

LAB TEST - DYNAMICS

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SKILLS: 16.5/17

Part A: Multiple Choice

Select the most correct response to the following questions by circling a letter. (3 marks)

1. After jumping from his airplane, Air P. Lane (mass of 60 kg) reached terminal velocity in about 7 or 8 seconds. At this point F_{air} was _____ N.
a) 9.8 **(b) 590** c) 60 d) 294 e) 1000

2. If the speed of a mass increases and the radius of its path remains constant, the centripetal force will do what?

(a) Increase b) decrease c) remain constant d) equal 0 e) None of the following

3. An object rests on an inclined surface. As the angle between the inclined surface and the horizontal increases, the force needed to prevent the object from sliding down the incline must:

a) Decreases **(b) increases** c) remains the same d) has no affect on the object's motion
e) none of the above



Part B: Data Analysis

Answer the following questions directly on the test paper. (14 marks)

1. Use your knowledge of relationships to complete the following chart: (6 marks)

Sketch of Graph -Label each axis	Variation Statement -Use specific variables	Dynamics Eq'n
	$F \propto a$ ✓	$F = ma$ ($m = 1 \text{ kg}$)
	$y \propto x$	Dynamics $-1/2$ $y = kx$?
	$F_c \propto f^2$ ✓	$F_c = 4\pi^2 r m f^2$ ✓

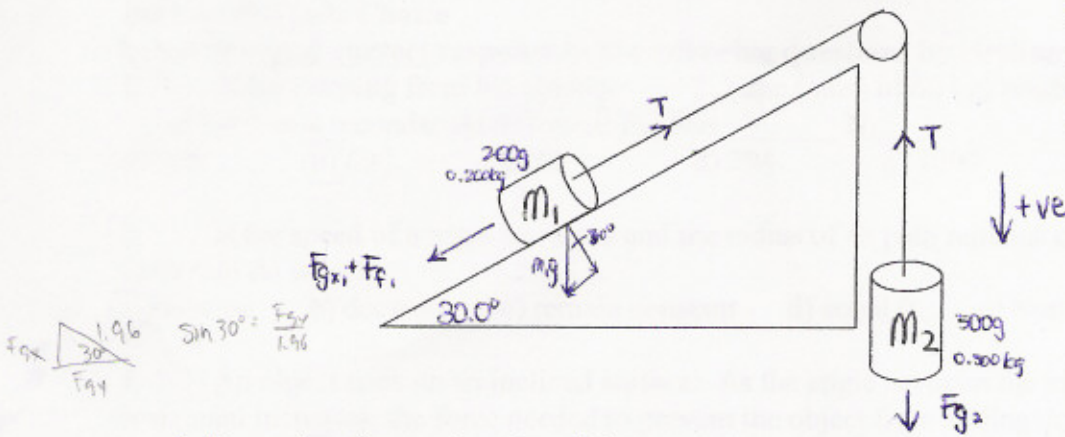
5.5

8.5

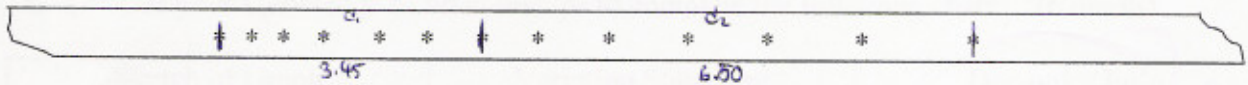
2. Tye Kertape has just recently finished the pulleys, ramps and friction lab. Help Tye out with the ticker tape analysis:

Required Information:

$M_1 = 200 \text{ g}$
 $M_2 = 500 \text{ g}$
 $\mu_k = 0.100$
 Tilt = 30.0° to horizontal



- Determine the acceleration of the masses by using the rapid analysis technique. (2 marks)
- Determine the theoretical value for the acceleration. (4 marks)
- Assuming that the theoretical value is the accepted value, determine Tye's % error for this lab. (2 marks)



a) $a = (d_2 - d_1) / t^2$

$0 = (0.0650 - 0.0345) / 100$
 $a = 3.05 \text{ m/s}^2$ ✓

b) $F_{net1} = T - (F_{gx1} + F_{f1})$

$m_1 a = T - m_1 g \sin 30^\circ - \mu_k m_1 g \cos 30^\circ$

$0.200a = T - 0.98 - 0.17$

$T = 0.200a + 1.15$

$F_{net2} = F_{g2} - T$

$m_2 a = m_2 g - T$

$0.500a = 4.9 - T$

$T = 4.9 - 0.500a$

$0.200a + 1.15 = 4.9 - 0.500a$

$0.700a = 3.75$

$a = 5.36 \text{ m/s}^2$ ✓

c) $\% \text{ error} = \frac{\text{actual} - \text{accepted}}{\text{accepted}} \times 100$

$\% \text{ error} = \frac{3.05 - 5.36}{5.36} \times 100$

$= -43.1\%$ ✓