	Total	K+E	I+O
Student	34	17	17
Average	24.0/50	24.2/50	23.8/50
Best	39.5/50	39.5/50	39.0/50

11th Physics (2018 – 19)

(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

---

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

/[Total 50 pt]

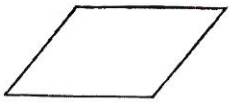
(1) How do you read the following equations in English.

(1-a) $20 \times 3 = 60$

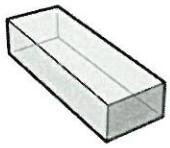
(1-b) $20 \div 2.2 = 9.09 \rightarrow 9.1$

What are the English names of the figures blow?

(1-c)



(1-d)



(1-a) Answer Twenty multiplied by 3 equals 60
(1-b) Answer Twenty divided by 2 point 2 is nine point zero nine : it is nine point one when rounding
(1-c) Answer Parallelogram
(1-d) Answer Cuboid (or rectangular prism)

(50%)

(2) The mass of a newborn baby's brain has been found to increase by about 1.6 mg per minutes.

(2-a) How much does the brain's mass increase in 1day? (1 : integer)

(2-b) How long does it take for the brain's mass to increase by 0.0075 kg?

(Equations)

(a) $1.6 \frac{mg}{min} \times \frac{24 \times 60 min}{1 day} = 2304 mg/day \rightarrow 2.3 g/day$

(b) $0.0075 kg = 7.5 g = 7500 mg$

$\frac{7.5 g}{2.304 g/day} = 3.255 \rightarrow 3.3 (day)$

$\frac{7500 mg}{1.6 mg/min} = 4688 min \rightarrow 4700 min$

$= 78.13$

$\rightarrow 78 h$

(2-a) Answer 2.3 g
(2-b) Answer 3.3 day, 4700 min or 78 h

(66%)

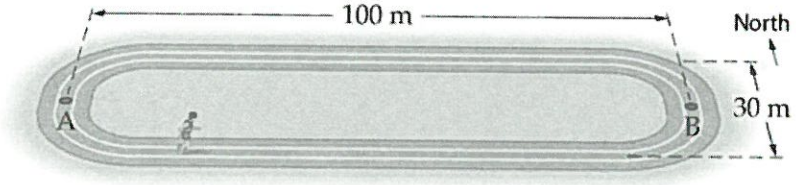
(3) A jogger runs on the track shown below. Neglect the curvature of the corners.

(3-a) What is the distance traveled from point A to point B?

(3-b) What is the displacement in running from point A to point B?

(3-c) Find the distance for a complete circuit of the track.

(3-d) Find the displacement for a complete circuit of the track.



(Equations)

$d = 15 + 100 + 15 = 130$

(3-a) Answer	130 m
(3-b) Answer	100 m to east
(3-c) Answer	260 m
(3-d) Answer	0

(68%)

(4) A student throws a ball vertically upward such that it travels 7.1 m to its maximum height. The ball is caught at the initial height 2.4 s after being thrown.

(4-a) What is the ball's average speed?

(4-b) What is the ball's average velocity?

(Equations)

$$\text{Av. speed} = \frac{d}{t} = \frac{7.1 \times 2}{2.4} = 5.92 \longrightarrow 5.9 \text{ (m/s)}$$

$$\text{Av. velocity} = \frac{\Delta x}{\Delta t} = \frac{0}{\Delta t} = 0$$

(4-a) Answer	5.9 m/s
(4-b) Answer	0

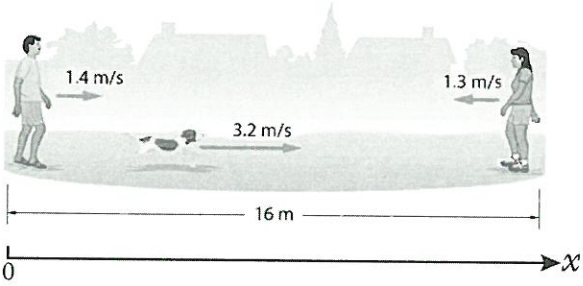
(36%)

(5~7) A dog runs back and forth between its two owners, a boy and a girl, who are walking toward one another, as shown in the figure. The dog starts running when the owners are 16 m apart. The dog runs with a speed of 3.2 m/s, and the boy and the girl walk with a speed of 1.4 m/s and 1.3 m/s, respectively.

(5) Write the position-time equations of motion for the boy and girl. The origin t=0 is the time when the boy starts to walk and

(6) Draw the position-time graph for the motion of the boy and girl.

(7) How far has the dog traveled when the owners meet? (Equations)



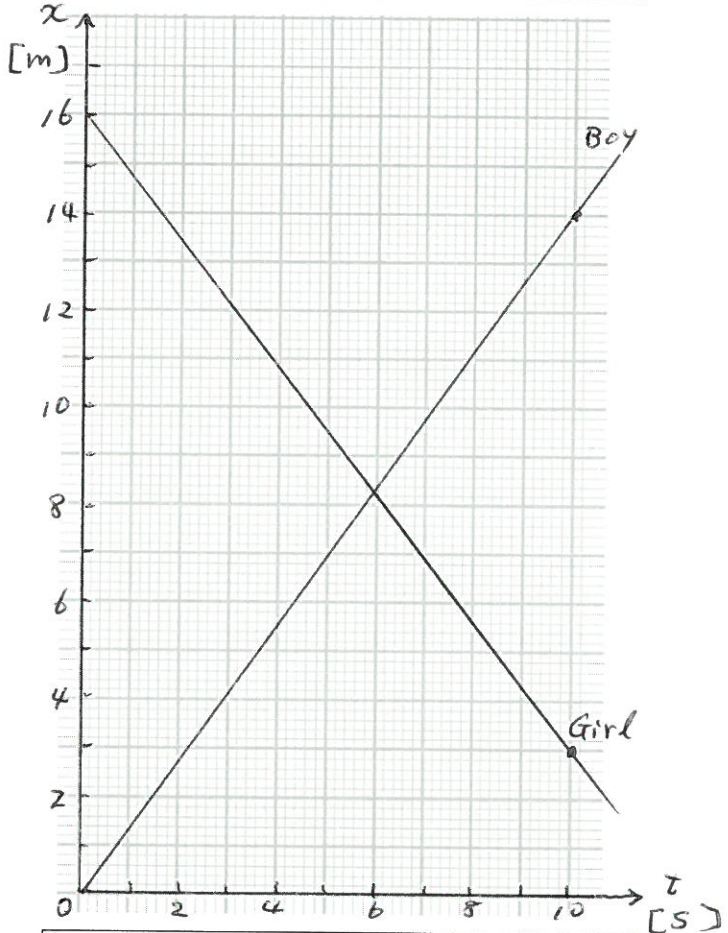
(5) Answer

Boy: $x = 1.4t$

Girl: $x = 16 - 1.3t$

(47%)

(6) Answer Draw a graph below. (51%)



(7)

$\Delta x = (16 - 1.3t) - 1.4t$

$= 16 - 2.7t$

$\Delta x = 0 \rightarrow t = \frac{16}{2.7}$

$= 5.926\ (s)$

$d = vt = 3.2 \times 5.926$

$= 18.96 \longrightarrow 19$

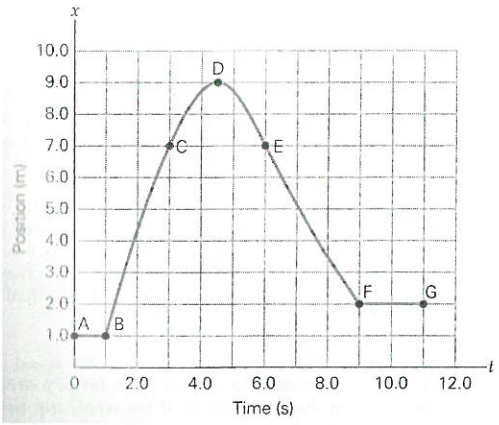
(7) Answer

19 m

(38%)

(8) A plot of position verses time for an object in linear motion is shown in the figure at the right.
Find the average velocities for the following segments.
(8-a) AB
(8-b) BE
(8-c) CG

(8-d) What is the instantaneous velocity at point D?
Equations



(a) $v_{AB} = \frac{\Delta x}{\Delta t} = \frac{0}{1.0} = 0$

(b) $v_{BE} = \frac{7.0 - 1.0}{6.0 - 1.0}$

$= \frac{6.0}{5.0}$

$= 1.20 \rightarrow 1.2$

(c) $v_{CG} = \frac{2.0 - 7.0}{11.0 - 3.0}$

$= \frac{-5.0}{8.0}$

$= -0.6250 \rightarrow -0.62$

(5 in even)

(d) $v_D = \lim_{\Delta t = 0} \frac{\Delta x}{\Delta t} = 0$

(8-a) Answer	0
(8-b) Answer	1.2 m/s
(8-c) Answer	− 0.62 m/s
(8-d) Answer	0

(57%)

(9-a)A 747 airliner reaches its takeoff speed of 173 mi/h in 35.2 s. What is the magnitude of its average acceleration?
Equations

$$173\ \frac{mi}{h} \times \frac{1\ h}{3.6\times10^{3}\ s} \times \frac{1.609\ km}{1\ mi} \times \frac{10^{3}\ m}{1\ km}$$

$$= 173 \times \frac{1.609}{3.6}\ \frac{m}{s} = 77.32\ (m/s)$$

$$a_{av} = \frac{\Delta v}{\Delta t} = \frac{77.32-0}{35.2}$$

$$= 2.197 \rightarrow 2.20$$

$1.37\times10^{-3}\ mi/s^2$
OK.

(9-b) Now the airliner makes a landing traveling due east with a speed of 115 m/s. If the airliner comes to rest in 13.0 s, what are the magnitude and direction of its acceleration?
Equations

$$a_{av} = \frac{\Delta v}{\Delta t}$$

$$= \frac{0-115}{13.0}$$

$$= -8.846 \rightarrow -8.85$$

(9-a) Answer	$2.20\ m/s^2$
(9-b) Answer	$8.85\ m/s^2$ due west

(60%)

(10,11) The infamous chicken is dashing toward home plate with a speed of 5.8 m/s when he decides to hit the dirt. The chicken slides for 1.1 s, just reaching the plate as he stops (safe, of course).
(10) What are the magnitude and direction of the chicken's acceleration?
(11)How far did the chicken slide?
(Equations)

(10) $v_0 = 5.8$ m/s

$t = 1.1$ s

$$a_{av} = \frac{\Delta v}{\Delta t} = \frac{0 - 5.8}{1.1} = -5.27 \longrightarrow -5.3$$

(11) $v^2 - v_0^2 = 2ax$

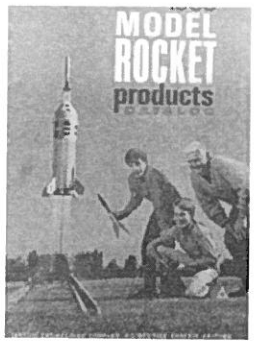
$$x = \frac{v^2 - v_0^2}{2a}$$

$$= \frac{0 - 5.8^2}{2 \times (-5.27)}$$

$$= 3.19 \longrightarrow 3.2$$

(10) Answer: 5.3 m/s² Toward the 3rd base (66%)

(11) Answer: 3.2 m (48%)



(12,13) A model rocket blasts off and moves upward with an acceleration of 12 m/s² until it reaches a height of 26 m, at which point its engine shuts off and it continues its flight without engine.
(12-a) What is the speed of the rocket when the engine shuts off?
(12-b) What is the maximum height attained by the rocket?
(13-c) What is the speed of the rocket just before it hits the ground?
(13-d) What is the total duration of the rocket's flight.

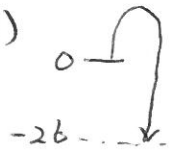
(a) $v^2 - v_0^2 = 2ay$ $\quad v = \sqrt{v_0^2 + 2ay} = \sqrt{0 + 2\times 12 \times 26}$

$= 24.98 \longrightarrow 25\ (m/s)$

(b) $v^2 - v_0^2 = -2gy$, $v = 0$, $v_0 = 24.98$

$y = \dfrac{v^2 - v_0^2}{-2g} = \dfrac{0 - 24.98^2}{-2\times 9.80} = 31.84$

$31.84 + 26 = 57.84 \longrightarrow 58\ (m)$

(c) 

$v^2 - v_0^2 = -2gy$ $\quad v$? $\quad v_0 = 24.98$, $g = -26$

$v = \sqrt{v_0^2 - 2gy} = \sqrt{24.98^2 - 2\times 9.80 \times (-26)}$

$= 33.67 \longrightarrow 34\ (m/s)$

(d) $y = v_0 t - \frac{1}{2} g t^2 \rightarrow -26 = 24.98t - 4.90t^2$

$t^2 - 5.098t - 5.306 = 0$

$t = \dfrac{5.098 \pm \sqrt{5.098^2 + 4\times 5.306}}{2} = \dfrac{5.098 \pm 6.871}{2}$

$= 5.985$

$y = \frac{1}{2} a t'^2 \longrightarrow t' = \sqrt{\dfrac{2y}{a}} = \sqrt{\dfrac{2\times 26}{12}} = 2.082$

$t + t' = 5.985 + 2.082 = 8.067 \longrightarrow 8.1$

(12-a) Answer	25 m/s
(12-b) Answer	58 m

(13%)

(13-c) Answer	34 m/s
(13-d) Answer	8.15

(0)

Your opinions

(The solution will be shown on the Website of Physic Class tonight.