Physics 11 U1 - Kinematics Test October 2015

Key

Name: _____ Date: _____

Please show all your working. Formula, substitution, answer as a minimum

You may use a formula sheet and a scientific calculator

1. We watched a video that was a re-enactment of Galileo at dinner. He dropped and orange and some grapes.

a) Who was he trying to prove wrong? Aristotle

/1

b) Why did the church not like Galileo's views?

/2 He believe that the Earth went around Sun which was against Church doctrine, we are not special.

c) How was Galileo's way of doing science different than how science had been practiced in the past?

/1 he relied on observation/data.

2. Based on our data how does mass effect the period of a pendulum?

/1 it does not

3. Newton said that he could see further because he stood on the shoulders of giants. Who was he referring to?

/1 Galileo

4. How was the video of the feather and the bowling ball dropping in the huge vacuum chamber related to other videos we watched?

Name one video and the describe the connection.

/2 Ex moon shot
OR
Ex church dinner.

/8

5. A blender spins 6200 times in 13 seconds.

a) Calculate the period

/3 $T = 0.002097 \text{ sec.}$

b) Calculate the frequency

/3 $f = 477 \text{ Hz.}$

c) How long does it take for the blender to spins 20 times?

/2 $T \times 20 = 0.0419 \text{ sec.}$

d) How many times does the blender spin in 30 seconds?

/2 $14{,}310 = f \times 30$

6. A runner sprints at 9.1 m/s. How long does it take to complete a 100 m race?

/3

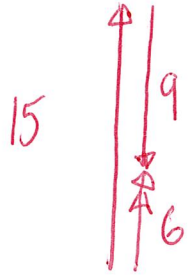
$$t = \frac{d}{v} = \frac{100}{9.1} = 10.989$$

$= 11.0 \text{ sec.}$

/13

7. A dog walks 15 m North and 9 m South. Find the distance and displacement.

/2



distance = 24 m.

displacement = 6m.

8. A boat travels at 10.3 m/s across a river that is 90 m wide. The current in the river moves at 1.3 m/s. If the boat is pointed straight across the river . .

a) How long does it take to cross the river?

/3

$$t = \frac{d}{v} = \frac{90}{10.3} = 8.74 \text{ sec.}$$

b) How far down stream does it drift while crossing the river?

/3

$$d = v \cdot t = (1.3)(8.7378) = 11.4 \text{ m.}$$

11.359

8

9. A car accelerates from rest to 120 km/hr in 6.3 seconds. Calculate the acceleration in m/s2.

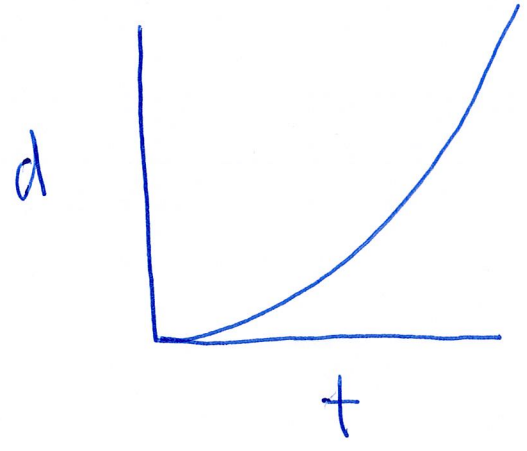
/4

$\Delta v = 33.\overline{3}$

$a = \frac{\Delta v}{\Delta t} = \frac{33.\overline{3}}{6.3} = 5.29\ m/s^2.$

10. Describe the motion depicted by the distance vs time graph below.

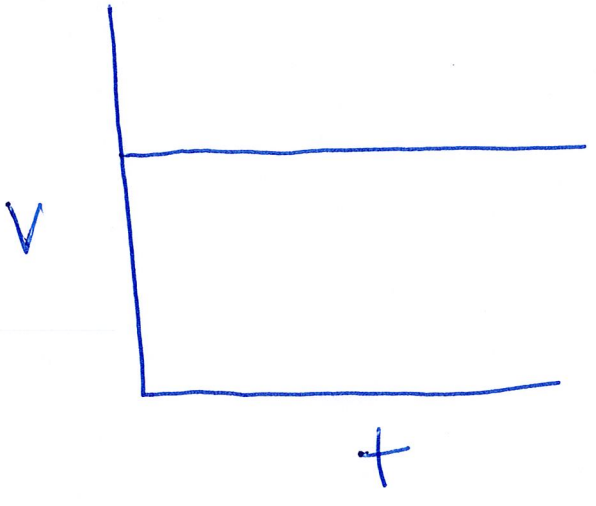
/2



accelerating

11. Describe the motion depicted by the velocity vs time graph below.

/2



constant vel.

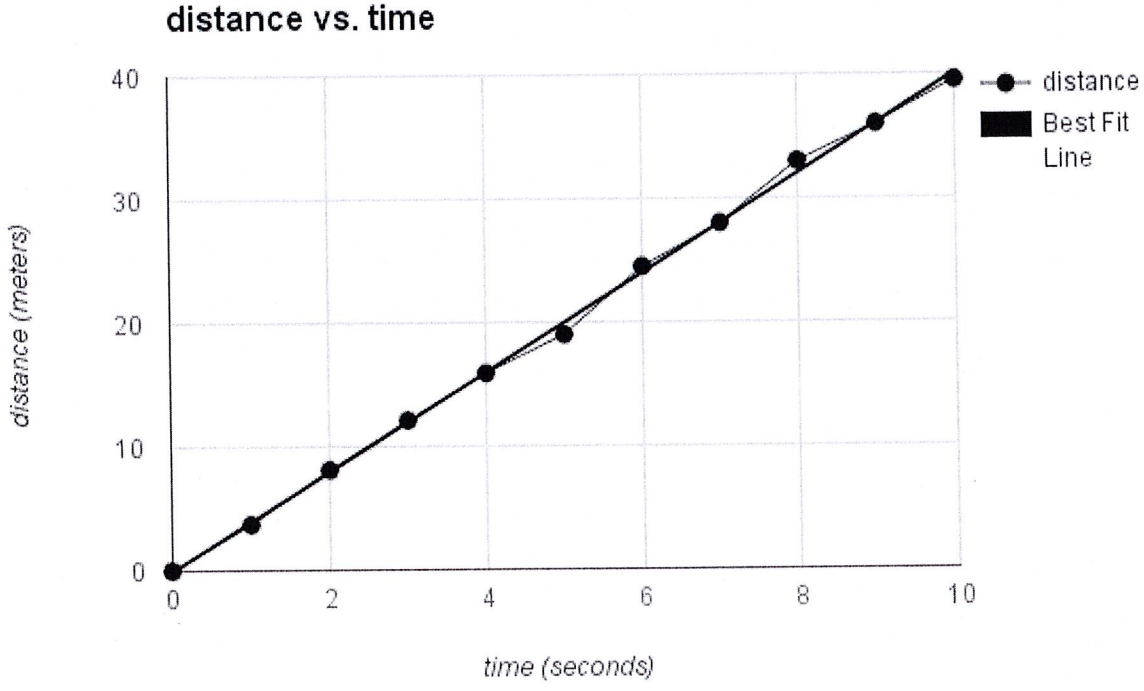
/8

12. a) Calculate he slope of the graph below. Show your calculations on the graph.

/3

b) What does the slope represent? velocity.

/1



about $\frac{40}{10} = 4$ m/s.

/4

13. A car is travelling at 40 km/hr and accelerates at 3.2 m/s2 for 4.2 seconds. What is the final speed in m/s?

/4

$\Delta V_i = 11.\bar{1}$ m/s

$V_f = V_i + at = (11.\bar{1}) + (3.2)(4.2)$

$= 24.6$ m/s.

14. How much distance does it take a truck to stop that is going at 100 km/hr if the reaction time of the driver is 0.9 seconds and the truck can brake at 5.7 m/s2?

/6

$27.\bar{7}$

$d_1 = v \cdot t = (27.\bar{7})(0.9) = 25$m.

~~$d_2 = V_i t + \frac{1}{2} a t^2 = (27.\bar{7})(0.9) + (\frac{1}{2})(-5.7)($~~

$V_f^2 = V_i^2 + 2ad.$

$0 = (27.\bar{7})^2 + 2(-5.7)(d)$

$d_2 = 67.68$

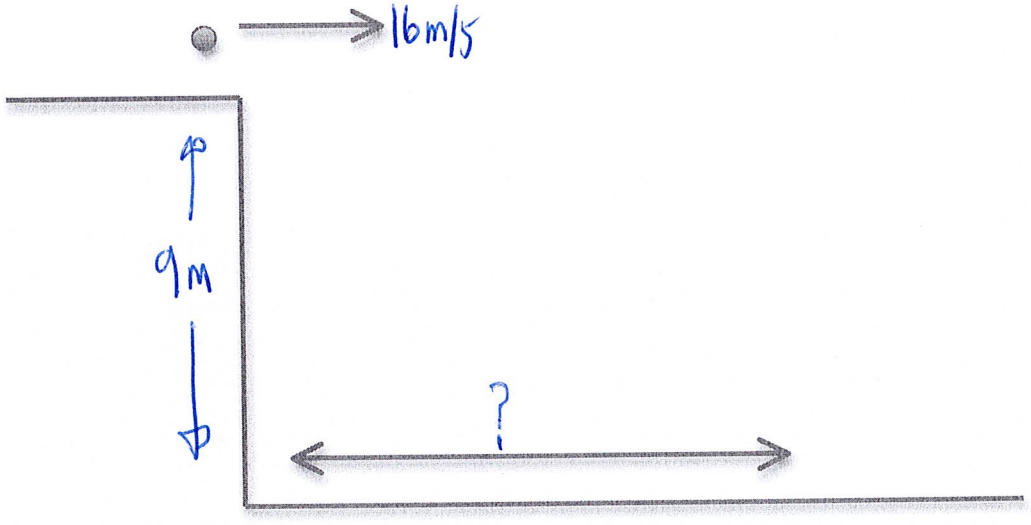
$d_{TOT} = 25 + 67.68$

$= 92.7$m

/10

15. A rock is thrown side ways off a 9 m cliff at 16 m/s. How far away does it land?

/6



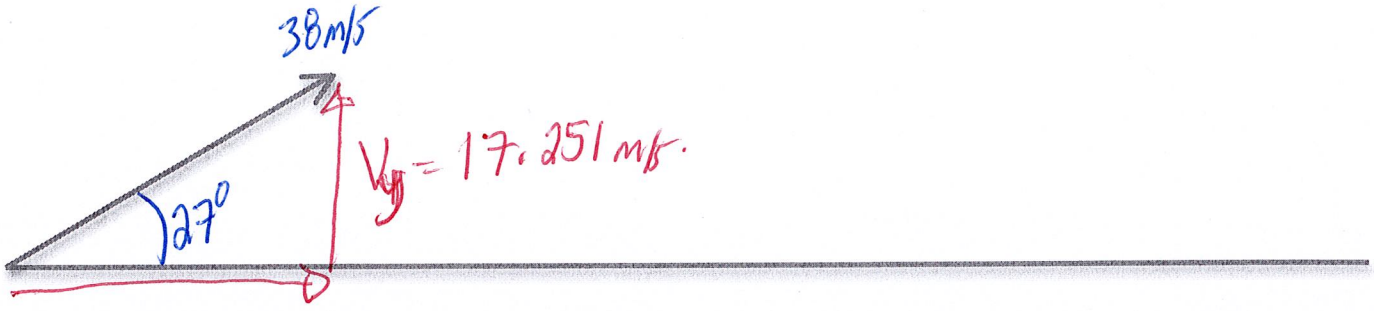
$$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2 \times 9}{9.8}} = 1.355 \text{ sec.}$$

$$d = v \cdot t = (16)(1.355) = 21.7 \text{m.}$$

6

16. A soccer ball is kicked at 38 m/s at 27 degrees above the horizontal. Find the range of the soccer ball.

/9



(1) $V_x = 33.858$ m/s.

(2) $V_f = V_i + at$ OR $t = \frac{2V_i}{a} = \frac{(2)(17.251)}{9.8} = 3.5206$ sec.

(3) $d = v \cdot t = (33.858)(3.52) = 119$ m