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Physics 112
SA: U1 - S1&2 #3 (October 2018)

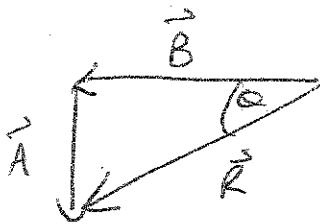
Name - Key

Date - Oct. 9/18

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 $A = 5.8 \text{ m/s}^2$, S and $B = 9.3 \text{ m/s}^2$, W.



$$R = \sqrt{(5.8)^2 + (9.3)^2}$$

$$R = 11 \text{ m/s}^2$$

$$\tan \theta = \frac{5.8}{9.3}$$

$$\theta = 32^\circ$$

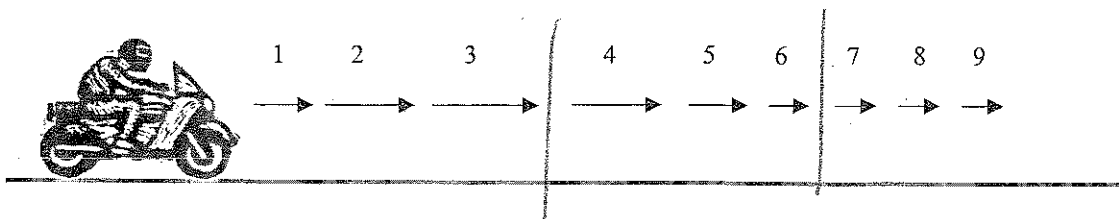
$$R = 11 \text{ m/s}^2, 32^\circ \text{ S of W}$$

58° W of S

Part 2 – Describing Motion (Value – 9)

Complete the chart below for the motorcycle and driver below the table. The arrows represent the velocities of the motorcycle and driver.

Images in Diagram	Direction of Velocity Vector	Direction of Acceleration Vector	Description of Motion
1-2-3	positive	positive	Speeding up in a positive dir.
4-5-6	positive	negative	Slowing down in a positive dir.
7-8-9	positive	X	Const. Speed in a positive dir.



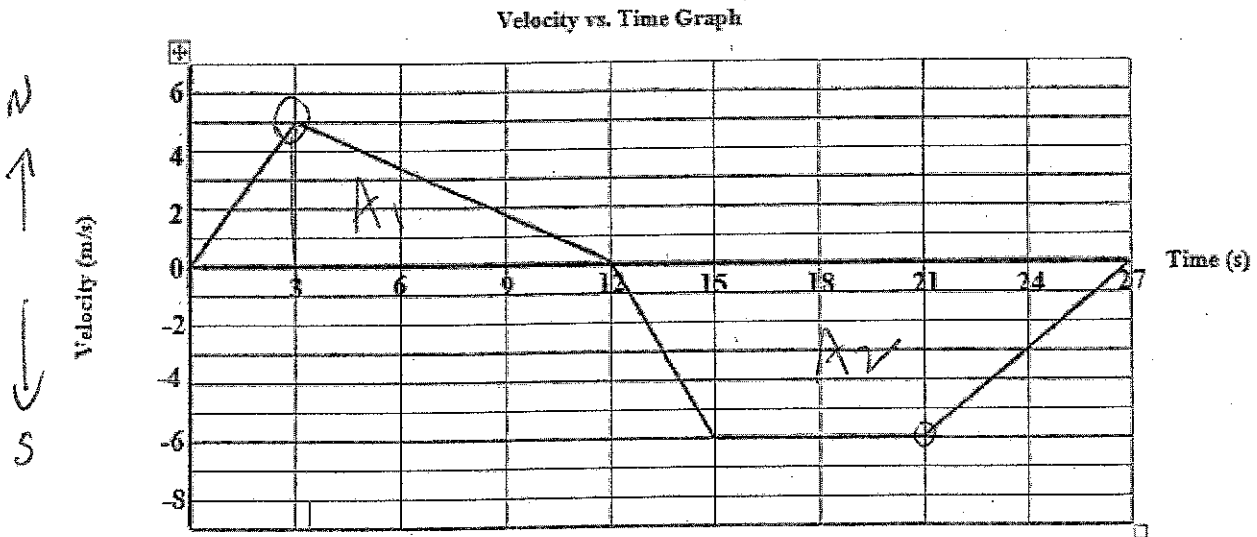
Part 3 – Types of Quantities (Value – 6)

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

Scalar Quantities	Vector 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.



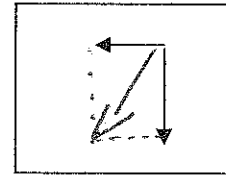
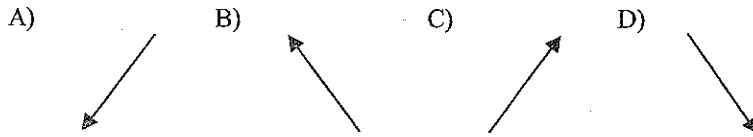
1. How much time did the object spend traveling south? (1)
2. What was the acceleration of the object at $t = 22$ s? (2)
3. At what time, if any, did the object change its direction? (1)
4. What distance was traveled by the object between 3.0 s and 27 s? (3)
5. What was the average velocity of the object between 3.0 s and 27 s? (3)
6. In which direction was the object traveling at $t = 7.0$ s? (1)
7. What was the average acceleration of the object between $t = 3.0$ s and $t = 15$ s? (2)
8. What was the maximum speed of the object? (1)

Part 5 – Multiple Choice (Value – 12)

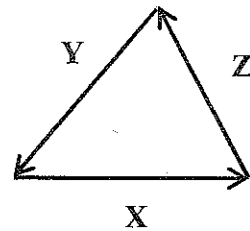
Choose the letter of the best answer and print the letter on the line provided.

- B 1. An object displaying uniformly accelerated motion is
- A) a car traveling northward at 25 m/s
 - B) a car rounding a curve at 10 m/s
 - C) a car traveling up a hill at 18 m/s
 - D) a car backing out of a driveway at 2 m/s

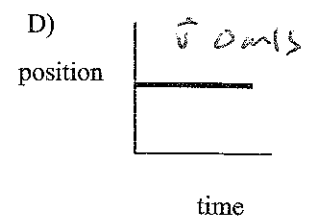
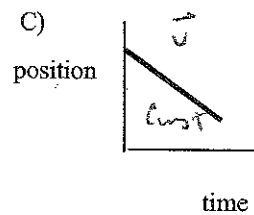
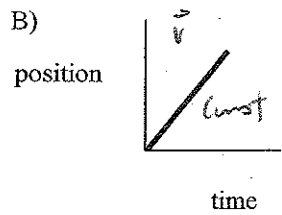
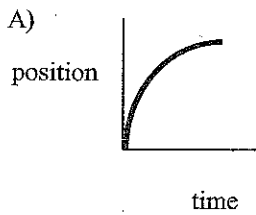
- A 2. Which vector represents the resultant of the two displacement vectors shown in the box?



- D 3. 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.



- A 4. Which of the following graphs represents uniformly accelerated motion? *changing vel.*



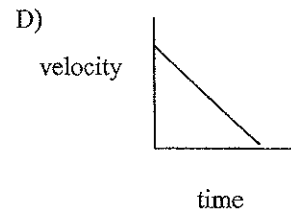
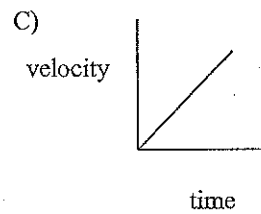
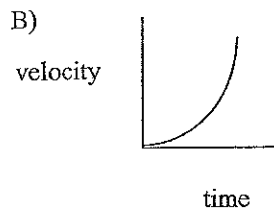
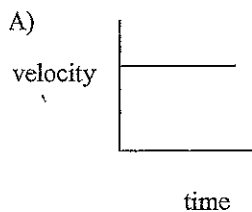
- C 5. A scalar quantity has
- A) magnitude or direction
 - B) magnitude and direction
 - C) only magnitude
 - D) only direction

- B 6. Which pair of units can only be associated with scalar quantities?
- A) s, m
 - B) kg, s
 - C) m/s, m
 - D) m/s², kg

- D 7. A resultant is the
- A) difference of vectors
 - B) product of vectors
 - C) quotient of vectors
 - D) sum of vectors

- D 8. The minimum resultant of two forces acting on an object will occur when the angle between the two forces is
- A) 0°
 - B) 45°
 - C) 90°
 - D) 180°

- A 9. Which of the following graphs represents uniform motion? *const. vel.*



- C 10. In order to have a change in velocity, there must be
- A) an increase in speed
 - B) a decrease in speed
 - C) a change in speed and/or direction
 - D) a change in both speed and direction

- B 11. Kinematics is the study of ____ objects move.
- A) when
 - B) how
 - C) where
 - D) why

- A 12. Which of the following requires a direction?
- A) position
 - B) distance
 - C) speed
 - D) time

Part 4 - Vel. vs. Time

1. $\boxed{15.0s}$ (1)

2. \vec{a} at $t = 22s$

$(21, -6), (27, 0)$ (2)

$$\vec{a} = \frac{0 - (-6)}{27 - 21} = 1.00 \text{ m/s}^2$$

$\boxed{1.00 \text{ m/s}^2, N}$

3. $\boxed{t = 12s}$ (1)

4. $A_1 = \frac{1}{2}(9)(5) = 22.5 \text{ m}$ (3)

$$A_2 = \frac{1}{2}(15 + 6)(6) = 63 \text{ m}$$

$$d = 22.5 + 63 = \boxed{85.5 \text{ m}} \rightarrow \text{turn}$$

5. $\vec{v}_{\text{ave}} = \frac{22.5 - 63}{24} = \frac{-40.5}{24} = -1.69 \text{ m/s}$ (3)

$\boxed{\frac{-40.5}{24} \text{ m/s}, S}$
1.69

6. north (1)

7. $(3, 5), (15, -6)$

$$\vec{a}_{\text{ave}} = \frac{-6 - 5}{15 - 3} = \frac{-11}{12} = -0.917 \text{ m/s}^2$$

$\boxed{\frac{-11}{12} \text{ m/s}^2, S}$ (2)

8. 6.00 m/s (1)