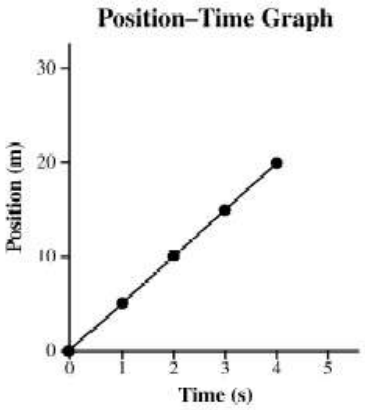
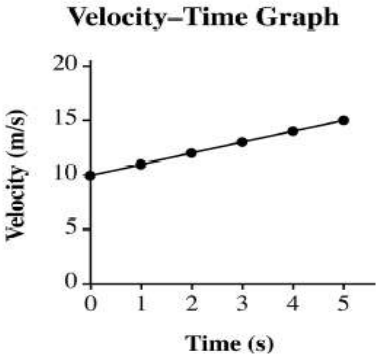
Pre-AP Physics Semester 1 Review



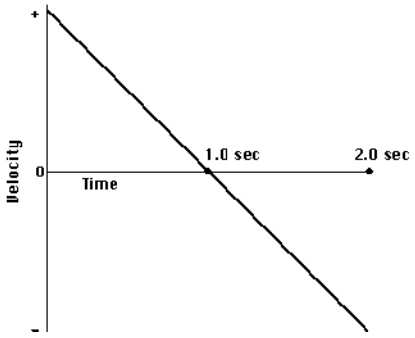
Use the graph to the right to answer the following 4 questions.

1. What type of motion is occurring here? constant velocity
2. What is the location of the object at t = 2s? x = 10m
3. What is the velocity at t = 2s? 5 m/s (slope)
4. What is the displacement from t = 1s to t = 4s? 15m



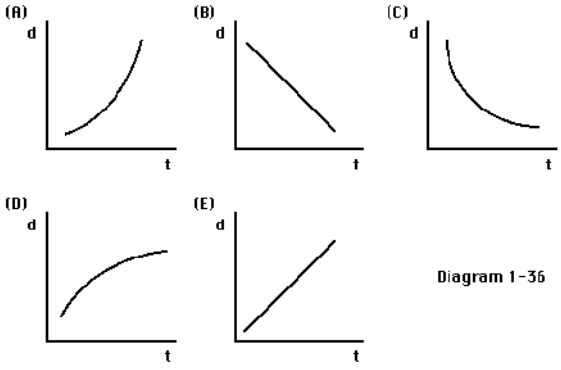
Use the graph to the right to answer the following 4 questions.

5. What type of motion is occurring here? constant acceleration
6. What is the velocity at t = 2s? 12 m/s
7. What is the acceleration at t = 4s? 1 m/s^2 (slope)
8. What is the displacement from t = 1s to t = 4s? 37.5 m (area)
9. What is meant by the term uniform motion? constant velocity
10. Which of the two graphs above show uniform motion? the first one



Use the graph to the right to answer the following 6 questions.

11. Describe the motion represented by the graph. constant neg. accel.; could be ball tossed up and falling back down
12. What is the total displacement for the 2s shown in the graph? zero
13. What is the velocity at t = 1s? zero
14. What else is happening at t = 1s? changing direction
15. During what time interval is the object slowing down? 0-1s
16. During what time interval is the object speeding up? 1s-2s



17. Which of the graphs on the right show
    a. positive constant velocity E
    b. negative constant velocity B
    c. positive acceleration A and C
    d. negative acceleration D

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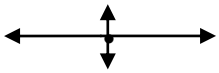
18. Define acceleration: rate of change of velocity

19. If a car moving at 22 m/s speeds up to 25 m/s over a time period of 4.5 s, what was the average acceleration? a = (3ms)/(4.5s) = 0.7 m/s^2

20. If the same car, travelling at 22 m/s, accelerates at a rate of – 3.5 m/s^2 for 3.2 s, what is its final speed? 10.8 m/s

21. An object, represented by a dot, is travelling at a constant velocity towards the right with four forces acting on it: one upward, one downward, one towards the right and one towards the left. Draw a free body diagram for the situation. opposing force vectors must be the same length since net force = 0



22. A car travels 16.0 kilometers due north and then 6.0 kilometers due east going from town A to town B**.** What is the approximate magnitude of the displacement of a helicopter that flies in a straight line from town A to town B? 17.1 km

23. A ball is thrown horizontally from the top of a 35.0 m high building at 25.0 m/s over level ground.

    a. What is the initial vertical velocity of the ball? zero

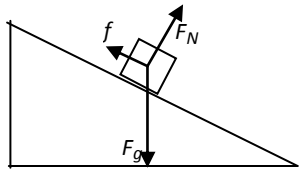
    b. What is the initial horizontal velocity of the ball? 25.0 m/s

    c. What will be the time of flight of the ball? 2.65 s

    d. What will be the ball's vertical velocity just before impact with the ground? -26.5 m/s

    e. What will be the ball's horizontal velocity just before impact with the ground? 25.0 m/s

24. Draw and label the three forces acting on the block, gravity, normal, and friction.



25. Two masses, m_1 and m_2, are separated by a distance *r* and exert a force *F* on each other. What will be the new force between the two masses if:

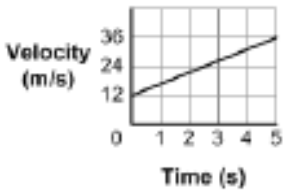
    a. both masses are doubled 4F

    b. they are moved so they are twice as far from each other ¼ F

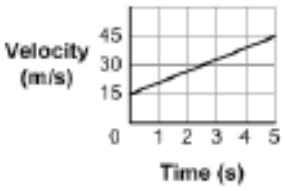
    c. both masses are doubled and they are moved twice as far apart F

26. Calculate the acceleration for each of the four graphs below: find the slopes: A: 4.8 m/s^2; B: 6 m/s^2; C: 0.8 m/s^2; D: 4 m/s^2

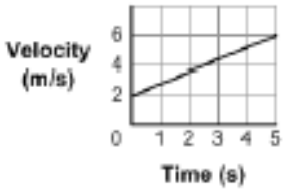
A.



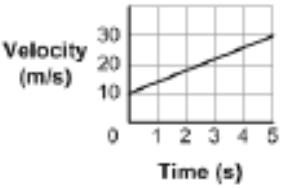
B.



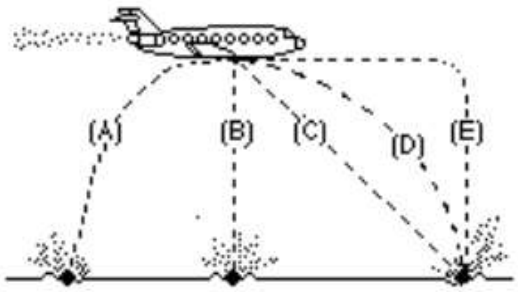
C.



D.



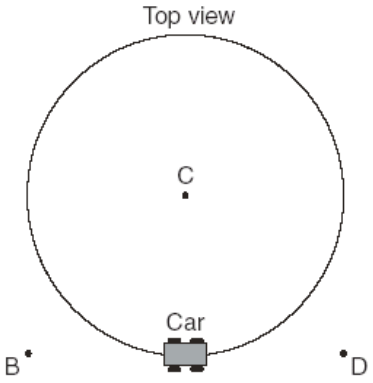
27. A bowling ball accidentally falls out of the cargo bay of an airliner as it flies along in a horizontal direction.



    a. As observed by a person standing on the ground and viewing the plane as in the figure at right, which path would the bowling ball most closely follow after leaving the airplane? D

    b. As observed by a person looking down from the airliner cargo bay, which path would the ball appear to follow? B

28. The 2.0 kg car is moving clockwise at 4.0 m/s around the circle. Th centripetal acceleration of the car is directed towards which of the four labeled points on the diagram? C



29. If the radius of the circle is 2.5 m, what is the magnitude of the centripetal force? 12.8 N

30. A large truck collides with a small compact car. During the collisio

• A

a. How does the force of the collision on the car compare with the force on the truck? equal

b. How does the impulse of the collision acting on the car compare with the impulse acting on the truck? equal

c. How does the change in momentum for the car compare with the change in momentum for the truck? equal

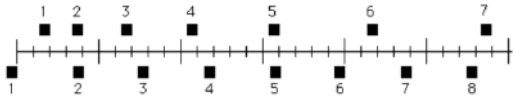
31. Two people are pushing a car with a mass of 1,850 kg. One person applies a force of 275 N while the other person applies a force of 365 N to the car, both in the same direction. Due to friction, the opposing force on the car is 560 N. What is the acceleration of the car? F_{net} = 80N; a = 0.043 m/s^2

32. A 25-kg sled is being pulled horizontally at a constant velocity on ice that has a coefficient of sliding friction of 0.178. What is the approximate value of

a. the force of friction being exerted on the sled 44.5 N

b. the pulling force? 44.5 N

33. The positions of two blocks at successive 0.20-second time intervals are represented by the numbered squares in the figure to the right.



a. What type of motion is shown by the upper series of squares? acceleration

b. What type of motion is shown by the lower series of squares? constant velocity

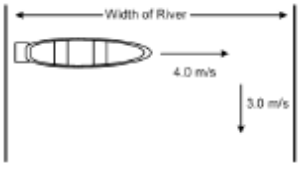
c. Do the blocks ever have the same speed? When? yes, from 3 – 4 s

34. A student is playing pool with a group of friends. The student applies a 6.5 N force, using a cue stick, to a 0.10 kg billiard ball. The cue stick stays in contact with the ball for 5.0 x 10^{-3} s.

a. What is the change in momentum of the ball? 0.0325 Ns

b. What is the speed of the ball? 0.325 m/s

35. Two students use a boat to cross a river that is flowing at 3 m/s, and the boat is traveling at 4 m/s straight across the river. What is the resulting speed of the boat? 5 m/s

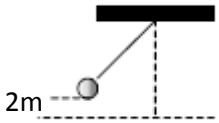


36. A bullet is fired from a rifle horizontally and at the same time, an identical bullet is dropped from the same height. Which one hits the ground first? same time

37. A dynamics cart with a mass of 1.5 kg initially moving with a speed of 3.0 m/s collides with a another cart at rest. The carts stick together after the collision and move off with a speed of 2.0 m/s. What was the mass of the second cart? 0.75 kg

38. Describe Henry Cavendish's famous experiment and his apparatus. What was he measuring with his experiment? He measured gravitational force and the constant G with torsion apparatus and optical lever

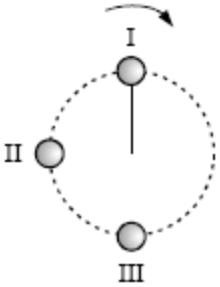
39. A pendulum with a mass of 1.5 kg is raised to a height of 2 m above the lowest point of its swing and released.



    a. Describe the energy transformations that take place during one cycle of the pendulum's swing. PE converts to KE and back to PE and repeats

    b. How fast will the pendulum be moving at the lowest point, when the cord is vertical? 6.3 m/s

40. A 0.10 kg ball on the end of a string is being swung in a vertical circle as shown to the right. Points I, II, and III are labeled on the circle.



    a. At which point will the tension in the string be the greatest? III

    b. At which point will the tension in the cord be the least? I

    c. At the minimum speed where the ball will continue its circular path, what will be the centripetal force at the top of the circle? 1 N (weight of ball)

    d. If the string were to break at point II, what would be the initial direction for the ball's motion? straight up

41. A boy applies a horizontal force of 20 N to a 5-kg box over a distance of 10 m, and then lifts the box up to a shelf 2 m high. Calculate

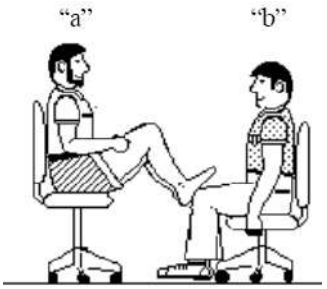
    a. the work done against friction 200N

    b. the work done against gravity 100N

    c. the total amount of work done by the boy. 300 N

42. A 20 kg ball is fired straight up from the ground with an initial velocity of 200 m/s. Air resistance is negligible.
    a. What is the potential energy gained by the ball at its highest point? 400,000 J
    b. How high will the ball rise? about 2000 m

43. In the figure at right, student "a" has a mass of 95 kg and student "b" has a mass of 77 kg. They sit in identical office chairs facing each other. Student "a" places his bare feet on the knees of student b", as shown. Student "a" then suddenly pushes outward with his feet, causing both chairs to move.



    a. How does the force on student "a" compare with the force on student "b"? equal

    b. If student "a" moves to the left with a speed of 1.5 m/s, what will be the speed of student "b"? (ignore friction) 1.85 m/s (recoil)

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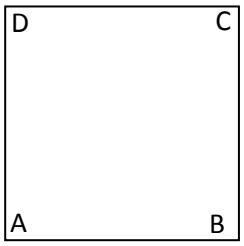
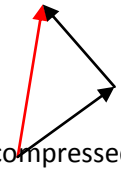


44. Sally starts at position A and walks around the park square which is 100m on each side. Determine the magnitude of her displacement at each corner of the square. B: 100m C: 141m D: 100m A: 0

45. Draw a vector that represents the sum of vector A:  and vector B:  

46. In a momentum lab, two carts are placed together at rest on a track, one of which has a compressed spring plunger. When the spring plunger is released, the carts move apart.

    a. What is the total momentum of the two cart system before the spring is released? 0

    b. What is the total momentum of the two cart system before the spring is released? 0

    c. If cart 1 has a mass of .75 kg and moves with a speed of 0.60 m/s, what is the speed of cart 2 with a mass of 0.50 kg? 0.90 m/s

47. In another momentum experiment two carts of equal mass collide in a totally inelastic collision.

    a. If one cart is moving with a speed of 0.40 m/s and the other cart is at rest, what is the final speed of the combined carts after the collision? 0.20 m/s

    b. If both carts are moving with equal speed in opposite directions, what happens? they stop

48. Position & Velocity of a Vertically Thrown Object

Time (s)	Position (m)	Velocity (m/s)
0.0	0.0	10.0
0.1	1.0	9.0
0.2	1.8	8.0
0.3	2.6	7.0
0.4	3.2	6.0
0.5	3.8	5.0

Using the data table, predict what time the object will have a velocity of 2.0 m/s. 0.8s

49. In a density lab, a student measures experimental values of 1.65 g/ml, 1.67 g/ml, 1.64 g/ml, and 1.68 g/ml. The accepted value in the experiment was 2.11 g/ml. The student's results were fairly (a) precise and accurate (b) precise but not accurate (c) accurate but not precise (d) neither precise nor accurate. b

50. For an object in projectile motion, which quantity of the motion remains constant during the flight: displacement, velocity, acceleration, speed, position? acceleration

51. In order to produce the greatest acceleration from two forces, how should they be situated? (A) in the same direction (B) in opposite directions (C) perpendicular to each other (D) It makes no difference (A)