Name: _____ Class: _____ Date: _____ ID: A

Exam: #2 Forces (secondary Linear motion) Practice Test

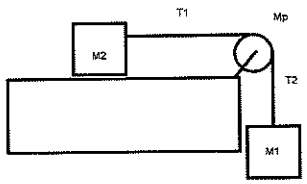
D 1. (#2-2) When a 12N horizontal force is applied to a box on a horizontal tabletop, the box remains at rest. The force of static friction acting on the box is
   a. 0N
   b. between 0N and 12N
   c. greater then 12N
   d. 12N

A 2. (#2-1) A sheet of paper can be withdrawn from under a milk carton without toppling the carton if the paper is jerked away quickly. This demonstrates
   a. the inertia of the milk carton
   b. that gravity tends to hold the milk carton secure
   c. there is an action reaction pair of forces
   d. that the milk carton has no acceleration.

C 3. (#2-2)A car of mass m is going up a shallow slope with an angle of Θ to the horizontal when the driver suddenly applies the brakes. The car skids as it comes to a stop. The coefficient of static friction between the tires and the road is u_s and the coefficient of kinetic friction is u_k Which expression represents the normal force on the cart?
   a. $mgtan\Theta u_s$
   b. $mgsin\Theta u_k$
   c. $mgcos\Theta$
   d. mgu_s

D 4. (#2-2) A 27kg object is accelerated at a rate of $1.7m/s^2$. How much force does the object experience?
   a. 62N b. 74N c. 7N d. 46N

D 5.



(#2-2) How are the two identical masses moving if they are attached by a light string that passes over a small pulley? (no friction)
   a. with an acceleration equal to g
   b. with an acceleration greater than g
   c. at a constant speed
   d. with an acceleration less then g

B 6. (#2-1) What happens to a moving object in the absence of an external force?
   a. gradually accelerates until it reaches its terminal velocity, at which point it continues at a constant velocity.
   b. moves with a constant velocity
   c. Moves with a constant acceleration
   d. Slows to a stop.

A 7. (#2-2) A can of paint with a mass of 10kg hangs from a rope. If the can is to be pulled up to a rooftop with a constant velocity of 0.5m/s, what must the tension on the rope be? (gravity = $10m/s^2$)
   a. 100N b. 40N c. 0N d. 104N

B 8. (#2) A block is sliding down a frictionless slope of an inclined plane with angle Θ. Using the weight of the block, what is the force parallel to the surface of the plane experienced by the block?

a. mgCosΘ b. mgsinΘ c. mg d. mgsinΘ – $F_{friction}$

A 9. (#2-1) A passenger on a train traveling in the forward direction notices that a piece of luggage starts to slide directly toward the front of the train. From this, it can be concluded that the train is

a. slowing down
b. speeding up
c. moving at a constant velocity forward
d. changing direction

d 10. (#2-2)An object is moving to the west at a constant speed. Three forces are exerted on the object. One force is 10N, directed due north, and another is 10N directed due west. What is the magnitude of the third force if the object is to continue moving to the west at a constant speed?

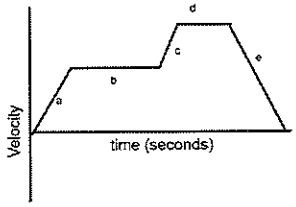
a. $10\sqrt{3}$ N, directed northwest
b. $10\sqrt{3}$ N, directed southeast
c. $10\sqrt{2}$ directed northwest
d. $10\sqrt{2}$directed southeast

A 11. (#1)John kicked a rock horizontally off a cliff at "x" meters per second. If Jill kicks the rock with a velocity of 2x, If John's rock is in the air, "t" time, how long will Jill's rock be in the air?

a. t
b. 1/2t
c. 2t
d. depends on height of the cliff.

C 12. (#1) John kicked a rock horizontally off a cliff at "x" meters per second. If Jill kicks the rock with a velocity of 2x, If John's rock travels "d" distance, how far does Jill's rock travel?

a. d
b. 1/2d
c. 2d
d. depends on height of the cliff.



d 13. (#1-1) At what time is the object at the highest velocity?

a. a b. b c. c d. d

C 14. (#1-1) At what point does the object have the largest acceleration?

a. a b. b c. c d. d

B 15. (#1-1) At time "e", Which of the following is true relative to the velocity and acceleration.

a. +, +
b. +, -
c. -, -
d. both zero. no acceleration constant velocity

C 16. (#1)At the end of which time frame did the object return back to its original position?

a. time frame "d"
b. did not return back to original position
c. time frame "e"
d. the graph can not tell me this piece of information. Therefore we do not know.

Name: _____ ID: A

D 17. (#2) A tennis ball experiences a large amount of drag force. A tennis ball is hit so that it goes straight up and then comes back down. The direction of the drag force is

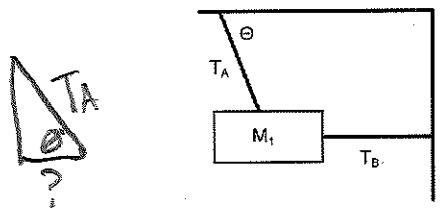
a. always up
b. always down
c. up and then down
d. down and then up.

____ 18. (#2) A group of students is making model cars that will b propelled by model rockets engines. These engines provide a nearly constant thrust force. The cars are light, most of the weight comes from the rocket engine. The friction and drag are minimal. As the engine is ignited the care starts to accelerate. As the engine continues to burn how would you describe the magnitude of the acceleration

a. same
b. increase
c. decrease
d. Not enough information to answer this question.

Short Answer

19.

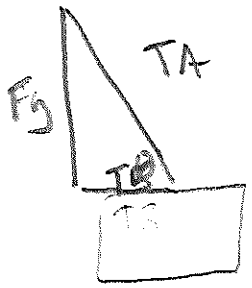


a. Derive a formula for tension is wire B.

$\cos\theta = \frac{T_x}{T_A}$ $T_x = T_B$ $\cos\theta \cdot T_A = T_B$

b. If the mass of the box is doubled, how does the tension on the wire A change?

$T_A =$



$\sin\theta = \frac{F_G}{T_A}$

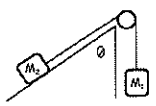
$\frac{F_G}{\sin\theta} = T_A$

$\times 2 = T_A$

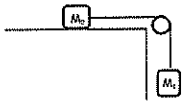
$\times 2$

Name: _____ **ID: A**

Two separate experiments were set up as seen below.
Both surfaces are frictionless and all masses are identical.



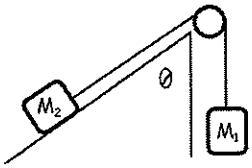
Object A



Object B

20.

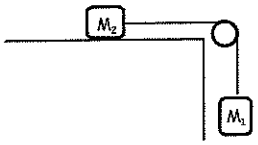
a. On the drawing provided, add the force vectors, not the component force vectors.



Object A

see inclues Rubric

i. (#2)(#2)(#2)



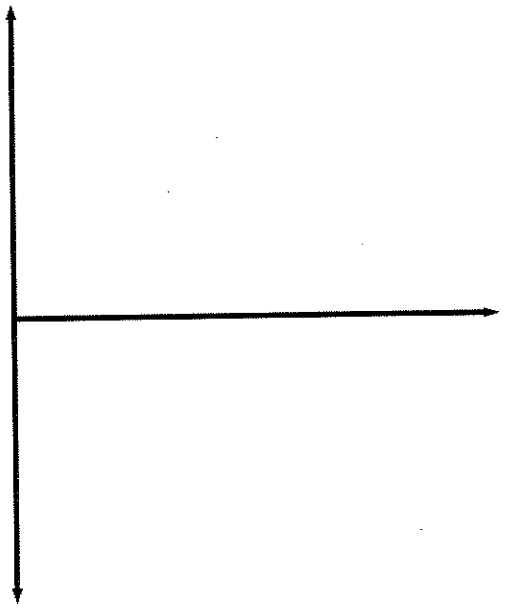
Object B

ii. (#2) (#2)

b. You have been given the task of determining the acceleration of M_1 on object B.
i. (#2) (#2) List the materials you might use and what you intend to measure with that device.

ii.(#2) Write a procedure you would follow to determine the acceleration of M_1 on object B.

c. Using the empty graph below explain how you might graph the data you collected to find the acceleration. (#2) (#2)



d. The mass of M_2 is doubled in both objects. Answer the following question.
i. The tension on the rope in object 1 will (increases, decreases, stays the same) when the mass of M_2 is increased. (#2)

ii. The tension on the rope in object 2 will (increases, decreases, stays the same) when the mass of M_2 is increased. (#2)

iii. If there is a difference between your answers in i and ii, describe why the differences. If they are equal explain why they are equal. (#2)

(12 points, suggested time 25 minutes)

A student wants to determine the coefficient of static friction between a long, flat wood board and a small wood block.

(a) Describe an experiment for determining the coefficient of static friction between the wood board and the wood block. Assume equipment usually found in a school physics laboratory is available.

i. Draw a diagram of the experimental setup of the board and block. In your diagram, indicate each quantity that would be measured and draw or state what equipment would be used to measure each quantity.

ii. Describe the overall procedure to be used, including any steps necessary to reduce experimental uncertainty. Give enough detail so that another student could replicate the experiment.

(b) Derive an equation for the coefficient of static friction in terms of quantities measured in the procedure from part (a).

A physics class consisting of six lab groups wants to test the hypothesis that the coefficient of static friction between the board and the block equals the coefficient of kinetic friction between the board and the block. Each group determines the coefficients of kinetic and static friction between the board and the block. The groups' results are shown below, with the class averages indicated in the bottom row.

Lab Group Number	Coefficient of Kinetic Friction	Coefficient of Static Friction
1	0.45	0.54
2	0.46	0.52
3	0.42	0.56
4	0.43	0.55
5	0.74	0.23
6	0.44	0.54
Average	0.49	0.49

(c) Based on these data, what conclusion should the students make about the hypothesis that the coefficients of static and kinetic friction are equal?

____ The static and kinetic coefficients are equal.

____ The static and kinetic coefficients are not equal.

Briefly justify your reasoning.

(d) A metal disk is glued to the top of the wood block. The mass of the block-disk system is twice the mass of the original block. Does the coefficient of static friction between the bottom of the block and the board increase, decrease, or remain the same when the disk is added to the block?

____ Increase ____ Decrease ____ Remain the same

Briefly state your reasoning.

21.