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 කல்විප් பொதுத் தராதரப் பத்திர(உயர் தர)ப் பரீட்சை, 2023 ஓகஸ்தர்
 General Certificate of Education (Adv. Level) Examination, August 2023

භෞතික විද්‍යාව I
 பொளதிகவியல் I
 Physics I

Advanced Level Physics
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PHT6210 2023Th 2021-10-14

Multiple Choice Questions

1. X, Y and Z represent three physical quantities with **different** dimensions. They can be combined to form another physical quantity P of the form,

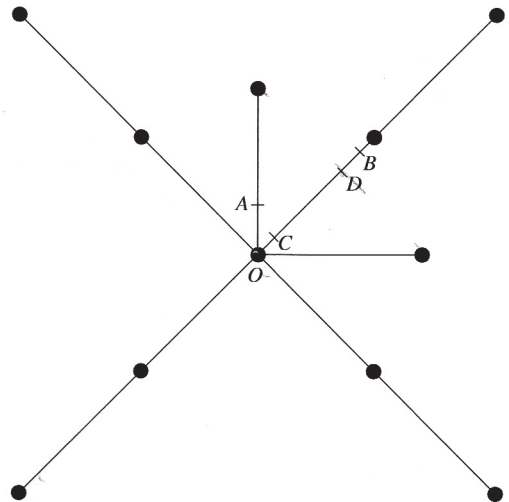
$$P = AX + BY + CZ$$

Which of the following expressions has different dimensions from the rest?

- (1) AX (2) AX - CZ (3) $\frac{(AX)(CZ)}{BY}$ (4) $\frac{(BY)^2}{P}$ (5) (BY)(CZ)

2. A coplanar structure is made by connecting eleven identical spheres each of mass m using ten identical light rods as shown in the figure. The centre of gravity of the structure is most likely to be at the point,

- (1) O
 (2) A
 (3) B
 (4) C
 (5) D



3. Consider two motor vehicles, A and B. In motor vehicle A only the front wheels are coupled to the engine and rotated, and in vehicle B only the rear wheels are coupled to the engine and rotated. Which of the following diagrams correctly shows the **directions** of the frictional forces acting on the front and rear wheels of motor vehicles A and B by the ground, when they are travelling in the forward direction?

- (1) (2) (3) (4) (5)

4. If the velocity (v) of an object varies with time (t) as shown in figure (a), the corresponding variation of the displacement (x) with time (t) is best represented by

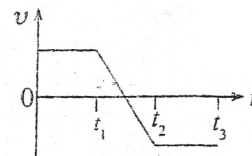
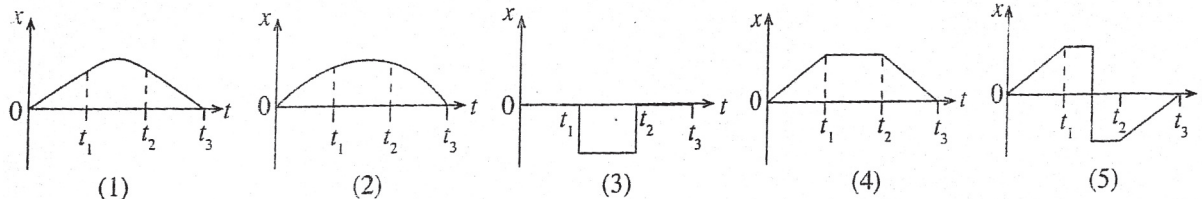
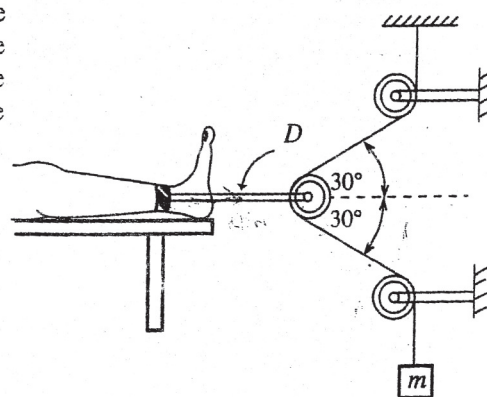


Figure (a)

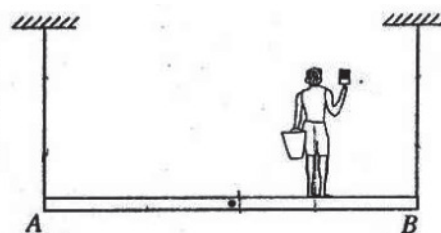


5. The pulley arrangement shown in the figure exerts a force on a leg of a patient connected to a traction device D . The pulleys are frictionless and the system is at equilibrium. If the horizontal force acting on the leg by D is 80 N, then the value of the hanging mass m will be $\left(\cos 30^\circ = \frac{\sqrt{3}}{2}\right)$



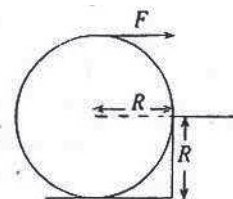
- (1) $\frac{4}{\sqrt{3}}$ kg (2) 4 kg
 (3) $\frac{8}{\sqrt{3}}$ kg (4) 8 kg
 (5) $8\sqrt{2}$ kg

6. A man of mass 60 kg standing on a uniform wooden rafter hung horizontally by two identical ropes is painting a wall. The mass of the rafter is 20 kg. What is the **minimum** tension that should be withheld by each rope so that the man can move safely between A and B?



- (1) 100 N (2) 400 N (3) 600 N
 (4) 700 N (5) 800 N

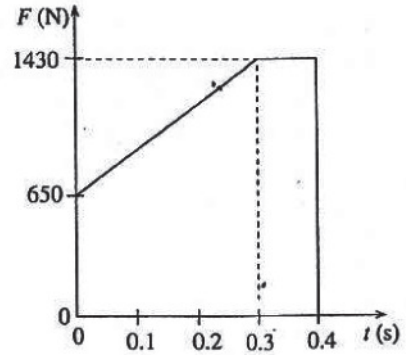
7. A circular coin of radius R and mass M is placed so that it touches a step of height R as shown in the figure. The minimum value of the horizontal force F required to pull the coin over the step is



- (1) $\frac{Mg}{2}$ (2) $\frac{Mg}{\sqrt{2}}$ (3) Mg
 (4) $\sqrt{2} Mg$ (5) $2 Mg$

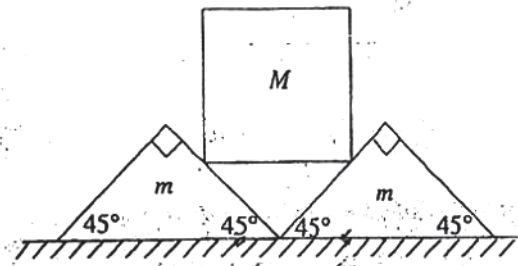
8. Figure shows the variation of the force (F) exerted by the floor on the feet with time (t) when a person jumps vertically upwards. The force (F) increases from a value which is equal to the person's normal weight of 650 N to 1430 N in 0.3 s, stays constant for 0.1 s, and then drops to zero as the feet lose contact with the floor. At what speed did the person leave the floor?

- (1) 1 m s^{-1} (2) 1.5 m s^{-1} (3) 2 m s^{-1}
 (4) 3 m s^{-1} (5) 10 m s^{-1}



9. Two identical wedges each of mass m are placed next to each other on a flat floor. A cube of mass M is placed on the wedges as shown in the figure. Assume that there is no friction between the cube and the wedges. The coefficient of static friction between the wedges and the floor is μ . The largest M that can be balanced without moving the wedges is given by

- (1) $\frac{\mu m}{\sqrt{2}}$ (2) $\frac{\mu m}{1-\mu}$ (3) $\frac{2\mu m}{1-\mu}$
 (4) $(1-\mu)m$ (5) $\sqrt{2}(1-\mu)m$



10. A box, which is placed on a rough, horizontal surface of a table is pulled by a variable, horizontal force of magnitude F . For a given value of F the resultant force R exerted by the surface on the box makes an angle θ with the horizontal direction as shown in the figure. The variation of θ with F is best represented by

