Exam PHYS 4A WINTER 2015 QUIZ 1

Name_Professor S.K. Sinha_____VERSION A_____

1 hour =60 mins 1 min = 60 secs. g= 9.8 m s-2
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which of the following could be used in an expression for the period (the time for one full swing) of a pendulum? [g has units of $\frac{L}{[T]2}$ and x has units of distance [L].]

A) $(g/x)^{3/2}$ B) $(gx)^{1/2}$ C) $(x/g)^{1/2}$ D) g/x

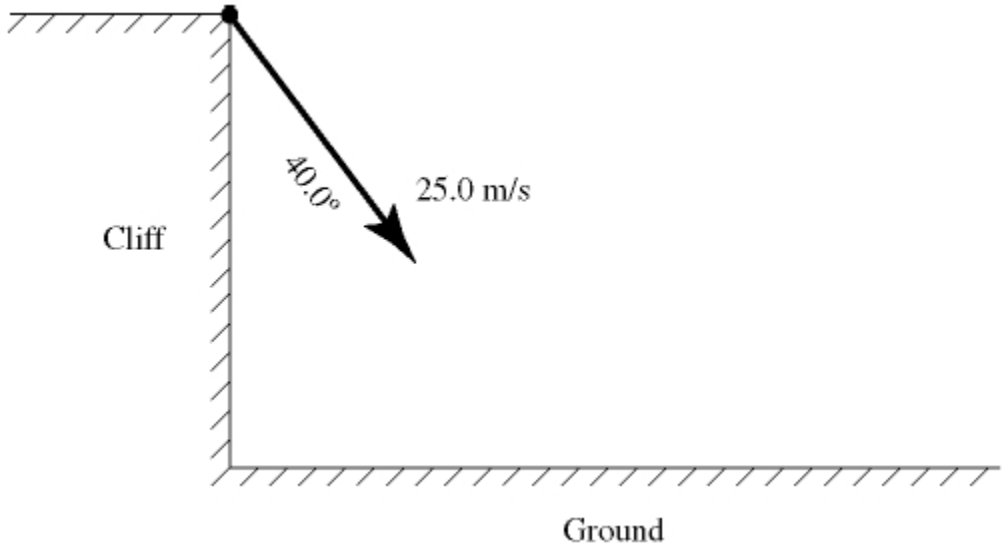
2) A hiker walks 6.0 mi to the east in 3.6 h, then turns around and walks 1.3 mi to the west in 1.6 h. What was her average velocity during the trip?
A) 1.2 mi/h B) 1.4 mi/h C) 0.90 mi/h D) 3.9 mi/h

3) An airplane needs to reach a velocity of 190.0 km/h to take off. On a 2000-m runway, what is the minimum (constant) acceleration necessary for the plane to take flight?
A) 0.84 m/s2 B) 0.70 m/s2 C) 0.91 m/s2 D) 0.77 m/s2

Situation 3.1

A hiker throws a stone from the upper edge of a vertical cliff. The stone's initial velocity is 25.0 m/s directed at 40.0° with the face of the cliff, as shown in Fig. 3.1. The stone hits the ground 3.75 s after being thrown and feels no appreciable air resistance as it falls.

Figure 3.1



4) In Situation 3.1, the speed of the stone just before it hits the ground is closest to:
A) 56.2 m/s B) 16.1 m/s C) 58.2 m/s D) 52.8 m/s E) 55.9 m/s

QUIZ-1 SOLUTIONS

Order.

As Per VERSION A.

1.) c) $\sqrt{\frac{\pi}{g}} = \sqrt{\frac{[L][T]^2}{[L]}} = [T]$

Period has the dimension $[T]$.

2.) C) 0.9 mi/h

$$V_{avg} = \frac{(6 - 1.3)\,mi}{(3.6 + 1.6)\,h} = 0.9\ mi/h$$

3.) B) 0.70 m/s^2

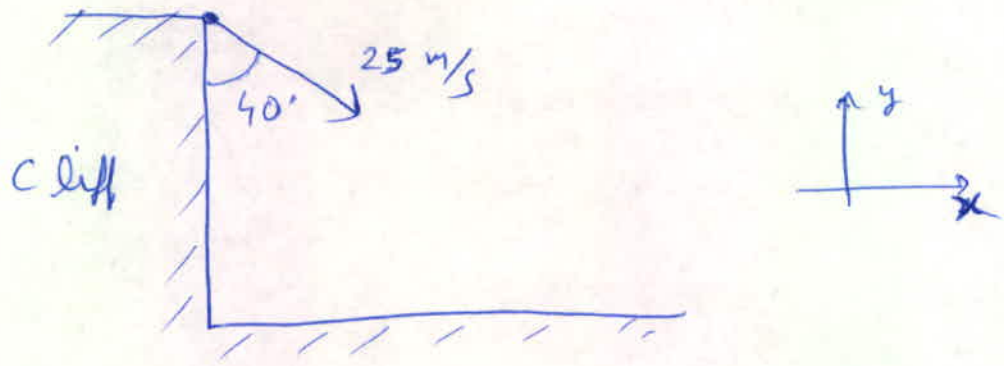
3rd Equation of motion $\longrightarrow$ $v^2 = u^2 + 2as$ { where $s = 2000$ m, $\Delta u = 0$ (initial velocity) }

$$\Rightarrow a = \left(190 \times \tfrac{5}{18}\right)^2 \times \frac{1}{2 \times 2000}\ m/s^2$$

$$\Rightarrow a = 0.696\ m/s^2$$

$$\Rightarrow a \simeq 0.7\ m/s^2$$

4.)



In y-direction,

$$v_{y_f} = v_{y_i} + at$$
$$= -25\cos 40^\circ - (9.8 \times 3.75)$$
$$= 55.9 \text{ m/s}^2$$

In x-direction,

$$v_{x_f} = v_{x_i} = 25\sin 40^\circ \text{ m/s} \quad \{\text{as } a = 0\}$$
$$= 16.07 \text{ m/s}$$

$$\therefore |\vec{v}| = \sqrt{v_{x_f}^2 + v_{y_f}^2}$$
$$= 58.16 \text{ m/s}$$
$$\simeq 58.2 \text{ m/s}$$

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