

Name:				Tuesday, April 09, 2013			
Ku:	/37	App:	/20	T&I:	/	Com:	

Multiple Choice [ku:3]

Identify the letter of the choice that best completes the statement or answers the question.

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- ___1. For a projectile returning to level ground, as the angle of projection increases from 0° to 45° , a projectile's time of flight
- increases and horizontal range decreases
 - decreases and horizontal range decreases
 - increases and horizontal range increases
 - decreases and horizontal range increases
 - remains constant and horizontal range decreases
-
- ___2. Three identical boats set out to cross a river that has a current. Boat A points directly across the river, boat B points 20° downstream from a point straight across the river, and boat C points 20° upstream from a point straight across the river. Which boat will arrive on the opposite shore first?
- boat A
 - boat B
 - boat C
 - it is impossible to tell with the information given
 - all three boats will arrive at the same time
-
- ___3. An object is travelling due east when it experiences a uniform acceleration directed north. Its velocity some time later
- must be directed north
 - could be directed north
 - must be directed north-east
 - could be directed east when the acceleration ceases
 - must be directed east when the acceleration ceases

Extended Multiple Choice [3 marks each]

Identify the letter of the choice that best completes the statement or answers the question. Show your work. GRFS not required.

- ___4. In an emergency braking exercise, a student driver stops a car travelling at 83 km/h [W] in a time of 4.0 s. What is the car's acceleration during this time? (The answer is expressed in units of m/s^2 .)
- | | |
|------------|-------------|
| a. 5.8 [W] | d. 21 [W] |
| b. 21 [E] | e. -5.8 [E] |
| c. 5.8 [E] | |

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- ___5. An object is thrown vertically downward at 3.2 m/s. How long will the object take to hit the ground 12 m below?
- | | |
|----------|----------|
| a. 3.8 s | d. 1.0 s |
| b. 3.1 s | e. 1.3 s |
| c. 2.0 s | |

Problem Solving: Show full solutions using GRFS

1. Mr. LoRusso can kick a soccer ball at a speed of 22 m/s . In the excitement of the game, Mr. LoRusso kicks the ball but clears the crossbar of the net by 2.00 m (I'm not a great shot). If the crossbar is 2.44 m off the ground and assuming he kicks the ball at the optimum angle, determine the flight time of the ball (assuming the ball went over the net on the way down) and the distance he was from the goal when he failed to score. **[8]**

2. A speed boat can travel at a maximum speed of 72 km/h . The boat is moving through a current that is coming from a direction of $[N30^\circ E]$ at a speed of 3.5 m/s . If the boat is trying to reach a shore that is directly north, determine: **[ku:10]**
- the correct heading of the boat in order to maintain a bearing of due north (include a vector diagram. [4]
 - the boats velocity with respect to the shore. [4]
 - the time, in minutes, it would take to reach an island that is 3.5 km away [2]

3. A car enters a curve of radius 75.0 m moving in the clockwise direction along a circular track. When the car enters the curve it experiences a centripetal acceleration of $3.00\text{ m/s}^2 [E40.0^\circ N]$. Moments later the car is experiencing a centripetal acceleration of $0.750\text{ m/s}^2 [E]$. (Note: Please remember which way centripetal acceleration points during circular motion) Determine: **[ku:13]**
- The initial and final velocity of the vehicle. (draw a detailed diagram that includes the centripetal acceleration, radius, and velocity vectors) [5]
 - The distance the car travels during that section [2]
 - The time it takes to complete that section [2]
 - The average vector acceleration of the vehicle [4]

Application: [20] answer the following question in paragraph form using complete sentences.

Explain what is meant by inertial and non-inertial frames of reference. Include examples in your answer with diagrams show how objects would move in the non-inertial frame. Explain what is meant by a "fictitious force" experienced in the non-inertial frame and explain the real reason for the strange motion of object within an accelerated frame of references.