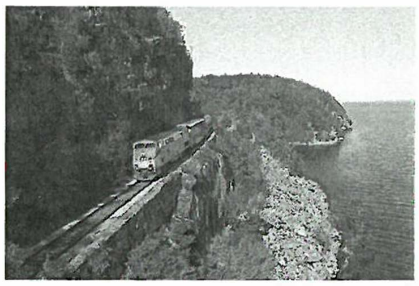
	Total	K+E	I+O
Student	31	15	16
Average	25.4/50	22.6/50	28.6/50
Best	45.0/50	41.5/50	45.0/50

11th Physics (2019 – 20)

(1stQ, #1 Mini Test)

Class	No.	Name Solutions



In calculation problems, describe equations clearly and systematically enough to show how to solve the problems.

Pi $\pi = 3.141593$

mile 1 mi = 1.609 km

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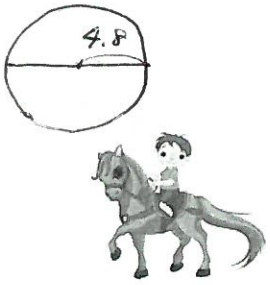
4 pt/question x 13 questions = 52 pt Max 50 pt

/[Total 50 pt]



(Q1) A child rides a pony on a circular track whose radius is 4.8 m.

(Q1-a) Find the distance traveled and the magnitude of displacement after the child has gone halfway around the track.

(Q1-b) Find the distance and the magnitude of displacement after a complete circuit of the track.

Equations

a) distance $= \frac{2\pi r}{2} = \pi r = 3.14 \times 4.8 = 15.1 \rightarrow 15$ [m]

displacement $= 2r = 2 \times 4.8 = 9.6$ [m]

b) distance $= 2\pi r = 2 \times 3.14 \times 4.8 = 30.2 \rightarrow 30$ [m]

displacement $= 0$

(Q1-a) Answer

Distance : 15 m

Magnitude of displacement : 9.6 m

(Q1-b) Answer Distance : 30 m

Magnitude of displacement : 0

[61 %]

(Q2) You jog at 9.5 km/h for 8.0 km, then you jump into a car and drive an additional 16 km. With what average speed must you drive your car if your average speed for the entire 24 km is to be 22 km/h?

Equations

Total 24 km | 16 km | 8.0 km

22 km/h | v | 9.5 km/h

$\frac{24}{22} = 1.090$ km/h $\qquad \frac{8.0}{9.5} = 0.842$ km/h

$1.\overline{090} - 0.\overline{842}$

$= 0.\overline{248}$ (one s.f.)

$v = \frac{16}{0.248} = \overline{6}4.51 \rightarrow 60$

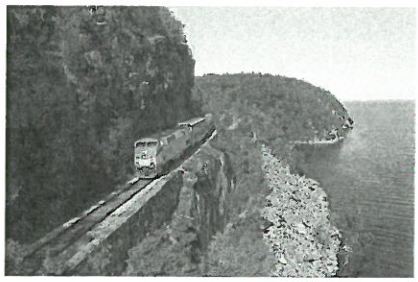
(Q2) Answer

60 km/h

[34 %]

65 km/h + 3.5

(Q3) The International Express, Amtrak Adirondack departs at 9:30 am at Montreal, Canada and arrives at 8:20 pm at New York, NY – Penn Station. The distance between Montreal and New York is 613 km.



(Q3-a) What is the average speed in km/h?

(Q3-b) In the above question, what is the average speed in m/s? (Equations)

20:20
−) 9:30
10:50 $= 10 \cdot \frac{50}{60} = 10.833$ [h]
‖
650 min
(3 s.f.)

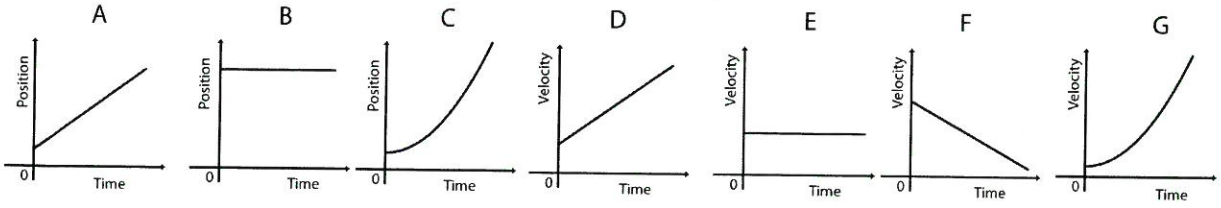
(a) $v = \frac{613\ \text{km}}{10.833\ \text{h}} = 56.59 \rightarrow 56.6$ [km/h]

(Q3-a) Answer 56.6 km/h
(Q3-b) Answer 15.7 m/s

[65 %]

(b) $56.59\ \frac{\text{km}}{\text{h}} \times \frac{10^3\ \text{m}}{1\ \text{km}} \times \frac{1\ \text{h}}{3.6 \times 10^3\ \text{s}}$

$= \frac{56.59}{3.6}\ \frac{\text{m}}{\text{s}} = 15.72 \rightarrow 15.7$ [m/s]



(4,5) Some of the above figures represent graphs expressing four types of motion for a body moving on a straight line. Choose all of the graphs expressing the following motions from A – G. Answer "Nothing" if no graph can be chosen.

(4-a) A body is at rest.
(4-b) A body is moving with a constant speed.
(5-c) A body is moving with a constant acceleration.
(5-d) A body is moving with changing acceleration.

(Q4-a) Answer
B
(Q4-b) Answer
A , E

[55 %]

0 ✓ +1
0 ✓✓ +0.5

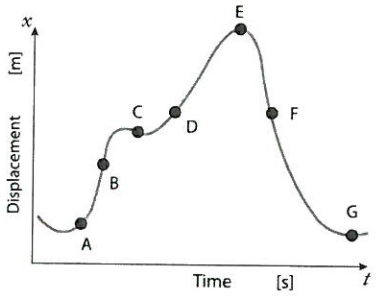
(Q5-c) Answer
C , D , F
(Q5-d) Answer
G

[48 %]

(Q6, 7) The figure shows x–t graph or the relation between displacement and time.

(6) In the seven points, A - G, which has the highest positive instantaneous velocity?

(7) In the two points, A – G, two points have the almost the same instantaneous velocity. Find the two points.



(Q6) Answer
B

[46 %]

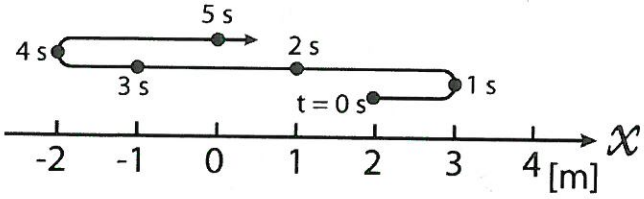
A – B
+2

(Q7) Answer
E and G

[13 %]

A and D
+2

(Q8, 9) The figure shown below visualizes a particle's motion by sketching its position as a function of time. In this case the particle moves in the positive x direction for 1 s, then reverses direction and then reverse direction again.



(Q8) Replot the same information with an x–versus-t graph where the vertical and horizontal axes represent the position, x, and time, t.

(Q9) Find the average velocity for the particle from t=0 to t = 5 s.
(Equations)

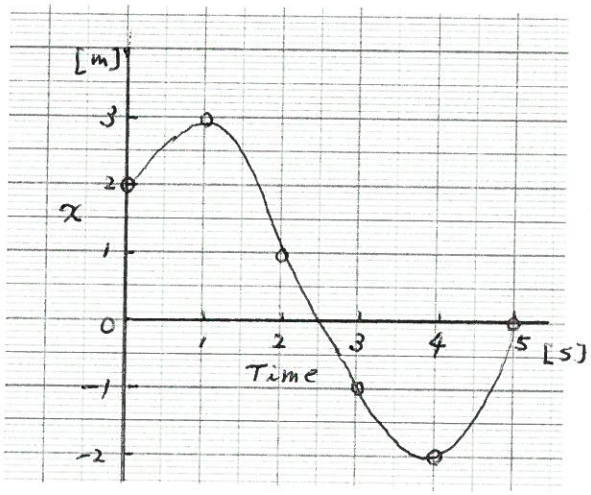
$$a_v = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i} = \frac{0 - 2.0}{5.0 - 0}$$

$$= \frac{-2.0}{5.0} = -0.40 \ [m/s]$$

(Q8) Answer

Draw graph.

[70 %]



(Q9) Answer

-0.40 m/s

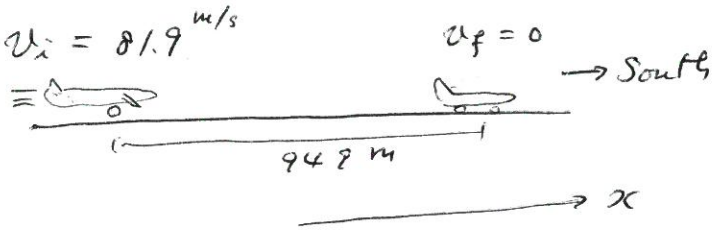
[64 %]

0.4 m/s +2

(Q10, 11) Landing with a speed of 81.9 m/s, and the travelling due south, a jet comes to rest in 949 m. Assume that the jet slows with constant acceleration.

(Q10) Find the magnitude and direction of its acceleration.

(Q11) Find how long does it take from landing to rest. (Equations)



(10) $v_f^2 - v_i^2 = 2ax$

$\rightarrow a = \dfrac{v_f^2 - v_i^2}{2x}$

$= \dfrac{0 - 81.9^2}{2 \times 949} = -3.534 \longrightarrow -3.53 \ [m/s^2]$

(11) $a = \dfrac{v_f - v_i}{t}$

$\rightarrow t = \dfrac{v_f - v_i}{a}$

$= \dfrac{0 - 81.9}{-3.534}$

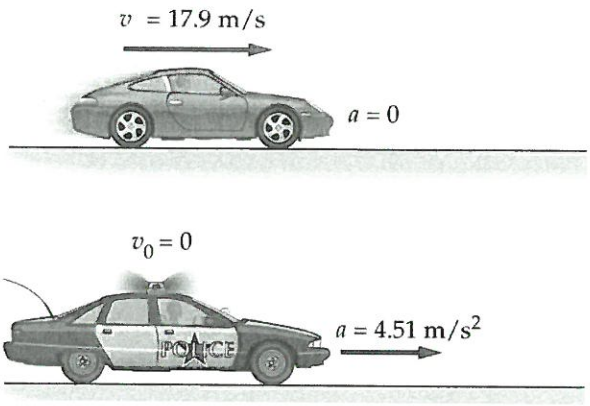
$= 23.17 \longrightarrow 23.2 \ [s]$

(Q10) Answer

3.53 m/s^2 To North [64 %]

(Q11) Answer

23.2 s [64 %]



(12) A red car is driving at a constant speed of 17.9 m/s and passes the police car. At that instant the police car begins their pursuit because the speed of the red car is too high. The police car accelerates with a constant acceleration of 4.51 m/s2. Assume the red car maintains a constant velocity.

(12-a) How long does it take for the police car catch the red car?

(12-b) How far has the police car traveled in this time. (Equations)

(a) $x_{red} = vt = 17.9t$

$x_p = v_i t + \frac{1}{2}at^2 = 0 + \frac{1}{2} \times 4.51 t^2$

$x_{red} = x_p \quad 17.9t = \frac{1}{2} \times 4.51 t^2$

$t = \frac{2 \times 17.9}{4.51} = 7.938 \longrightarrow 7.94$ [s]

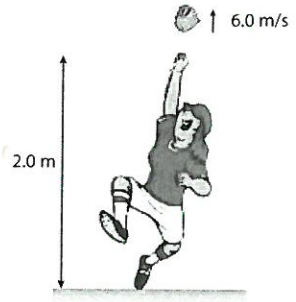
(b) $x_p = \frac{1}{2} \times 4.51 \times 7.938^2$

$= 142.1 \longrightarrow 142$ [m]

(Q12-a) Answer	7.94 s
(Q12-b) Answer	142 m

[14%]

(Q13) To celebrate a victory, a pitcher throws her glove straight upward with an initial velocity of 6.0 m/s at the height 2.0 m from the ground.



(Q13-a) How long does it take for the glove to reach the maximum height?

(Q13-b) How high is the maximum point from the ground?

(a) $v_f = v_i - gt$, $v_f = 0$, $v_i = 6.0$ m/s , $g = 9.80$

$$t = \frac{v_f - v_i}{-g} = \frac{0 - 6.0}{-9.80} = 0.612 \longrightarrow 0.61\,[s]$$

(b) $v_f^2 - v_i^2 = -2gy$

$$y = \frac{v_f^2 - v_i^2}{-2g} = \frac{0 - 6.0^2}{-2 \times 9.80} = 1.84\,[m]$$

$1.84\,[m] + 2.0\,[m] = 3.84\,[m] \longrightarrow 3.8\,[m]$

(Q13-a) Answer 0.61 s
(Q13-b) Answer 3.8 m

[38%]

Your opinions
