2 m , starts from rest and begins to rotate counterclockwise with an angular acceleration of 2.5 rad/s^2 . How many rotations does the disk take to reach the speed 7.0 m/s ?

- A. 3.5 rev
- B. 2.7 rev
- C. 1.9 rev
- D. 1.1 rev

20- An object decelerates from angular speed 6.8 rad/s to 1.3 rad/s , it makes 12 rev during this deceleration, what is the magnitude of the angular acceleration of the object?

- A. 0.30 rad/s^2
- B. 1.2 rad/s^2
- C. 1.9 rad/s^2
- D. 2.5 rad/s^2

21- An object accelerates from rest to 7.7 rad/s during 3.6 s , what is the angular displacement that object makes to reach that speed?

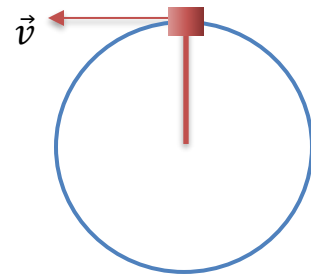
- A. 13 rad
- B. 14 rad
- C. 15 rad
- D. 16 rad

22- What is the angular speed of the earth's rotation around its axis?

- A. $1.2 \times 10^{-5} \text{ rad/s}$
- B. $4.6 \times 10^{-5} \text{ rad/s}$
- C. $6.5 \times 10^{-5} \text{ rad/s}$
- D. $7.3 \times 10^{-5} \text{ rad/s}$

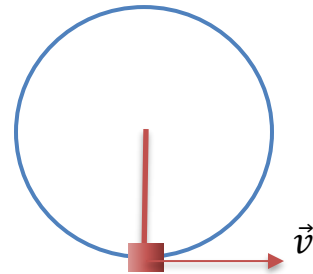
23- A ball that has a mass of 1.00 kg is attached to a string 1.00 m long and is whirled in a vertical circle at a constant speed of 10.0 m/s. Determine the tension in the string when the ball is at the top of the circle.

- A. 75.1 N
- B. 86.5 N
- C. 90.2 N
- D. 98.6 N



24- A ball that has a mass of 2.5 kg is attached to a string 1.3 m long and is whirled in a vertical circle at a constant speed of 5.6 m/s. Determine the tension in the string when the ball is at the bottom of the circle.

- A. 85 N
- B. 71 N
- C. 66 N
- D. 59 N



25- The rotation of the Earth on its axis creates a centripetal acceleration at the surface of the Earth. Suppose you were standing on the Equator and the Earth stopped rotating. When the Earth stopped, you would

- A. Feel slightly lighter than before.
- B. Feel slightly heavier than before.
- C. Fly off the surface of the Earth.
- D. Not be able to tell whether the Earth was still rotating.

26- You are sitting on a carousel, which is in motion. Where should you sit so that the smallest possible centripetal force is acting on you?

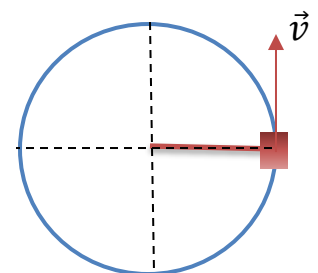
- A. Close to the outer edge.
- B. Close to the center.
- C. In the middle.
- D. The force is the same everywhere.

27- A pilot in an aircraft moving at a constant speed of 320 m/s pulls out of a vertical dive along an arc of a circle of radius 4120 m. Find the centripetal acceleration of the pilot.

- A. 22 m/s²
- B. 23 m/s²
- C. 24 m/s²
- D. 25 m/s²

28- A roller coaster moving on a vertical metal loop has a radius of 6.0 m. if the coefficient of friction between the loop and the coaster is 0.83. What is the minimum speed of the coaster that keep it in the circular path, when it reaches the position shown in the figure?

- A. 8.4 m/s
- B. 6.7 m/s
- C. 5.9 m/s
- D. 3.1 m/s



29- An object moves in a circular path with 3.6 m/s² acceleration, and 1.2 rad/s² angular acceleration, if the radius of the path is 1.1 m what is the centripetal acceleration of the object?

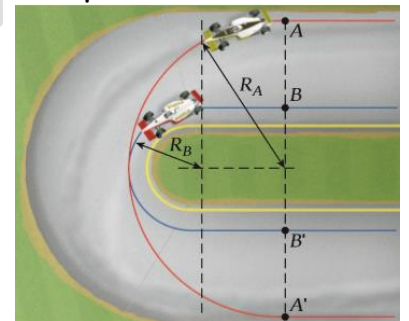
- A. 2.4 m/s²
- B. 3.3 m/s²
- C. 3.6 m/s²
- D. 4.2 m/s²

30- The flywheel of a steam engine starts to rotate from rest with a constant angular acceleration of $\alpha = 1.50 \text{ rad/s}^2$. The flywheel undergoes this constant angular acceleration for $t = 25.0 \text{ s}$ and then continues to rotate at a constant angular velocity, ω . After the flywheel has been rotating for 60.0 s , what is the total angle through which it has rotated since it started?

- A. 1310 rad
- B. 1450 rad
- C. 1630 rad
- D. 1780 rad

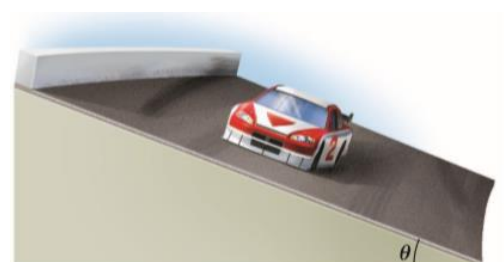
31- Suppose that car move through the U-turn shown in Figure at constant speed and that the coefficient of static friction between the tires and the road is $\mu_s = 1.2$. If the radius of the inner curve shown in the figure is $R_B = 10. \text{ m}$ and radius of the outer is $R_A = 30. \text{ m}$ and the car move at its maximum speed, how much time will it take to move from point B to B'?

- A. 4.5 s
- B. 5.9 s
- C. 6.6 s
- D. 7.8 s



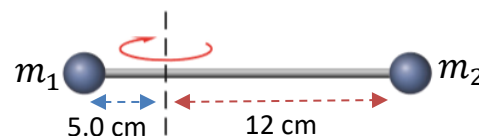
32- If the coefficient of static friction between the track surface and the car's tires shown in the figure is $\mu_s = 0.62$ and the radius of the turn is $R = 110 \text{ m}$, what is the maximum speed with which a driver can take a curve banked at $\theta = 25^\circ$?

- A. 41 m/s
- B. 37 m/s
- C. 32 m/s
- D. 28 m/s



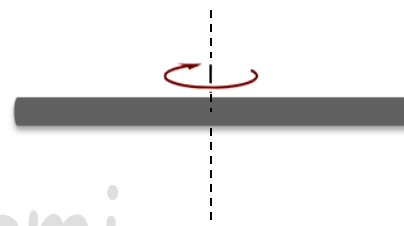
33- Two masses $m_1=0.10$ kg, $m_2= 0.20$ kg connected by a thin, massless rod. As shown in the figures, the two masses spin in a horizontal plane around a vertical axis represented by the dashed line with an angular speed of 12 rad/s. What is the rotational kinetic energy of the system?

- A. 0.23 J
- B. 0.95 J
- C. 1.1 J
- D. 2.3 J



34- What is the moment of inertia of a thin rod having 1.5 m length and 2.5 kg mass, rotating around the vertical axis as shown in the figure?

- A. 0.35 Kg.m²
- B. 0.47 Kg.m²
- C. 0.66 Kg.m²
- D. 0.81 Kg.m²



35- Two solid spheres masses $m_1=1.5$ kg, $m_2= 1.5$ kg connected by a thin, massless rod with 2.0 m length. As shown in the figures, the two spheres spin in a horizontal plane around the vertical axis of sphere 1. What is the moment of inertia of the system?

- A. 1.5 Kg.m²
- B. 2.6 Kg.m²
- C. 3.2 Kg.m²
- D. 4.5 Kg.m²

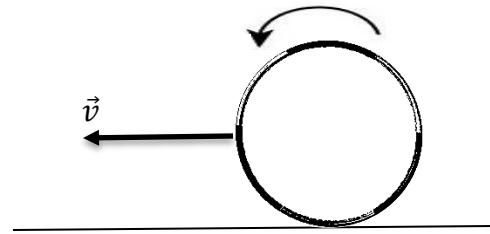


36- A solid sphere, a solid cylinder, and a hollow cylinder have the same mass and radius and are rolling with the same speed, which one of the following statements is true?

- A. The solid sphere has the highest kinetic energy
- B. The solid cylinder has the highest kinetic energy
- C. The hollow cylinder has the highest kinetic energy
- D. All three objects have the same kinetic energy.

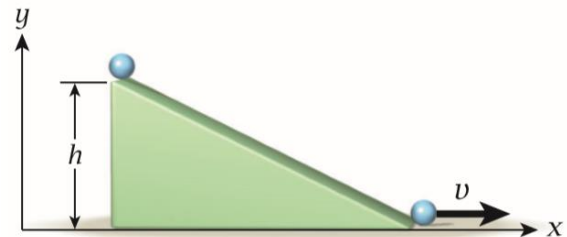
37- A hoop of 3.5 kg mass and is rolling without slipping on a horizontal frictionless surface with speed of 1.7 m/s, what is the kinetic energy of this hoop?

- A. 6.8 J
- B. 9.7 J
- C. 10. J
- D. 16 J



38- A solid sphere with a mass of 5.15 kg and a radius of 0.340 m starts from rest at a height of 2.10 m above the base of an inclined plane and rolls down without sliding under the influence of gravity. What is the linear speed of the center of mass of the sphere just as it leaves the incline and rolls onto a horizontal surface?

- A. 3.2 m/s
- B. 5.4 m/s
- C. 7.1 m/s
- D. 8.6 m/s



39- The force $\vec{F}$ is applied on a thin rod that is able to rotate around one of its edges (O) as shown in the figure. Determine the direction of the torque vector done by this force?

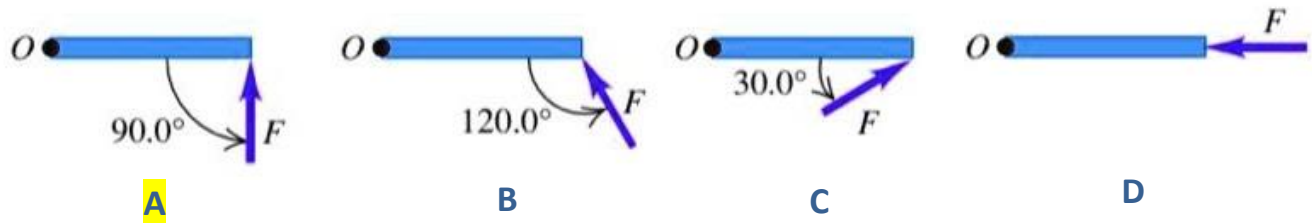
- A. Clockwise
- B. Counterclockwise
- C. Into the plane of the page
- D. Out of the plane of the page.



40- Which of the following is the unit of the torque?

- A. N.m
- B. N.m⁻¹
- C. J
- D. N.m²

41- The same force F is applied on a rotating rod as shown in the figure, in which case the torque done by the force is the largest?

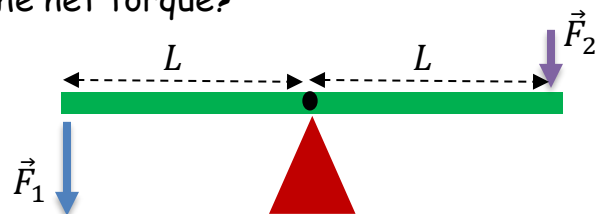


42- Which of the following is correct about the direction of torque vector?

- A. It is perpendicular to the force vector only
- B. It is perpendicular to the position vector only.
- C. It is perpendicular to both the force vector and the position vector.
- D. It is in the opposite direction of the force vector.

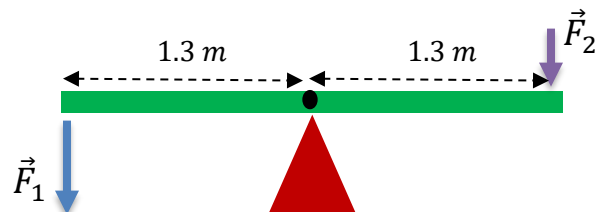
43- A thin massless rod is placed on a supporting point under its center of mass (exactly in the middle), and the two forces $F_1 > F_2$ applied on the two edges of the rod as shown in the figure, determine the direction of the net torque?

- A. Out of the page plane
- B. Up
- C. Down
- D. Counterclockwise



44- A thin massless rod is placed on a supporting point under its center of mass, and the two forces $F_1 = 120 \text{ N}$, $F_2 = 70 \text{ N}$ applied on the two edges of the rod as shown in the figure, find the net torque on the rod?

- A. 247 N.m
- B. 115 N.m
- C. 85 N.m
- D. 65 N.m



45- A string is wrapped many times around a pulley and is connected to a block of mass 5.0 kg, which is hanging vertically. The pulley consists of a hoop of radius 45 cm and mass 6.0 kg, with spokes that have negligible mass. What is the magnitude of the acceleration of the block?

- A. 4.5 m/s^2 , downward
- B. 4.5 m/s^2 , upward
- C. 6.1 m/s^2 , downward
- D. 6.8 m/s^2 , upward



46- A disk with a mass of 35 kg and a radius of 42 cm is mounted on a frictionless horizontal axle. A string is wound many times around the disk and then attached to a 70. kg block, as shown in the figure. Find the magnitude of the block acceleration

- A. 3.1 m/s^2
- B. 4.2 m/s^2
- C. 6.5 m/s^2
- D. 7.8 m/s^2



47- A uniform 1.0 kg disk with a radius of 25 cm rolls 2.0 m down an incline plane angled at 25° . What is the speed of the disk at the bottom of the plane?

- A. 4.1 m/s
- B. 3.3 m/s
- C. 5.4 m/s
- D. 6.2 m/s

48- A torque of $2.2 \times 10^3 \text{ Nm}$ on a flywheel causes it to accelerate uniformly from rest to an angular speed of 125 rad/s in 12 s . What is the moment of inertia of the flywheel?

A. 211 kg.m^2

B. 189 kg.m^2

C. 172 kg.m^2

D. 163 kg.m^2

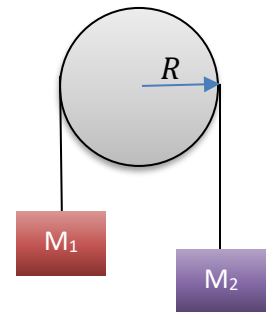
49- Two masses are hung by a massless cord over a disk with radius R and mass M as shown in the figure, if the angular velocity of the disk is 2.0 rad/s counterclockwise and constant, which of the following is correct:

A. $T_1 > T_2$

B. $T_2 > T_1$

C. The net torque equal zero

D. The disk has an angular acceleration



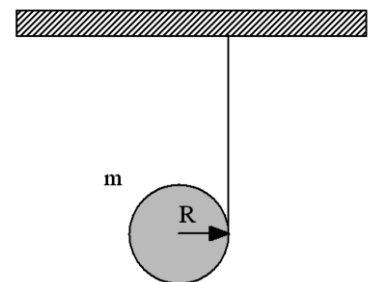
50- A massless string is wrapped around a cylinder of mass 0.400 kg and radius 0.100 m . The string is attached to the ceiling. The cylinder is released. As it falls, the string unwinds. What is the magnitude of the acceleration of the cylinder as it falls in m/s^2 ?

A. 6.54 m/s^2

B. 4.71 m/s^2

C. 3.22 m/s^2

D. 2.19 m/s^2



The end