

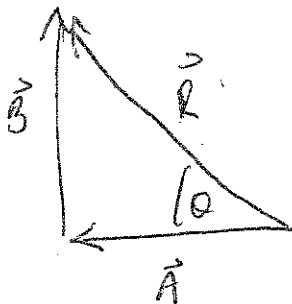
Name - Key

Date - Oct. 2018

Part 1 - Calculating a Resultant (Value - 10)

Show your work in the space provided. Follow the rubric to obtain full value.

Find the resultant of $A = 64.9 \text{ km/h, W}$ and $B = 73.1 \text{ km/h, N}$.



$$R = \sqrt{(64.9)^2 + (73.1)^2}$$

$$R = 97.8 \text{ km/h}$$

$$\tan \theta = \frac{73.1}{64.9}$$

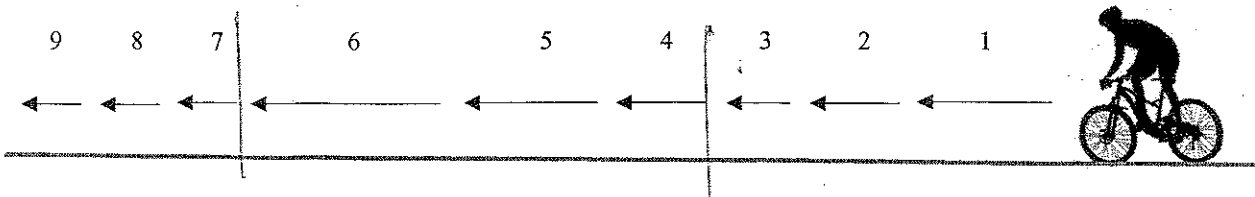
$$\theta = 48.4^\circ$$

$$\vec{R} = 97.8 \text{ km/h, } 48.4^\circ \text{ NW}$$

Part 2 - Describing Motion (Value - 9)

Complete the chart below for the bicyclist below the table. The arrows represent the velocities of the bicyclist.

Images in Diagram	Direction of Velocity Vector	Direction of Acceleration Vector	Description of Motion
1-2-3	neg.	positive	slowing down in a neg. direction.
4-5-6	neg.	neg.	speeding up in a neg. dir.
7-8-9	neg.	N/A	const. speed in a neg. dir.



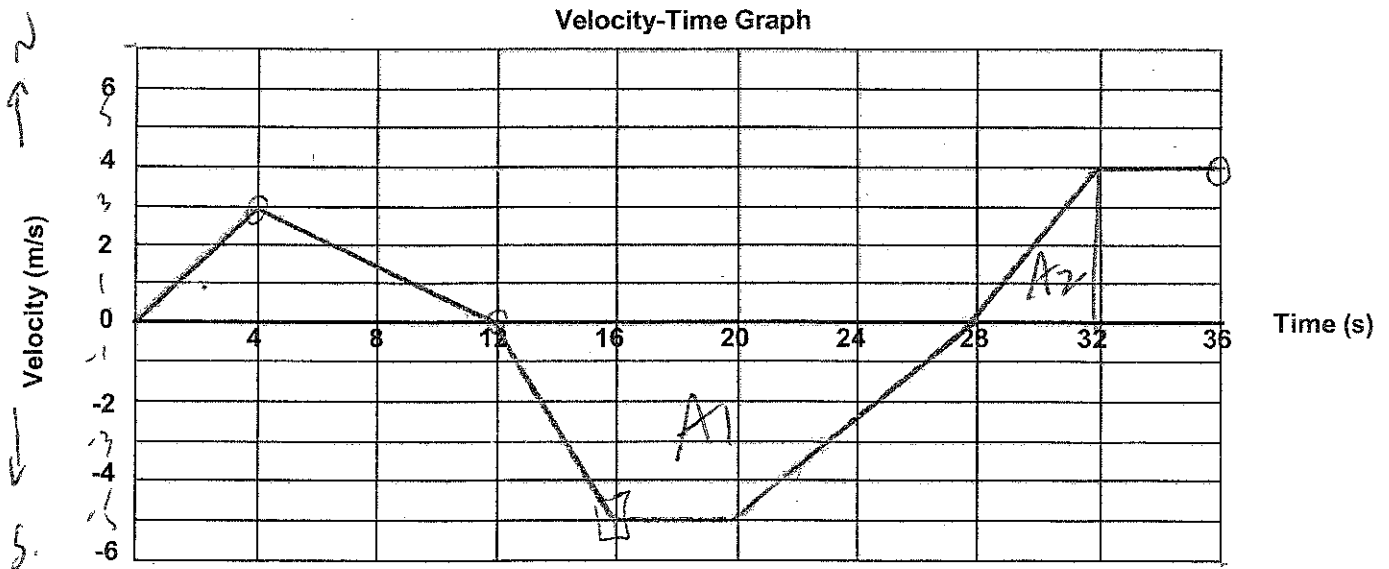
Part 3 – Types of Quantities (Value – 6)

Provide the names of three vector quantities and three scalar quantities.

Vector Quantities	Scalar Quantities

Part 4 – Velocity vs. Time Graph (Value – 14)

Refer to the following graph to answer the questions below. Assume that the positive direction is north.
Express all answers to three significant digits. Use north and south to describe the directions of vector quantities in your final answers. Report all final answers on your loose leaf and show work when calculations are required. Make sure your work is neat and organized.



1. How much time did the object spend traveling south? (1)
2. What was the acceleration of the object at $t = 9.0$ s? (2)
3. At what time, if any, did the object change its direction? (1)
4. What was the displacement of the object between 12 s and 32 s? (3)
5. What was the average speed of the object between 12 s and 32 s? (3)
6. In which direction was the object traveling at $t = 21$ s? (1)
7. What was the average acceleration of the object between $t = 16$ s and $t = 36$ s? (2)
8. What was the maximum velocity of the object? (1)

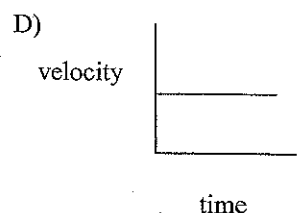
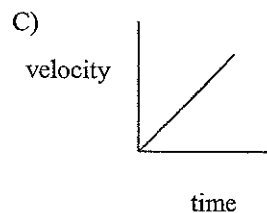
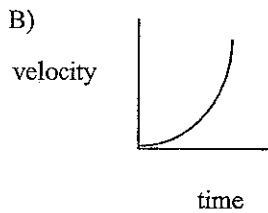
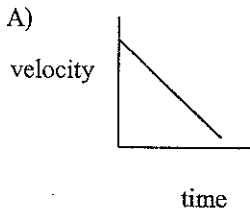
Part 5 – Multiple Choice (Value – 12)

Choose the letter of the best answer and print the letter on the line provided.

- B 1. A resultant is the
- A) difference of vectors
 - B) sum of vectors
 - C) product of vectors
 - D) quotient of vectors

- A 2. Given the angles between two vectors below, which would produce the largest resultant?
- A) 24°
 - B) 57°
 - C) 89°
 - D) 134°

- D 3. Which of the following graphs represents uniform motion? *constant*

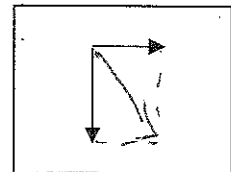
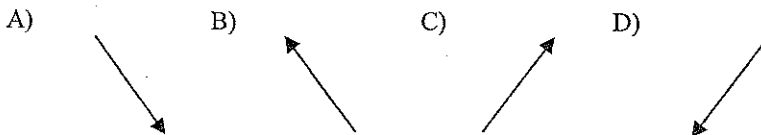


- C 4. The study of how objects move is called
- A) dynamics
 - B) mechanics
 - C) kinematics
 - D) thermodynamics

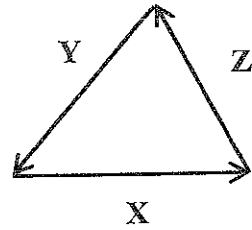
- B 5. Which of the following requires a direction?
- A) distance
 - B) acceleration
 - C) speed
 - D) time

- D 6. An object displaying uniformly accelerated motion is
- A) a car traveling northward at 90 km/h
 - B) a car traveling up a hill at 18 m/s
 - C) a car backing out of a driveway at 2 m/s
 - D) a satellite orbiting a planet with a speed of 2.8×10^4 km/h

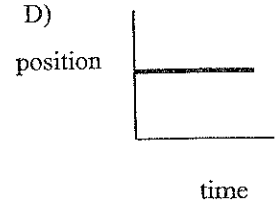
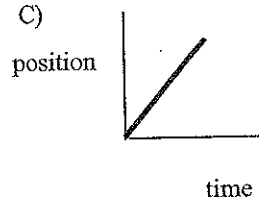
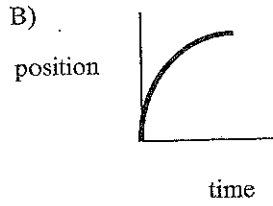
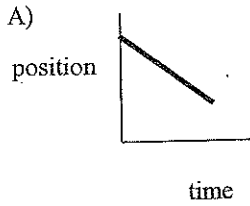
- A 7. Which vector represents the resultant of the two displacement vectors shown in the box?



8. Study the diagram to the right. Which statement best describes the relationship between X, Y and Z?
- A) Z is the resultant of X and Y
 - B) X is the resultant of Y and Z
 - C) Y is the resultant of X and Z
 - D) There is no particular relationship between X, Y and Z.



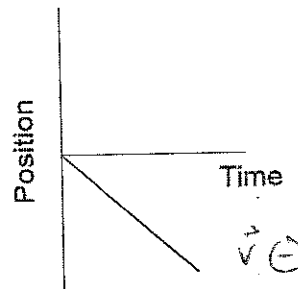
9. Which of the following graphs represents uniformly accelerated motion? *changing vel.*



10. A vector quantity has
- A) magnitude or direction
 - B) only magnitude
 - C) magnitude and direction
 - D) only direction

11. Which pair of units can only be associated with scalar quantities?
- A) kg, s
 - B) s, m
 - C) m/s, m
 - D) m/s^2 , kg

12. For the position versus time graph provided, what is the direction of the velocity of the object?
- A) positive
 - B) negative
 - C) N/A



Part 4

1. $28 - 12 = 16\text{s} \rightarrow 16.0\text{s}$ (1)

2. $(4, 3), (12, 0)$

$$\vec{a} = \frac{0 - 3}{12 - 4} = -0.375\text{m/s}^2 \quad [0.375\text{m/s}^2, \text{S}] \quad (2)$$

3. $t = 12.0\text{s}$ and $t = 28.0\text{s}$. (1)

4. $A_1 = \frac{1}{2}(16 + 4)(5) = 50.0\text{m}$

$$A_2 = \frac{1}{2}(4)(4) = 8.00\text{m}. \quad (3)$$

$$\Delta \vec{d} = -50.0\text{m} + 8.00\text{m} = -42.0\text{m} \\ [42.0\text{m}, \text{S}]$$

5. $\text{ave. speed} = \frac{58.0}{20} = 2.90\text{m/s}$ (3)

6. South (2)

7. $(16, -5), (36, 4)$

$$\vec{a}_{\text{ave}} = \frac{4 - (-5)}{36 - 16} = \frac{9}{20} = 0.450\text{m/s}^2 \quad [0.450\text{m/s}^2, \text{N}] \quad (2)$$

8. $5.00\text{m/s}, \text{S}$. (1)