

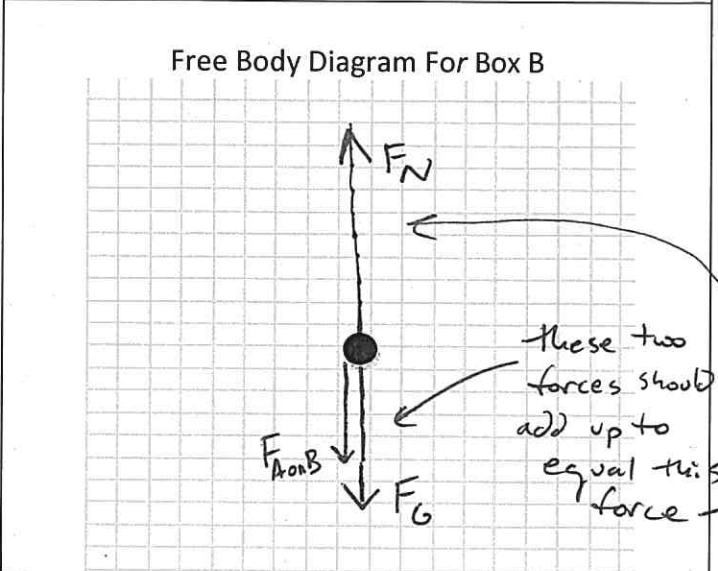
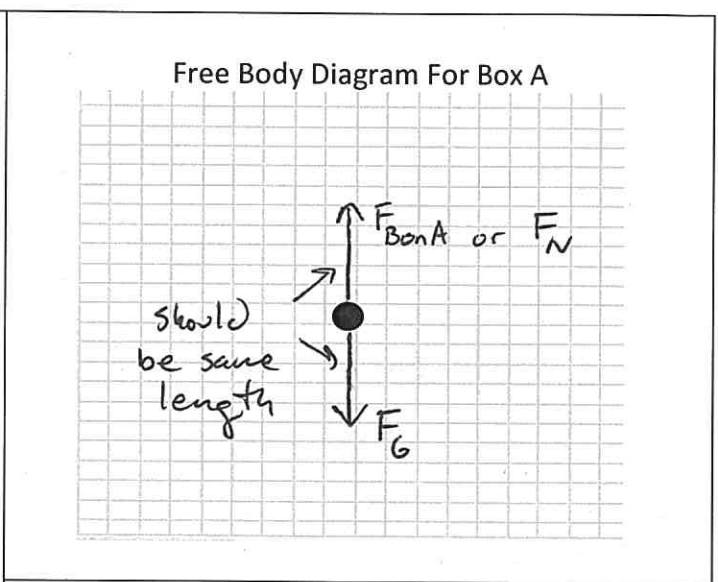
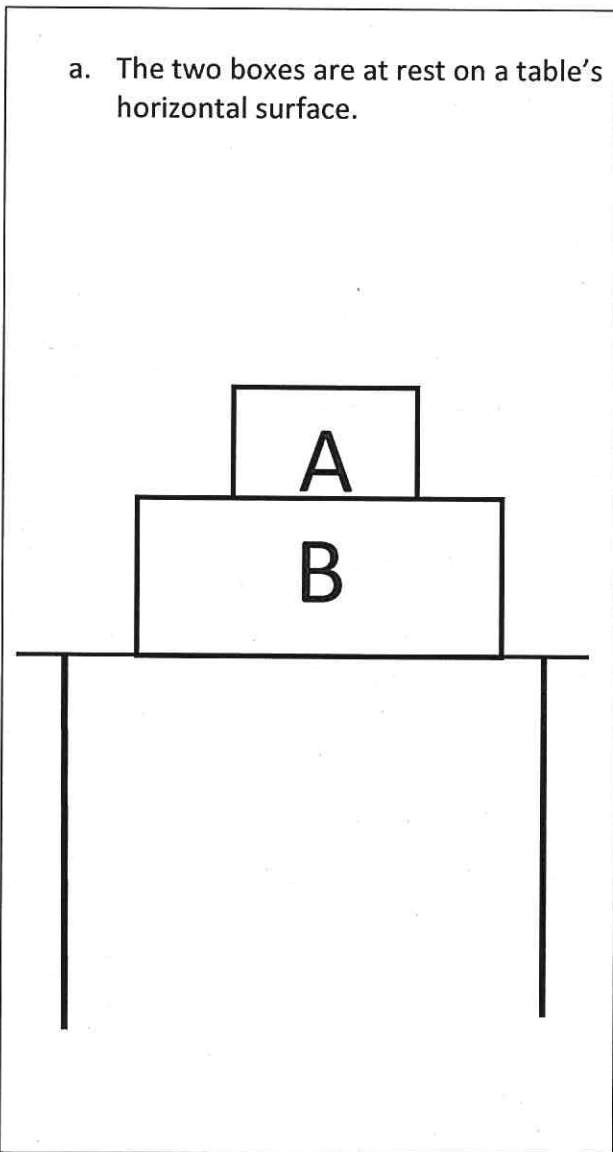
Name: Answer Key Period: _____ Date: _____

Word bank:	Accelerate	Applied	Direction	Friction	Force
	Mass	Motion	Opposite	Related	Velocity

HS.P.F.27, HS.P.F.28, HS.P.F.31, HS.P.F.32, HS.P.F.35, HS.P.F.36, HS.P.F.37 Assessment

1. In each of the following situations, represent the object with a dot. Draw and label all the forces acting on the object.

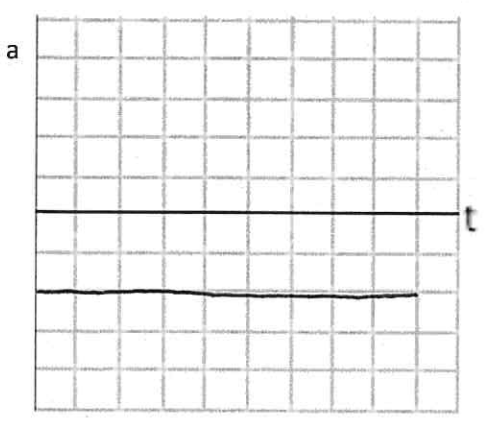
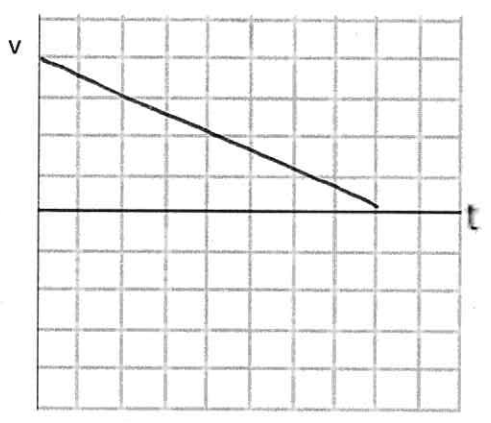
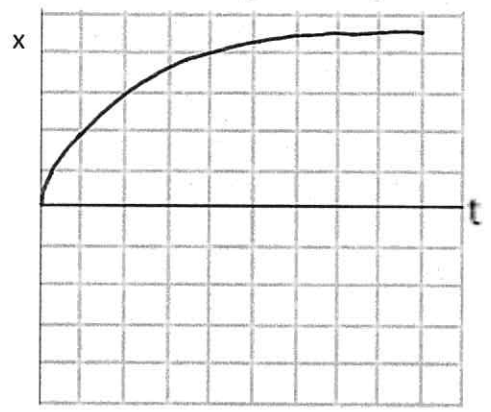
HS.P.F.27	I can identify surrounding objects interacting with an object, and the forces they exert on the objects	
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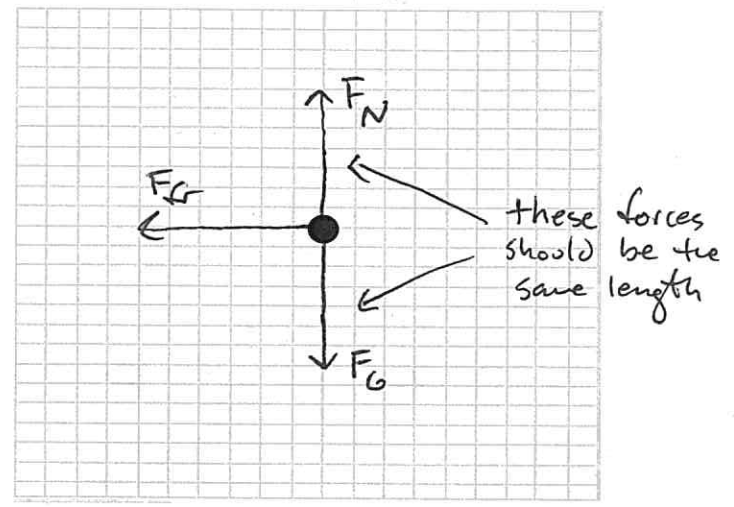
2. For the following situation, draw a stack of graphs for the objects motion and a draw a free body diagram of the forces acting on the object.

HS.P.F.28	I use multiple diagrams and graphs to represent objects moving at a changing velocity. For example: Motion graphs (x-, v-, a-t), motion map, free body diagram, vector addition diagram, system schema	
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a. A car is traveling to the right and slows to a stop.

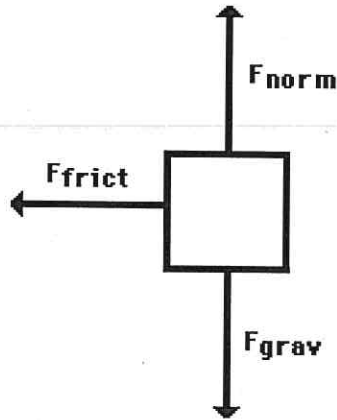


Free Body Diagram For The Car



3. Brian and JT are working on their physics homework and disagree about what the object in the free body diagram (below) is doing.

HS.P.F.31 I can relate unbalanced forces to an object's changing motion.



Brian says that the object is traveling at a constant velocity to the left.

JT says the object going to the right at a constant velocity.

Explain why Brian's answer is incorrect.

- The object is not traveling at a constant velocity because it has unbalanced forces.

- the object cannot travel to the left because that is the direction friction is pointing and friction always opposes motion.

Explain why part of JT's answer is correct and why part of his answer is incorrect.

correct - the object is traveling to the right because friction is pointing left and friction always opposes motion

incorrect - the object is not traveling at a constant velocity because it has unbalanced forces.

4. For the following descriptions, please circle the direction of the net force acting on the object.

HS.P.F.32	I can determine the direction of the net force based on the object's motion.	
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- a. A car is traveling to the left and slows down to a stop.

Up	Down	Right	Left
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- b. A sprinter starts from rest and is speeding up to the right.

Up	Down	Right	Left
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- c. A rocket accelerates upward into space.

Up	Down	Right	Left
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- d. A skydiver falls from a plane through the air without a parachute.

Up	Down	Right	Left
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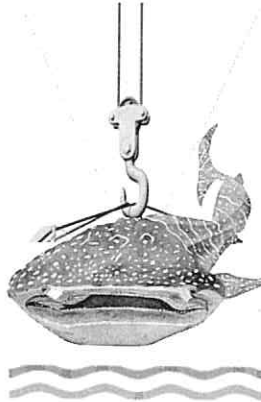
- e. A skydiver deploys their parachute slowing them down on their descent.

Up	Down	Right	Left
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5. For the following problems show all of your work for full credit.

HS.P.F.35	I can solve problems using Newton's 2nd Law ($F = ma$).	
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- a. The whale shark is the largest of all fish and can have the mass of three adult elephants. Suppose that a crane is lifting a whale shark into a tank for delivery to an aquarium. The crane must exert an unbalanced force of 2500 N to lift the shark from rest. If the shark's acceleration equals 1.25 m/s^2 , what is the shark's mass?

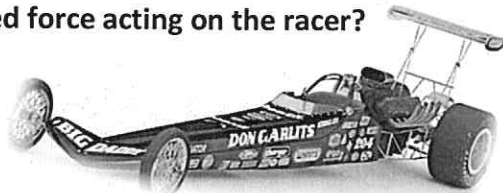


$$F = ma$$

$$\frac{2500}{1.25} = \frac{m(1.25)}{1.25}$$

$$2000 \text{ kg} = m$$

- b. In drag racing, acceleration is more important than speed, and therefore drag racers are designed to provide high accelerations. Suppose a drag racer has a mass of 1250 kg and accelerates at a constant rate of 16.5 m/s^2 . How large is the unbalanced force acting on the racer?



$$F = ma$$

$$F = (1250)(16.5)$$

$$F = 20,625 \text{ N}$$

6. Answer the following prompts. Be sure to write in complete sentences.

HS.P.F.36 I know when two surfaces must be experiencing a friction interaction.

a. Describe an instance where friction is helpful. Be as detailed as possible.

- coming to a stop

- lighting a match

- rock climbing

b. Describe an instance where friction is hurtful. Be as detailed as possible.

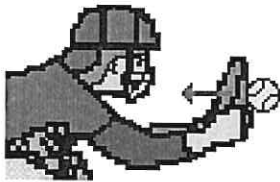
- skinning knees on pavement

- no oil in car

7. Describe the other force in the action-reaction force pair.

HS.P.F.37 When given one force, I can describe its Newton's third law force pair.

a. Baseball pushes glove leftwards.



Reaction Force: glove
pushes baseball
rightward

b. Enclosed air particles push balloon wall outwards.



Reaction Force: balloon wall
pushes air particles
inwards.