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be reasonable, to be successful

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Part I Choose the best answer from the given alternatives. (1pt each)

1. An object moves with a constant acceleration of 5 m/s^2 . Which of the following statements is true?
 - A. The object's velocity stays the same
 - B. The object moves 5 m each second
 - C. The object's acceleration increases by 5 m/s^2 each second
 - D. The object's acceleration decreases by 5 m/s^2 each second
 - E. the object's velocity increases by 5 m/s each second
2. Frictional force depends on the following except:
 - A. Normal force
 - B. Nature of the surface
 - C. Contact area of the surface
 - D. None
3. Two objects are projected at angles 30° and 60° respectively with respect to the horizontal direction. The range of two objects are denoted as R_{30} and R_{60} . Choose the correct relation from the following:
 - A. $R_{30} = R_{60}$
 - B. $R_{30} = 4R_{60}$
 - C. $R_{30} = R_{60}/2$
 - D. $R_{30} = 2 R_{60}$
4. The magnitudes of two vectors A and B are $A = 12$ units and $B = 8$ units. Which of the following pairs of numbers represents the maximum and minimum possible values for the magnitude of the resultant vector $R = A + B$?
 - A. 14.4 units, 4 units
 - B. 12 units, 8 units
 - C. 20 units, 4 units
 - D. None of these answers.
5. An athlete rotates a discus along a circular path of radius 1m. If the maximum speed of the discus is 20 m/s , the magnitude of the maximum acceleration is:

A. 400 m/s^2	C. 10 m/s^2
B. 100 m/s^2	D. 20 m/s^2

Part II Define the following questions briefly (5pts)

1. What is the difference between kinematics and dynamics? (1.5pts)
2. List and explain Kepler's laws of planetary motion? (2pts)
3. Discuss the work-energy theorem. (1.5pts)

Part III Work out (Show all the required necessary steps) (10pts)

1. An older model car accelerates from rest to speed v in 10 seconds. A newer, more powerful car accelerates from rest to $2v$ in the same time period. What is the ratio of the power of the newer car to that of the older car? (2pts)
2. Callisto is the eighth of Jupiter's moons: its mass and radius are $m = 1.08 \times 10^{23}$ kg and $r = 2403$ km, respectively. What is the gravitational acceleration on the surface of this moon? (2pts)

3. If $\vec{A} = 3\hat{i} - 4\hat{j}$, $\vec{B} = -4\hat{i} + 3\hat{j}$ and $\vec{C} = 13\hat{i} + 12\hat{j}$, Find a and b so that $a\vec{A} + b\vec{B} + \vec{C} = 0$. (2pts)

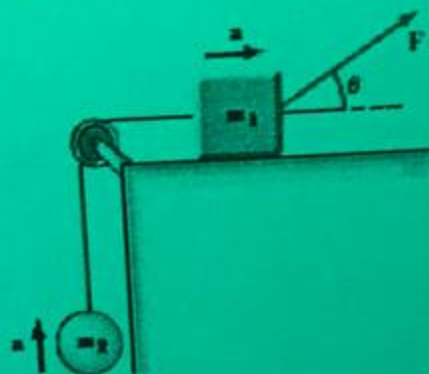
find A and B

$$\vec{a} = 5 \text{ m/s}^2$$

4. A block of mass m_1 on a rough, horizontal surface is connected to a ball of mass m_2 by a lightweight cord over a lightweight, frictionless pulley, as shown in Figure below. Force of magnitude $\vec{F}$

is applied to coefficient of and surface is

the
(4pts)



the block as shown. The kinetic friction between the block μ_k . Determine the magnitude of acceleration of the two objects.