

1. Define the following terms: **(4M)**

(a) speed

(b) displacement

(c) acceleration

(d) kinematics

2. Draw a vector diagram using a scale of $1 \text{ cm} = 4 \text{ m}$ that represents a velocity of 36 m/s at a direction of 40°E of N . **(3M)**

3. Draw a vector diagram using a scale of 1 cm = 5 m that represents the following trip. **(8M)**

(a) 25 m North followed by 35 m East followed by 10 m South

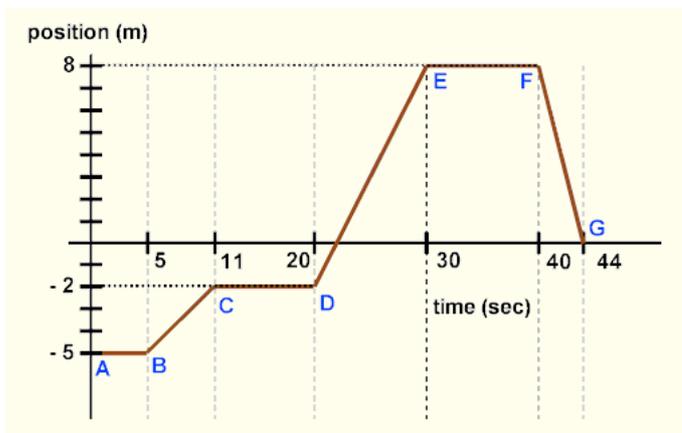
(b) Determine my total distance traveled.

(c) Determine my displacement during the trip.

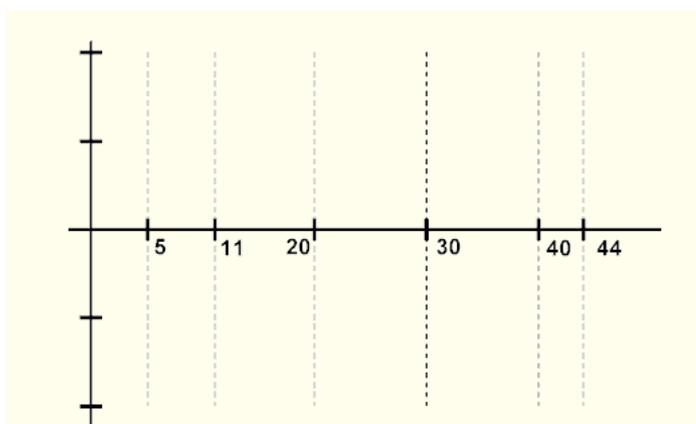
(d) If the trip took 120 seconds, determine my average speed for the trip.

(e) If the trip took 120 seconds, determine my average velocity for the trip.

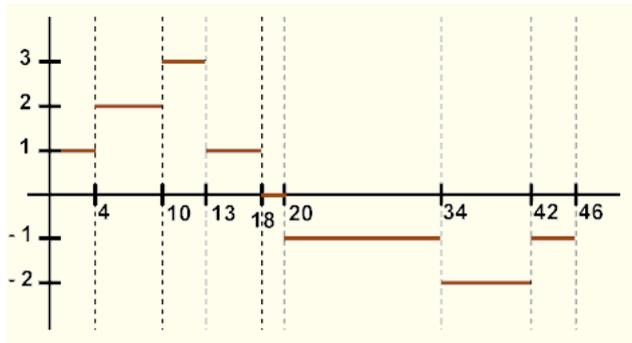
4. Answer the following questions given the following position-time graph: **(15M)**



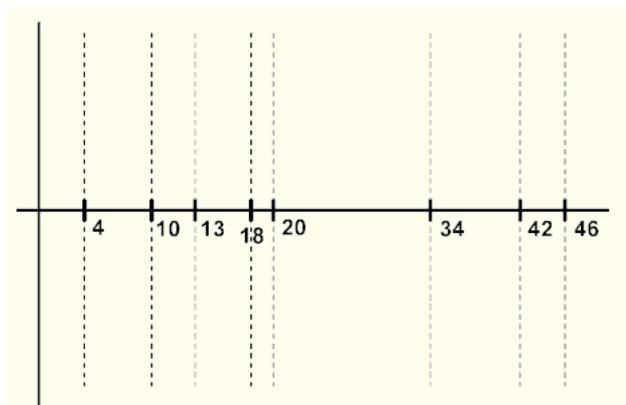
- a. During which time interval was the cart traveling at its greatest speed?
 AB BC CD DE EF FG
- b. During which time interval was the cart traveling at its smallest (nonzero) speed?
 AB BC CD DE EF FG
- c. During which time interval(s) was the cart at rest?
 AB BC CD DE EF FG
- d. During which time interval(s) did the cart travel in a negative direction?
 AB BC CD DE EF FG
- e. What was the cart's instantaneous speed at 6 seconds? _____.
- f. What was the cart's instantaneous speed at 22 seconds? _____.
- g. What total distance did the cart travel while moving in a negative direction? _____.
- h. What total distance did the cart travel while moving in a positive direction? _____.
- i. What total distance did the cart travel during the entire 44 seconds? _____.
- j. What was the cart's average speed during the entire 44 seconds? _____.
- k. What was the cart's net displacement for the entire graph? _____.
- l. What was the cart's average velocity during these 44 seconds? _____.
- m. Construct a velocity-time graph that illustrates this cart's behavior on the grid below:



5. On this graph, a cart's velocity in m/sec is plotted on the y-axis and the time in sec is plotted on the x-axis. **(13M)**



- (a) Give one combination of intervals when the cart traveled at the same speed but with different velocities? _____
- (b) What was the cart's instantaneous speed at 11 seconds? _____
- (c) What was the cart's instantaneous speed at 19 seconds? _____
- (d) What was the cart's instantaneous speed at 42 seconds? _____
- (e) During which time interval did the cart travel the greatest distance? _____
- (f) During which time interval(s) was the cart traveling in a negative direction? _____
- (g) Describe the cart's behavior between 0 and 20 seconds (speed, direction of travel, and distance traveled).
- (h) What was the total distance the cart traveled for the entire 46 seconds? _____
- (i) What was the cart's net displacement for the entire graph? _____
- (j) Construct a scaled position-time graph that illustrates the cart's behavior.



For the following word problems, remember the required presentation method. First, list your given & unknown information, write the appropriate formula, show the necessary work and make sure units are included in the final answer.

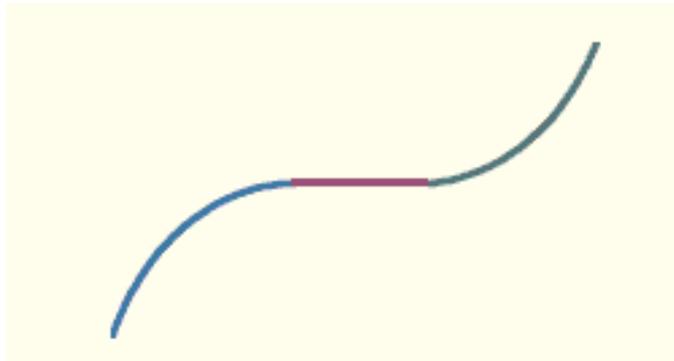
6. Mr Santowski traveled to Mesaieed to the Sea Line Beach Resort on Friday. For the trip from my house to the Beach Resort, it took 75 minutes to travel the 61 km. I took a different road to get home in the evening and the return trip took me 82 minutes as I averaged a speed of 71 km/hour.

(a) Determine my average speed in km/hour on my trip out to the beach resort. **(4M)**

(b) Determine the distance traveled on my trip to get back to my home. **(4M)**

(c) Determine my average speed in km/hour for the complete trip to and from the resort. **(4M)**

10. For the position-time graph shown below, choose the description that would correctly outline the behavior of the cart in each section as illustrated by the graph. **(2M)**



- (a) a cart originally at rest, uniformly gains speed in a positive direction, maintains that speed, and then uniformly loses its speed finally coming to a stop.
- (b) while traveling in a positive direction, a rapidly moving cart uniformly loses speed, comes to a stop and rests, and then uniformly regains its original speed.
- (c) a cart originally at rest, uniformly gains speed in a positive direction, maintains that speed, uniformly loses its speed coming to a stop, rests, uniformly gains speed in a negative direction, maintains that negative velocity, then uniformly loses speed and comes to a final rest.
- (d) while traveling in a negative direction, a rapidly moving cart uniformly loses speed, comes to a stop and rests, and then uniformly regains its original speed but in a positive direction.
- (e) a cart originally at rest, uniformly gains speed in a negative direction, maintains that speed, and then uniformly loses its speed finally coming to a stop.
- (f) none of the above
11. Make a sketch of a position-time graph that illustrates the following description of motion.

a cart originally at rest, uniformly gains speed in a positive direction, maintains that speed, uniformly loses its speed coming to a stop, rests, uniformly gains speed in a negative direction, maintains that negative velocity, then uniformly loses speed and comes to a final rest. **(3M)**



12. The following table represents a group's data for the motion of their ball down a hill.

(a) Graph the data on the grid included and include the line or curve of best fit. **(3M)**

(b) Determine the average velocity between: **(3M)**

i. $t = 0.5$ sec and $t = 1$ sec

ii. $t = 4$ sec and $t = 4.5$ sec

(c) Draw a tangent line at $t = 2.25$ seconds and calculate the instantaneous velocity of the object at $t = 2.25$ sec using this tangent line. **(3M)**

(d) Determine the average acceleration of the ball. **(3M)**

t sec	position m
0	0
0.5	0.25
1	1
1.5	2.25
2	4
2.5	6.25
3	9
3.5	12.25
4	16
4.5	20.25
5	25

