



MCG 2108 Mechanics II (Summer XXXX)

Mid term Examination

Total Points: 40

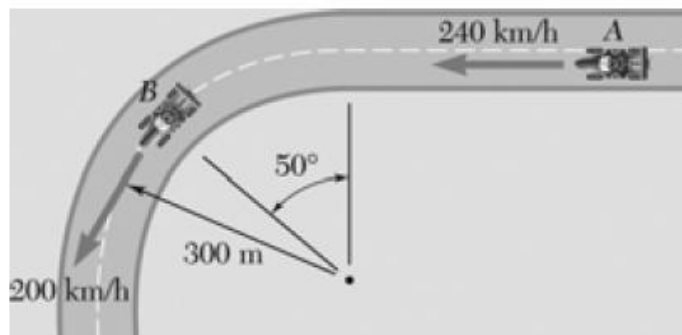
PLEASE READ INSTRUCTIONS CAREFULLY:

-
- *Write clearly, Non-Programmable Calculators permitted.*
 - *Attempt **All** questions*
 - ***Return the Question paper with the Answer booklet.***
 - *If you think additional data is needed make an engineering assumption and proceed*

Q1: (Chapter 11)

Racecar *A* is travelling on a straight portion of the track while race car *B* is travelling on a circular portion of the track. At the instant shown, the speed of *A* is increasing at the rate of 10m/sec^2 and the speed of *B* is decreasing at the rate of 6 m/sec^2 . For the position shown **Determine** (a) **VELOCITY** of *B* relative to *A*, (b), **ACCELERATION** of *B* relative to *A*.

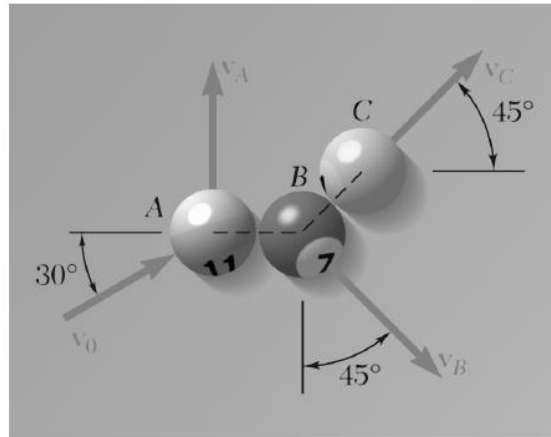
(10 points)



Q2: (Chapter 14)

In a game of pool, ball *A* is moving with a velocity \mathbf{V}_O of magnitude $V_O = 5 \text{ m/s}$ when it strikes balls *B* and *C*, which are at rest and aligned as shown. Knowing that after the collision the three balls move in the directions indicated in the figure below and assuming frictionless surfaces and perfectly elastic impact (conservation of energy), determine the magnitudes of the velocities, \mathbf{V}_A , \mathbf{V}_B and \mathbf{V}_C

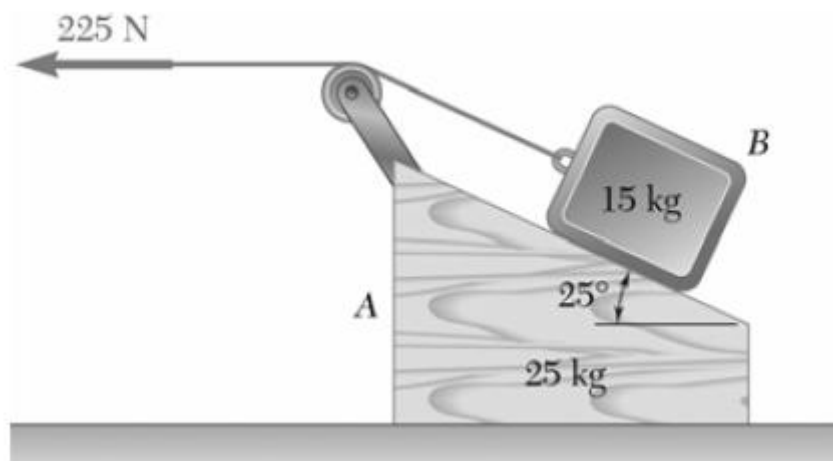
(10 points)



Q3: (Chapter 12)

The 15- kg block *B* is supported by the 25-kg block *A* and is attached to a cord to which a 225-N horizontal force is applied as shown. Neglecting friction, determine (a) the acceleration of block *A*, (b) the acceleration of block *B* relative to *A*.

(10 points)



Q4: (Chapter 13)

An uncontrolled automobile traveling at 100 km/h strikes squarely a highway crash cushion of the type as shown in which the automobile is brought to rest by successively crushing barrels. The magnitude F of the force required to crush the barrels is shown as a function of distance x the automobile has moved into the cushion. Knowing that the mass of automobile is 1000 kg and neglecting the effect of friction, determine (a) the distance the automobile will move into the cushion before it comes to rest, (b) the maximum deceleration of the automobile.

(10 points)

