Name: DISC: Score: / 20

Instructions:

|  |  |  |  |
| --- | --- | --- | --- |
| Q1 | Q2 | Q3 | Q4 |
|  |  |  |  |
| 5 | 5 | 5 | 5 |

* 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

1. Consider a system of two blocks connected by a light-weight, flexible cord over a massless, frictionless pulley as shown below:
   1. If is the acceleration of and is the acceleration of , how are the accelerations related? Explain your reasoning.

Answer:

Reasoning:

* 1. If and find the accelerations for the blocks.

Problem Set-up (2pts):

Value of accelerations:

1. For the pulley in Problem 1, block 1 starts from rest and falls *10 cm* to the top of a table. For how many seconds does the block fall?
   1. Explain your approach to solving this problem.

Reasoning (2 pts):

* 1. What is the final speed of block 1?

Set-up (2 pts):

Algebra:

1. You have just arrived on a new planet and wish to find the acceleration of gravity near the surface of this planet. You launch a ball straight up from a cannon. You know that the cannon can launch the ball with an initial velocity of 10 m/s. You time the ball until it reaches its maximum height . It takes 2 s.
   1. Find the acceleration of gravity on the new planet .

Set-up:

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* 1. What was the maximum height ?

Set-up:

Algebra:

:

1. A train traveling at 30 m/s approaches a station at which it needs to stop, and begins decelerating when 200 m away.
   1. What is the acceleration of the train? (Remember: acceleration is a vector.)

Set-up (1.5 pts):

Algebra:

* 1. How much time does the train take to stop?

Set-up (1.5 pts):

Algebra: