Group 1 Part I

1. Motion diagrams for an amusement park ride are shown. The diagrams indicate the positions of the car at regular time intervals. For each of these diagrams, indicate whether the car is accelerating or moving with constant velocity. If accelerating, indicate the direction (right or left) of acceleration. Support your answer with reasoning.

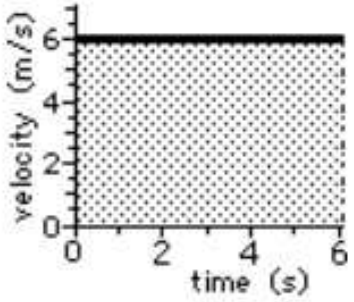
	Acceleration: Y/N	Dir'n
a.  Reason: _____		
b.  Reason: _____		
c.  Reason: _____		

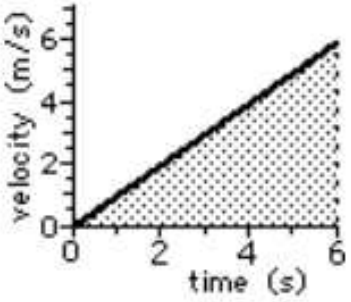
Group 1 Part II

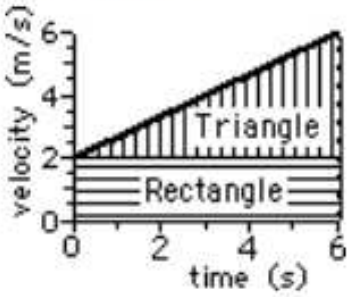
4. The area under the line of a velocity-time graph can be calculated using simple rectangle and triangle equations. The graphs below are examples:

If the area under the line forms a ...

... **rectangle**, then use	... **triangle**, then use	... **trapezoid**, then make it into a rectangle + triangle and add the two areas.
area = base*height	area = 0.5 * base*height	







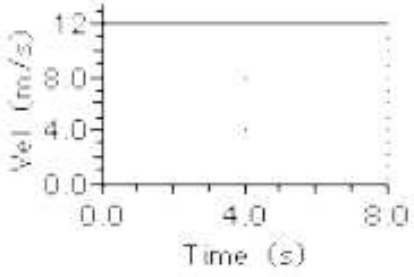
$A = (6\ m/s)*(6\ s) = \mathbf{36\ m}$

$A = 0.5 * (6\ m/s)*(6\ s) = \mathbf{18\ m}$

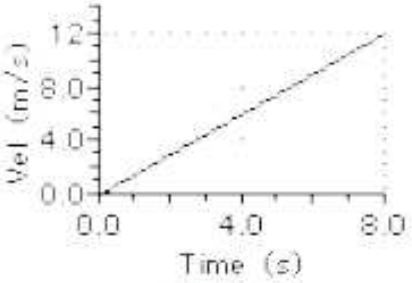
$A_{total} = A_{rectangle} + A_{triangle}$

$A_{total} = (2m/s)*(6\ s) + 0.5 * (4\ m/s) * (6\ s) = \mathbf{24\ m}$

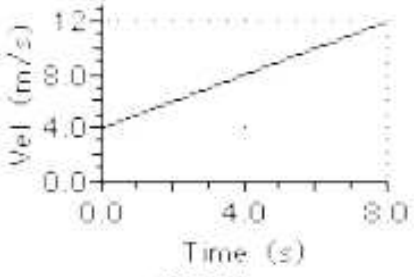
Find the displacement of the objects represented by the following velocity-time graphs.



PSYW:



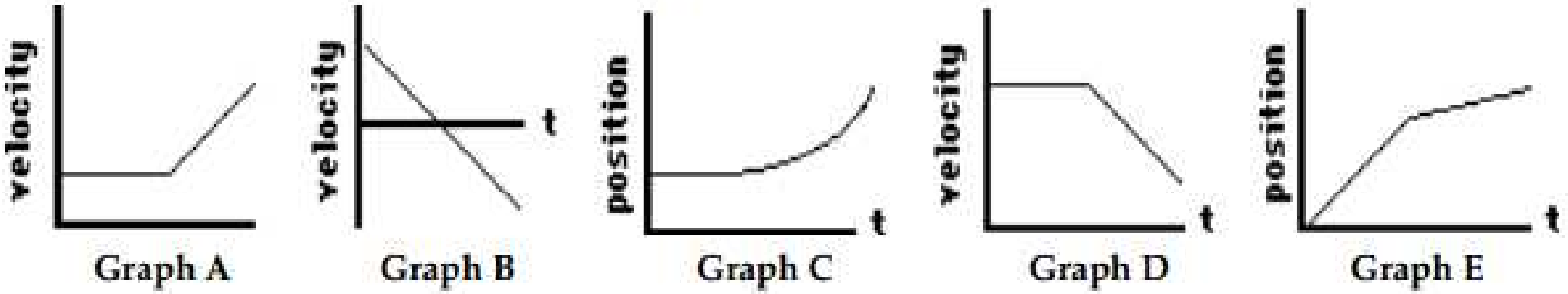
PSYW:



PSYW:

Group 1 Part III

5. The graphs below depict the motion of several different objects. Note that the graphs include both position vs. time and velocity vs. time graphs.



Graph A Graph B Graph C Graph D Graph E

The motion of these objects could also be described using words. Analyze the graphs and match them with the verbal descriptions given below by filling in the blanks.

d. The object moves with a constant velocity and then speeds up.	_____
e. The object maintains a rest position for several seconds and then accelerates.	_____

Group 2 Part I

1. Motion diagrams for an amusement park ride are shown. The diagrams indicate the positions of the car at regular time intervals. For each of these diagrams, indicate whether the car is accelerating or moving with constant velocity. If accelerating, indicate the direction (right or left) of acceleration. Support your answer with reasoning.

d. 

Reason: _____

_____

e. 

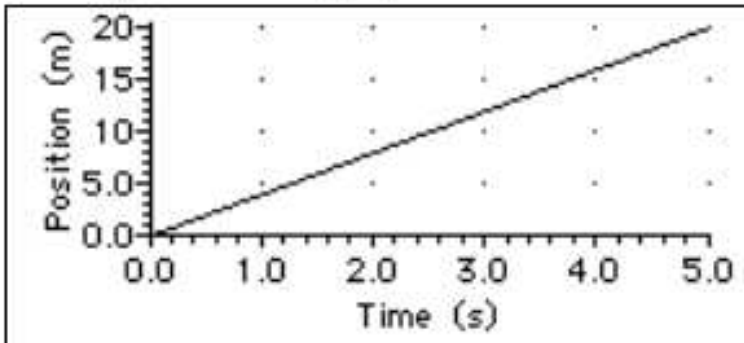
Reason: _____

_____

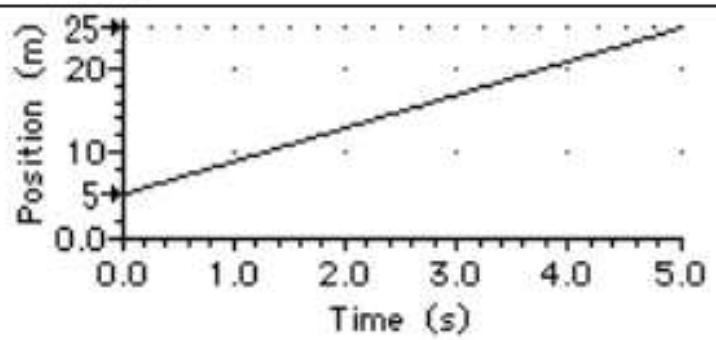
2. Suppose that in diagram D (above) the cars were moving leftward (and traveling backwards). What would be the direction of the acceleration? _____ Explain your answer fully.

Group 2 Part II

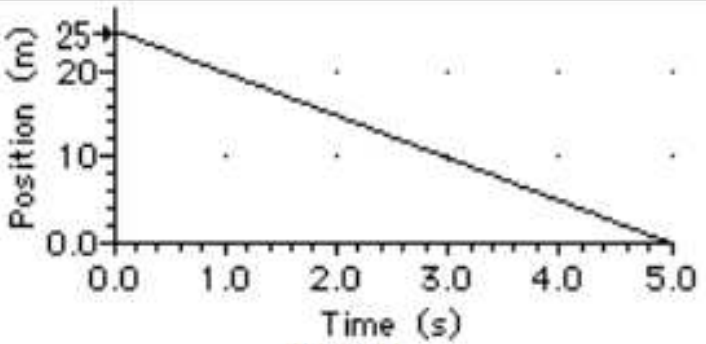
5. Use the position-time graphs below to determine the velocity. **PSYW**



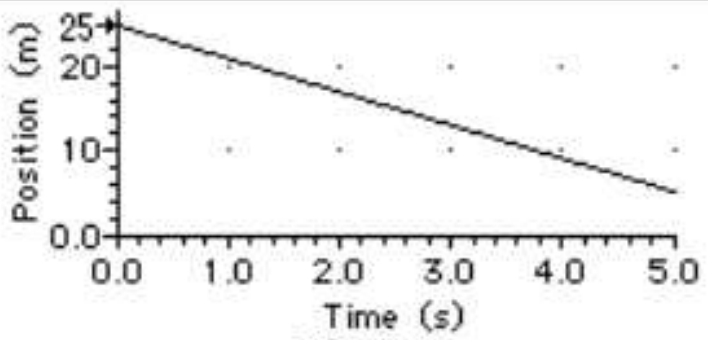
PSYW:



PSYW:



PSYW:



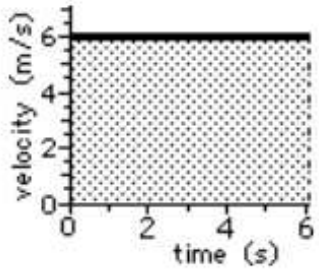
PSYW:

Group 2 Part III

If the area under the line forms a ...

... **rectangle**, then use

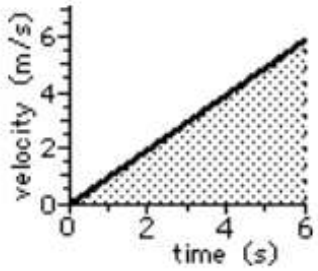
area = base*height



A = (6 m/s)*(6 s) = **36 m**

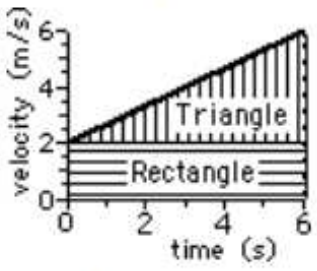
... **triangle**, then use

area = 0.5 * base*height



A = 0.5 * (6 m/s)*(6 s) = **18 m**

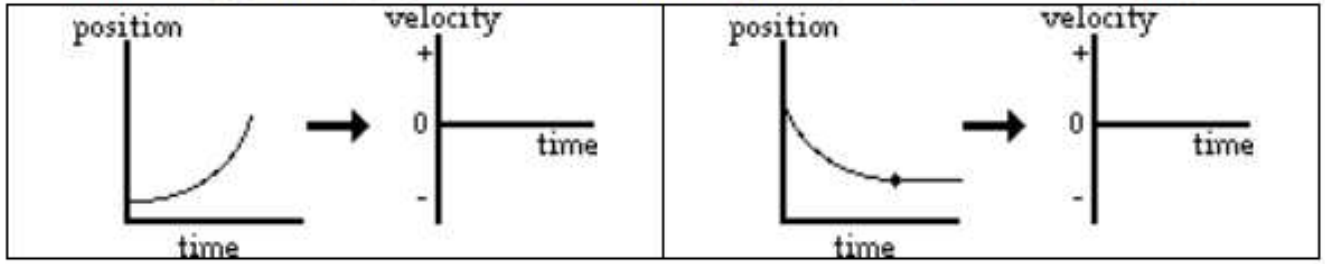
... **trapezoid**, then make it into a rectangle + triangle and add the two areas.



$A_{total} = A_{rectangle} + A_{triangle}$

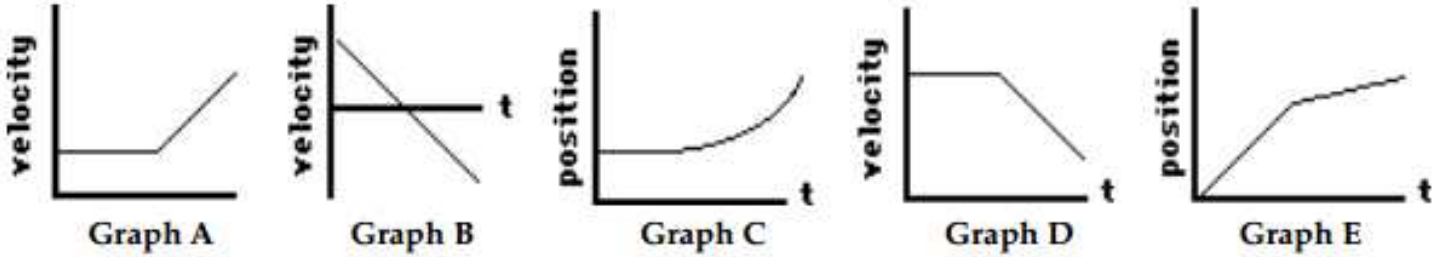
$A_{total} = (2m/s)*(6\ s) +$

5. For the following pos-time graphs, determine the corresponding shape of the vel-time graph.



Group 2 Part IV

5. The graphs below depict the motion of several different objects. Note that the graphs include both position vs. time and velocity vs. time graphs.



Graph A Graph B Graph C Graph D Graph E

The motion of these objects could also be described using words. Analyze the graphs and match them with the verbal descriptions given below by filling in the blanks.

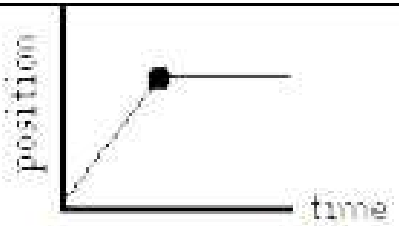
Verbal Description	Graph
a. The object is moving fast with a constant velocity and then moves slow with a constant velocity.	_____
b. The object is moving in one direction with a constant rate of acceleration (slowing down), changes directions, and continues in the opposite direction with a constant rate of acceleration (speeding up).	_____
c. The object moves with a constant velocity and then slows down.	_____

Group 3 Part I

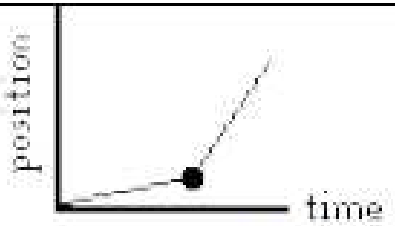
3. Based on the oil drop pattern for Car A and Car B, which of the following statements are true? Circle all that apply.
   a. Both cars have a constant velocity.
   b. Both cars have an accelerated motion.
   c. Car A is accelerating; Car B is not.
   d. Car B is accelerating; Car A is not.
   e. Car A has a greater acceleration than Car B.
   f. Car B has a greater acceleration than Car A.

Group 3 Part II

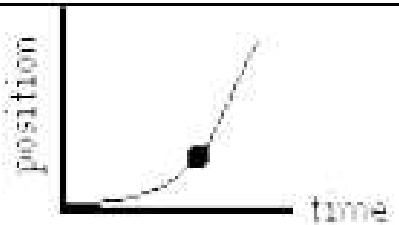
4. Use your understanding of the meaning of slope and shape of position-time graphs to describe the motion depicted by each of the following graphs.



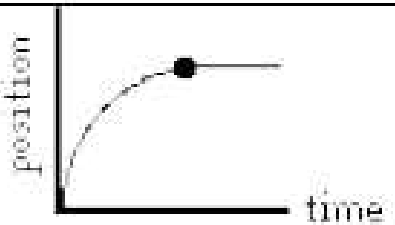
Verbal Description:



Verbal Description:



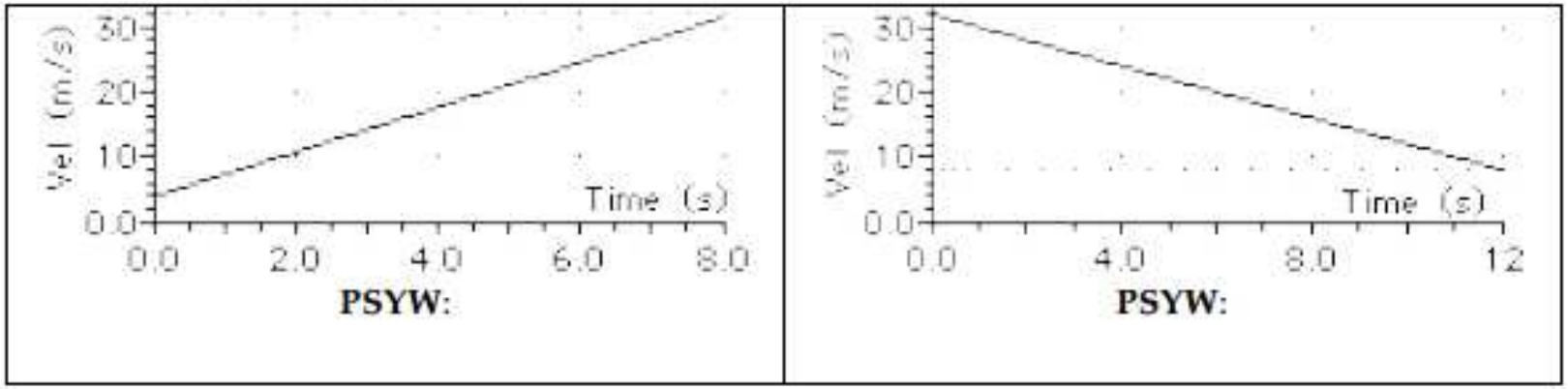
Verbal Description:



Verbal Description:

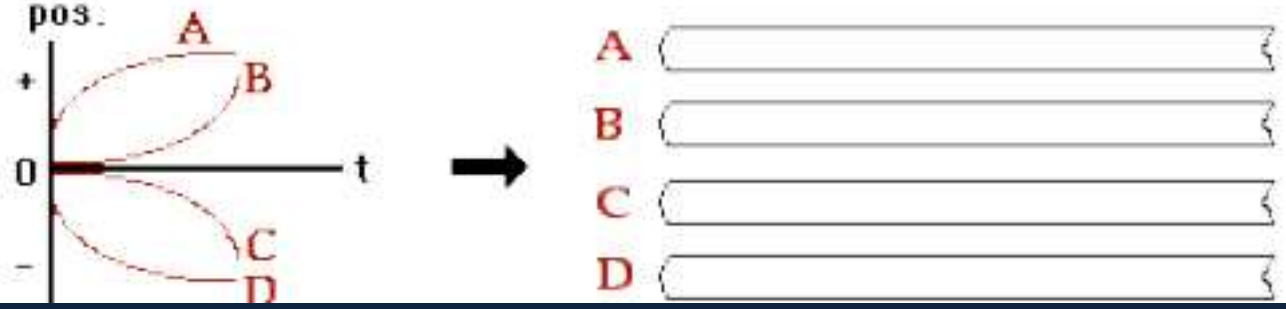
Group 3 Part III

3. Use the velocity-time graphs below to determine the acceleration. **PSYW**



Group 3 Part IV

6. Consider the position-time graphs for objects A, B, C and D. On the *ticker tapes* to the right of the graphs, construct a dot diagram for each object. Since the objects could be moving right or left, put an arrow on each *ticker tape* to indicate the direction of motion.



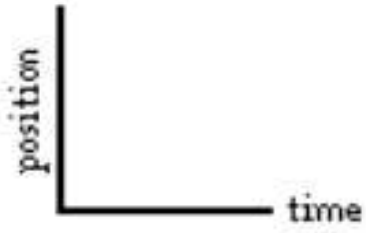
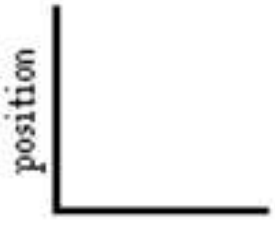
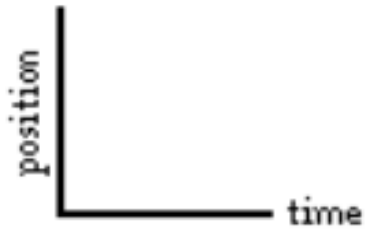
Group 4 Part I

4. An object is moving from right to left. It's motion is represented by the oil drop diagram below. This object has a _____ velocity and a _____ acceleration.

a. rightward, rightward
b. rightward, leftward
c. leftward, rightward
d. leftward, leftward
e. rightward, zero
f. leftward, zero

Group 4 Part II

3. For each type of accelerated motion, construct the appropriate shape of a position-time graph.

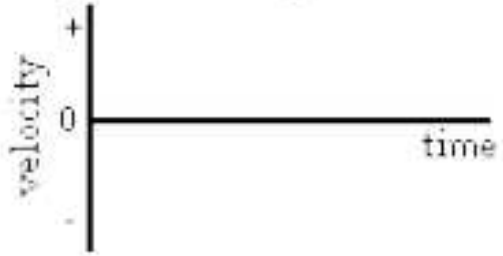
Moving with a + velocity and a + acceleration 	Moving with a + velocity and a - acceleration 
Moving with a - velocity and a + acceleration 	Moving with a - velocity and a - acceleration 

Group 4 Part III

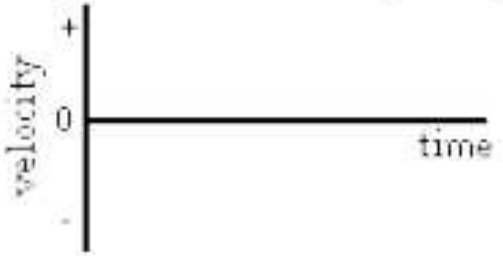
Interpreting Velocity-Graphs

2. On the graphs below, draw two lines/curves to represent the given verbal descriptions; label the lines/curves as A or B.

A Moving at constant speed in - direction
B Moving at constant speed in + direction



A Moving in + direction and speeding up
B Moving in - direction and speeding up

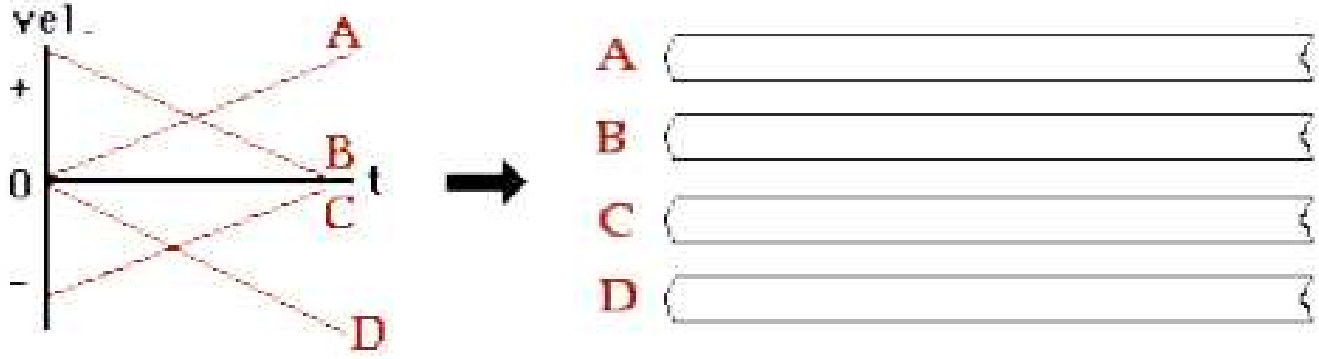


A Moving in + direction and slowing down
B Moving in - direction and slowing down

A Moving with + velocity and - accel'n
B Moving with + velocity and + accel'n

Group 4 Part IV

7. Consider the velocity-time graphs for objects A, B, C and D. On the *ticker tapes* to the right of the graphs, construct a dot diagram for each object. Since the objects could be moving right or left, put an arrow on each *ticker tape* to indicate the direction of motion.



Group 5 Part I

5. Renatta Oyle's car has an oil leak and leaves a trace of oil drops on the streets as she drives through Glenview. A study of Glenview's streets reveals the following traces. Match the trace with the verbal descriptions given below. For each match, verify your reasoning.

Diagram A:

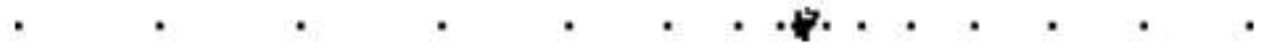


Diagram B:

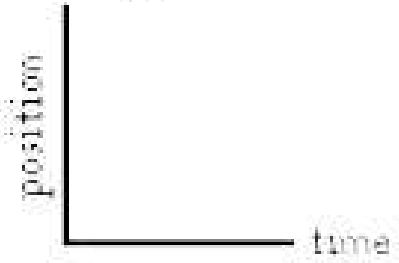
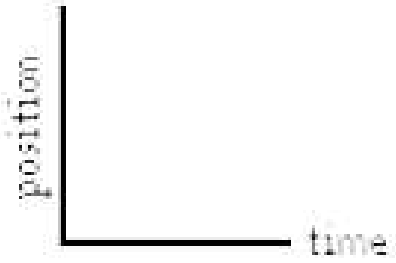
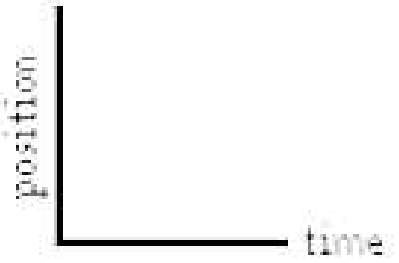
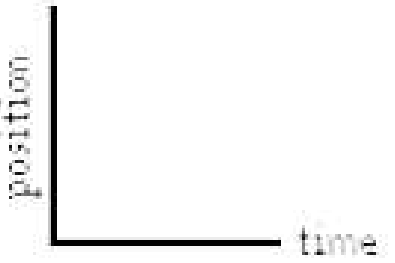
Diagram C:

	Verbal Description	Diagram
i.	Renatta was driving with a slow constant speed, decelerated to rest, remained at rest for 30 s, and then drove very slowly at a constant speed. Reasoning: _____ _____	
ii.	Renatta rapidly decelerated from a high speed to a rest position, and then slowly accelerated to a moderate speed. Reasoning: _____ _____	

Group 5 Part II

Interpreting Position-Graphs

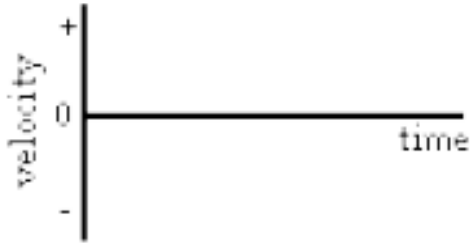
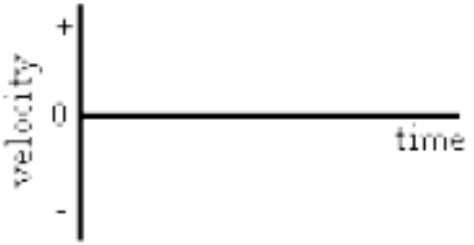
2. On the graphs below, draw two lines/curves to represent the given verbal descriptions; label the lines/curves as A or B.

A	Remaining at rest	A	Moving slow	A	Moving in + direction
B	Moving	B	Moving fast	B	Moving in - direction
					
A	Moving at constant speed	A	Move in + dirn; speed up	A	Move in - dirn; speed up
B	Accelerating	B	Move in + dirn; slow dn	B	Move in - dirn; slow dn
					

Group 5 Part III

Interpreting Velocity-Graphs

2. On the graphs below, draw two lines/curves to represent the given verbal descriptions; label the lines/curves as A or B.

A Moving with - velocity and - accel'n B Moving with - velocity and + accel'n	A Moving in + dir'n, first fast, then slow B Moving in - dir'n, first fast, then slow
	

Group 5 Part IV

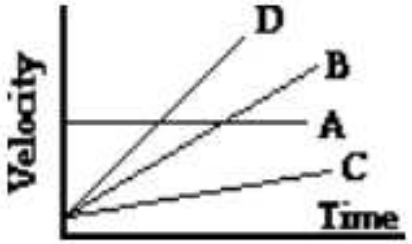
3. The slope of the line on a velocity vs. time graph reveals information about an object's acceleration. Furthermore, the area under the line is equal to the object's displacement. Apply this understanding to answer the following questions.

   a. A horizontal line means _____.

   b. A straight diagonal line means _____.

   c. A gradually sloped line means _____.

   d. A steeply sloped line means _____.



4. The motion of several objects is depicted by a velocity vs. time graph. Answer the following questions. Each question may have less than one, one, or more than one answer.

   _____ a. Which object(s) is(are) at rest?

   _____ b. Which object(s) is(are) accelerating?

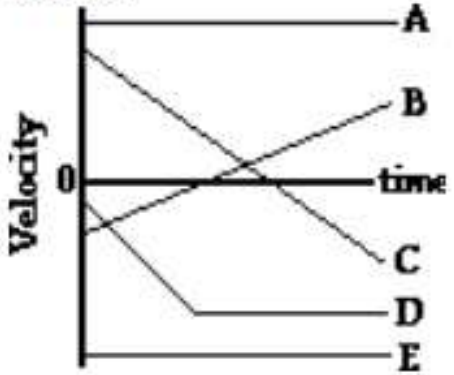
   _____ c. Which object(s) is(are) not moving?

   _____ d. Which object(s) change(s) its direction?

   _____ e. Which accelerating object has the smallest acceleration?

   _____ f. Which object has the greatest acceleration?

   _____ g. Which object(s) is(are) moving in the same direction as object E?



Group 6 Part I

5. Renatta Oyle's car has an oil leak and leaves a trace of oil drops on the streets as she drives through Glenview. A study of Glenview's streets reveals the following traces. Match the trace with the verbal descriptions given below. For each match, verify your reasoning.

Diagram A:

Diagram B:

Diagram C:

iii. Renatta was driving at a moderate speed and slowly accelerated.

Reasoning: _____

Group 6 Part II

Review:

1. Categorize the following motions as being either examples of + or - acceleration.
   a. Moving in the + direction and speeding up (getting faster) _____
   b. Moving in the + direction and slowing down (getting slower) _____
   c. Moving in the - direction and speeding up (getting faster) _____
   d. Moving in the - direction and slowing down (getting slower) _____

Group 6 Part III

1. The slope of the line on a position vs. time graph reveals information about an object's velocity. The magnitude (numerical value) of the slope is equal to the object's speed and the direction of the slope (upward/+ or downward/-) is the same as the direction of the velocity vector. Apply this understanding to answer the following questions.

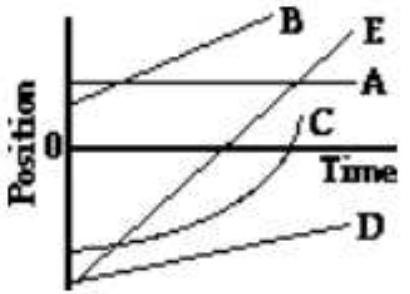
   a. A horizontal line means _____.

   b. A straight diagonal line means _____.

   c. A curved line means _____.

   d. A gradually sloped line means _____.

   e. A steeply sloped line means _____.



2. The motion of several objects is depicted on the position vs. time graph. Answer the following questions. Each question may have less than one, one, or more than one answer.

   _____ a. Which object(s) is(are) at rest?

   _____ b. Which object(s) is(are) accelerating?

   _____ c. Which object(s) is(are) not moving?

   _____ d. Which object(s) change(s) its direction?

   _____ e. Which object is traveling fastest?

   _____ f. Which moving object is traveling slowest?

   _____ g. Which object(s) is(are) moving in the same direction as object B?