

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. You launch a ball vertically upward with an initial velocity of 20 m/s. The ball takes 4s to reach its maximum height.

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

Answer (2pts):

b. Use your answer in part a) to find g_{new} :

Set-up:
Algebra:
 g_{new} :

2. A train traveling at 20 m/s approaches a station stop. It starts slowing with constant deceleration 100 m away from the station.

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

Choice (2 pts):

i. $x(t) = x_0 + v_0t + \frac{1}{2}at^2$

ii. $v^2 = v_0^2 + 2 a \Delta x$

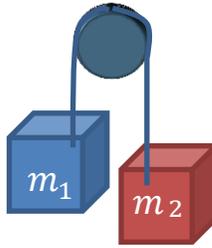
b. Use your chosen equation to find the acceleration (remember acceleration is a vector):

Information:
Solution (2 pts):

i. Do you have all the information you need (yes/no)?

ii. Solve for \vec{a} .

3. Consider a system of two blocks connected by a light-weight, flexible cord over a massless, frictionless pulley as shown below:



- a. If a_1 is the acceleration of m_1 and a_2 is the acceleration of m_2 :
- How are the magnitudes $|a_1|$ and $|a_2|$ related?
 - Explain your reasoning.

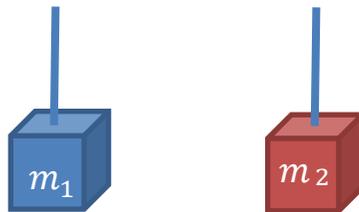
Answer:
Reasoning:

- b. Let $m_1 = 2 \text{ kg}$ and $m_2 = 8 \text{ kg}$:
- What is the **sign** of the acceleration of m_1 ?
 - What is the **sign** of the acceleration of m_2 ?
 - Explain your reasoning.

a_1 :
 a_2 :
Reasoning:

- c. Draw a free-body diagram for each block on the figures below. *Remember to label the forces and include a coordinate system (don't forget about the string!).*

Block 1:
Block 2:
Coordinate System:



- d. Forces:
- Write down the **sum of the forces** acting on m_1 :
 - Write down the **sum of the forces** acting on m_2 :

Forces on m_1 :
Forces on m_2 :