

Name: \_\_\_\_\_

DISC: \_\_\_\_\_

Score: \_\_\_\_\_ / 20

## Instructions:

- Do your own work.
- Answer the questions below in the space provided.
- Make sure you show all your work and any equations that you use.
- Please place a box around your answers.
- Remember to give the correct units with all numerical answers

Q1	Q2	Q3	Q4
5	5	5	5

1. You have just arrived on a new planet and wish to find its acceleration of gravity,  $g_{new}$ . You throw a ball vertically upward with an initial velocity,  $v_0 = 10 \text{ m/s}$ . The ball reaches a maximum height  $y_{max} = 4 \text{ m}$ . Assume  $y_0 = 0 \text{ m}$ .

- a. What happens to the *velocity* of the ball at its maximum height?

Answer (2pts):

- b. Of the following expressions, which would you use to find  $g_{new}$  the acceleration of gravity on the new planet:

i.  $v^2 = v_0^2 + 2 a \Delta y$

ii.  $y(t) = y_0 + v_0 t + \frac{1}{2} a t^2$

iii.  $v = v_0 + a t$

Expression (1 pt):

- c. Use your result in part a) and your chosen expression in part b) to find  $g_{new}$  :

 $g_{new}$  (2 pts):

2. A train traveling in a straight line at  $30 \text{ m/s}$  needs to make an emergency stop. It takes  $60 \text{ s}$  for the train to come to a complete stop.

- a. Select the equation you would use to find the acceleration of the train?

i.  $v = v_0 + a t$

ii.  $x(t) = x_0 + v_0 t + \frac{1}{2} a t^2$

Choice (2 pts):

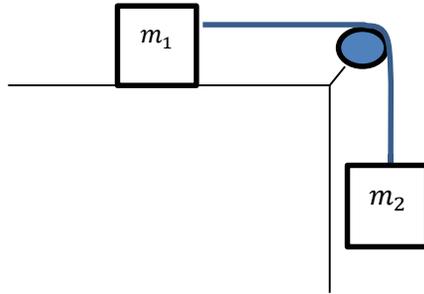
- b. Use your chosen equation to find the acceleration (remember acceleration is a vector):

- i. Do you have all the information you need? **choose one:** yes/no

- ii. Solve for  $\vec{a}$ .

Information:  
Solution (2 pts):

3. Two blocks are attached to each other by a massless cord as shown in the diagram below. Both the table and pulley are frictionless:



Coord. System (1 pt.):  
Forces (2 pts):

- Finish the free-body diagram by including all of the forces acting on the blocks. Include a coordinate system.
- Can this system be in equilibrium? Explain your reasoning.

Answer:  
Reasoning:

4. You are standing on a scale in an elevator. You read the weight on the scale.
- The reading is less than your weight outside the elevator. Which of the following is true:

Answer (2 pts):

- The elevator is undergoing positive acceleration.
  - The elevator is undergoing negative acceleration.
  - Both of these are true.
  - Neither of these is true.
- You look at the scale again. The scale now reads your weight as the same as outside the elevator. Explain in your own words what has happened.

Explanation (3 pts.):

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