



PHYCS101

Summer Semester, 2025-2026

Final Exam Revision

تتوفر المراجعة شاملة فيديوات الشرح التفصيلي والنوتات من خلال موقعنا

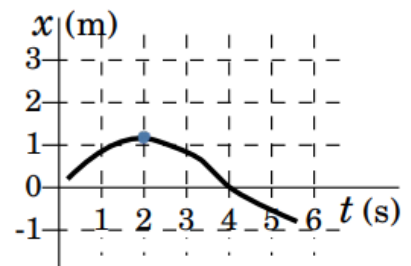
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1. The position of a particle moving along the x axis is given by $x(t) = t^4$ where x is in m and t is in s. What is the instantaneous acceleration in m/s^2 of the particle at $t=3$ s?

- (a) 108
- (b) 192
- (c) 300
- (d) 432
- (e) 588

2. The position of a particle moving along the x axis is shown in the figure. At what time in s is the particle momentarily at rest?

- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) 5

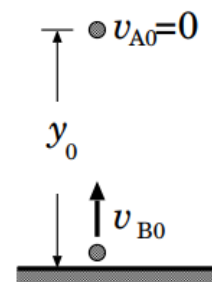


3. A car accelerates at a constant rate from an initial velocity of $v_o=5$ m/s. If it travels a distance of 200 m in 10 s, what is the final speed in m/s of the car?

- (a) 15
- (b) 20
- (c) 25
- (d) 30

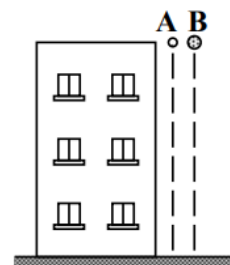
4. Ball A is dropped from a height of $y_o=80$ m and at the same time another ball is thrown vertically upward from ground level with a speed of $v_{Bo}=32$ m/s. After how many seconds will the two balls meet?

- (a) 1.0
- (b) 1.6
- (c) 2.0
- (d) 2.5
- (e) 3.2



5. Two balls, ball A with mass $m_a=0.1$ kg and ball B with mass $m_b=1$ kg are dropped (with $v_{Ao}=0$ and $v_{Bo}=0$) at the same moment from the same height from the top of a building. Assuming there is no air resistance, which of the two balls reaches the ground first?

- (a) A
- (b) B
- (c) Both at the same time
- (d) Depends on the height of the building
- (e) Depends on the shape of the ball

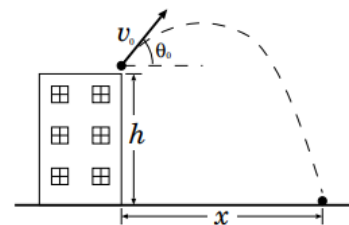


6. A particle moving in the $x - y$ plane is accelerating at a rate $\vec{a} = 2\mathbf{i} - \mathbf{j} \text{ m/s}^2$ from an initial velocity of $\vec{v} = 4\mathbf{i} + 2\mathbf{j}$. What is its velocity in m/s after $t=4 \text{ s}$?

- (a) $10\mathbf{i} - \mathbf{j}$
- (b) $12\mathbf{i} - 2\mathbf{j}$
- (c) $14\mathbf{i} - 3\mathbf{j}$
- (d) $16\mathbf{i} - 4\mathbf{j}$
- (e) $18\mathbf{i} - 5\mathbf{j}$

7. A boy on top of a building throws a ball with a speed $v_o = 10 \text{ m/s}$ at an angle $\theta_o = 37^\circ$, as shown. If the ball strikes the ground at a distance $x = 24 \text{ m}$ from the base of the building, how high (h) in m is the building?

- (a) 3.45
- (b) 8.00
- (c) 13.95
- (d) 21.31
- (e) 27.00



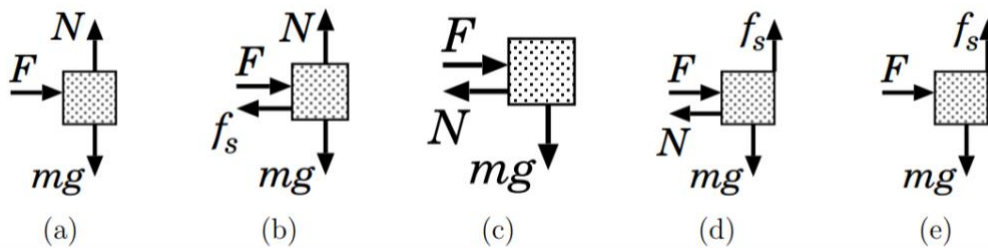
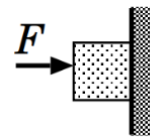
8. A ball is thrown with a speed $v_o = 10 \text{ m/s}$ at an angle of $\theta_o = 53^\circ$ above the horizontal. What is the speed in m/s of the ball at the maximum height?

- (a) 0
- (b) 3
- (c) 6
- (d) 9
- (e) 12

9. A force $F=21\text{ N}$ accelerates a block at a rate $a=7\text{ m/s}^2$. What is the mass in kg of the block?

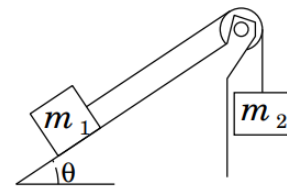
- (a) 3
- (b) 4
- (c) 5
- (d) 6
- (e) 7

10. A block of mass m is held stationary by a horizontal force F pressing it against a rough vertical wall as in the figure. Which of the following free body diagrams represents this system?



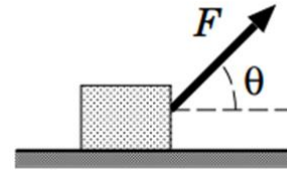
11. Block with mass $m_1=15\text{ kg}$ is placed on a smooth incline making an angle $\theta=53^\circ$ with the horizontal and connected by a massless string going over a massless pulley to a hanging block of mass m_2 . If the system remains at rest, what is the value of m_2 in kg?

- (a) 8
- (b) 12
- (c) 16
- (d) 20
- (e) 24



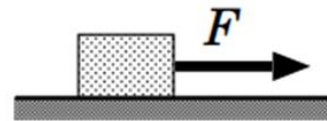
12. A block of mass $m=10\text{ kg}$ rests on a rough horizontal surface with the coefficient of kinetic friction between the block and the surface $\mu_k=0.5$. A force F making an angle $\theta=37^\circ$ with the horizontal accelerates the block at a rate $a=4.9\text{ m/s}^2$, to the right. What is the magnitude of the force F in N?

- (a) 60
- (b) 70
- (c) 80
- (d) 90
- (e) 100



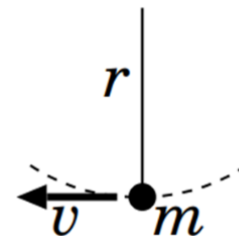
13. A block with mass $m=6\text{ kg}$ is resting on a rough horizontal surface with the coefficient of static friction between the block and the surface $\mu_s=0.5$. A horizontal force $F=10\text{ N}$ is applied on the block. What is the magnitude of the static frictional force (f_s) in N?

- (a) 10
- (b) 15
- (c) 20
- (d) 25
- (e) 30



14. A mass $m=2\text{ kg}$ is attached to the end of a $r=1\text{ m}$ string and swung in a vertical circle. If at the lowest point the speed of the mass is $v=6\text{ m/s}$, what is the tension in N in the string?

- (a) 20
- (b) 38
- (c) 52
- (d) 70
- (e) 92

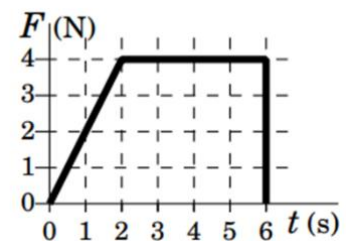


15. A variable force is given by $F(x) = 12x^2$ where F is in N and x is in m. What is the work done in J by the force from $x=1$ m to $x=4$ m?

- (a) 28
- (b) 104
- (c) 252
- (d) 496
- (e) 860

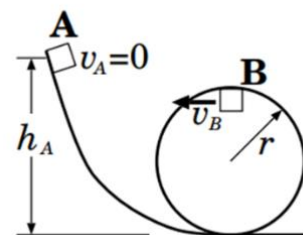
16. A block of mass $m=4$ kg is moving with a speed $v_o=4$ m/s in the positive x direction. A force F as shown in the figure is applied in the same direction. What is the final speed in m/s of the block?

- (a) 7.3
- (b) 8.1
- (c) 9.3
- (d) 10.7
- (e) 12.2



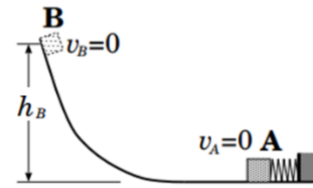
17. A block of mass m is placed at point A at a height h_A up the smooth track as shown. The block is released from rest ($v_A=0$) and slides down the smooth track and goes through loop-the-loop of radius $r=2$ m. If the block has the minimum speed at point B to make it through the loop, what is the value of h_A in m?

- (a) 5
- (b) 10
- (c) 15
- (d) 20
- (e) 25



18. A 2kg block is held compressing a spring with force constant $k=4000 \text{ N/m}$ a distance $x=0.2 \text{ m}$. The block is released from rest (point A) and moves up the rough track shown to a maximum height $h_b=1.5 \text{ m}$ (point B). How much energy in J is lost due to friction?

- (a) -20
- (b) -30
- (c) -40
- (d) -50
- (e) -60

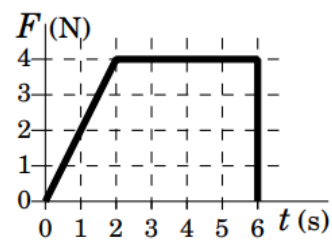


19. A force varies with time as $F(t) = 3t^2 - 2t$ where F is in N and t is in s. What is the impulse in N·s delivered by the force from $t=2 \text{ s}$ to $t=5 \text{ s}$?

- (a) 14
- (b) 44
- (c) 96
- (d) 176
- (e) 290

20. A block of mass $m=4 \text{ kg}$ is moving with a speed $v_i=6 \text{ m/s}$ in the positive x direction. A force F as shown in the figure is applied in the same direction. What is the final speed in m/s of the block?

- (a) 7
- (b) 8
- (c) 9
- (d) 10
- (e) 11

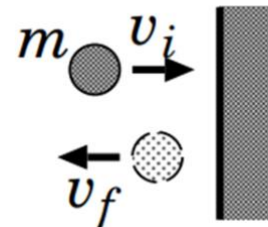


21. A 2 kg block initially traveling in the positive x direction with a speed of $v_i=3$ m/s. A force is applied increasing the speed to $v_f=8$ m/s in the same direction. What is the impulse in N·s delivered by the force?

- (a) 4
- (b) 6
- (c) 8
- (d) 10
- (e) 12

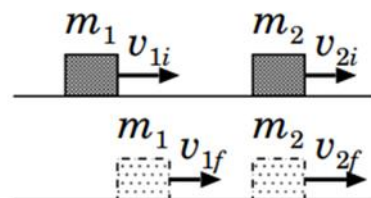
22. A ball of mass $m=0.2$ kg initially moving with a speed $v_i=6$ m/s strikes a wall and bounces back with a speed of $v_f=4$ m/s. The ball is in contact with the wall for 0.2 s, what is the magnitude of the average force in N applied by the wall on the ball?

- (a) 10
- (b) 15
- (c) 20
- (d) 25
- (e) 30



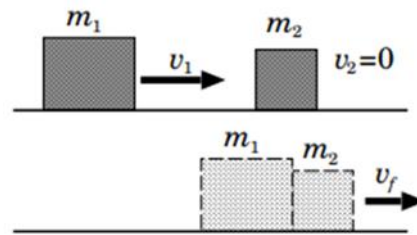
23. A block with mass $m_1=6$ kg moving to the right with a speed $v_{1i}=6$ m/s on a smooth horizontal track collides with a second block of mass $m_2=2$ kg moving to the right with a speed $v_{2i}=2$ m/s. After the collision block m_1 moves to the right with a speed $v_{1f}=4$ m/s. What is the speed of the second block v_{2f} in m/s after the collision?

- (a) 7
- (b) 8
- (c) 9
- (d) 10
- (e) 11



24. A block of mass $m_1=2$ kg moving with a speed $v_1=15$ m/s collides and sticks to a second block of mass $m_2=1$ kg initially at rest ($v_2=0$). After the collision the two blocks move together with a common speed v_f . How much energy in J is lost due to the collision?

- (a) -3
- (b) -12
- (c) -27
- (d) -48
- (e) -75



25. A block with mass $m_1=7$ kg moving to the right with a speed $v_{1i}=5$ m/s collides head on with a second block of mass $m_2=3$ kg moving to the left with a speed $v_{2i}=5$ m/s. After the collision, m_1 is seen moving to the left with a speed $v_{1f}=1$ m/s and m_2 to the right with a speed $v_{2f}=9$ m/s. Which of the following statements describes the collision?

- (a) The collision is inelastic
- (b) The collision is perfectly inelastic
- (c) The collision is elastic
- (d) The collision is not possible
- (e) None of the above.

