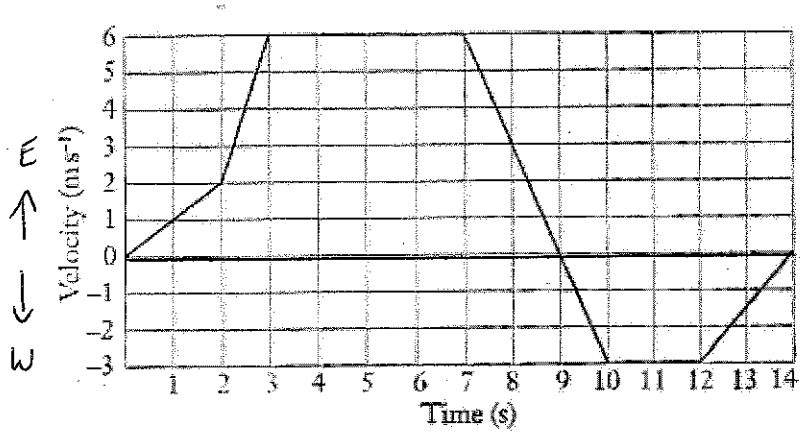
Physics 112
Review -> SA: U1- S1&2
(October 2019)

Name - Key

Part 1 – Velocity vs. Time Graph (Value – 14)

Assume that the positive direction for the graph below is east. Show work when calculations are required on loose leaf. Use east and west to describe the directions of vector quantities in your final answers. Express all answers to two significant digits. Write final answers on the lines provided. **NOTE: ms^{-1} = m/s.**

Velocity vs. Time



✓1. What was the maximum velocity of the object? (1)
✓2. What was the acceleration of the object at t = 9.5 s? (2)
✓3. What was the displacement of the object between 7.0 s and 14 s? (3)
✓4. What was the average speed of the object between 7.0 s and 14 s? (3)
✓5. How much time did the object spend travelling west? (1)
✓6. At what time, if any, did the object change its direction? (1)
✓7. What was the average acceleration of the object between t = 2.0 s and t = 8.0 s? (2)
✓8. In which direction was the object traveling at t = 13 s? (1)

Final Answers:

1. 6.0 m/s, E
2. 3.0 m/s², W
3. 4.5 m, W
4. 2.4 m/s
5. 5.0 s
6. 9.0 s
7. 0.17 m/s², E
8. West

2. (7, 6), (10, −3)

$\vec{a} = \frac{-3-6}{10-7}$

$\vec{a} = -3.0\ m/s^2$

3. $A_1 = \frac{1}{2}(2)(6)$

$A_1 = 6.0\ m$

$A_2 = \frac{1}{2}(2+5)3$

$A_2 = 10.5\ m$

$\vec{d} = 6 - 10.5$

$\vec{d} = -4.5\ m$

4. $v_{av} = \frac{d}{t}$

$v_{av} = \frac{6.0 + 10.5}{7.0}$

$v_{av} = 2.4\ m/s$

7. (2, 2), (8, 3)

$\vec{a} = \frac{3-2}{8-2}$

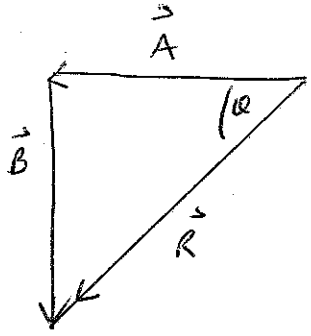
$\vec{a} = +0.17\ m/s^2$

Part 2 – Calculating a Resultant (Value – 10)

If **A** = 29.4 m/s, W and **B** = 33.1 m/s, S, find their resultant. Show your work in the space provided. Follow the rubric discussed in class to obtain full value.

$\vec{A} = 29.4\ m/s, W$

$\vec{B} = 33.1\ m/s, S$



$R = \sqrt{(29.4)^2 + (33.1)^2}$

$R = 44.3\ m/s$

$\tan\theta = \frac{33.1}{29.4}$

$\theta = 48.4°$

$\vec{R} = 44.3\ m/s,\ 48.4°\ S\ of\ W$

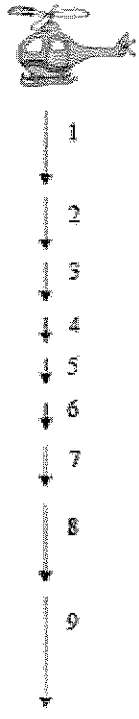
or

$41.6°\ W\ of\ S$

Part 3 – Describing Motion (Value – 9)

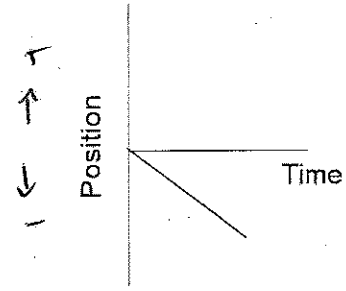
Complete the chart below for the helicopter to the right of the table. The arrows represent the velocities of the helicopter.

Images in Diagram	Direction of Velocity Vector	Direction of Acceleration Vector	Description of Motion
1-2-3	negative	positive	object is slowing down in a negative direction
4-5-6	negative	N/A	object has constant speed in a negative direction
7-8-9	negative	negative	object is speeding up in a negative direction



Part 4 – Interpreting Graphs (Value – 11)

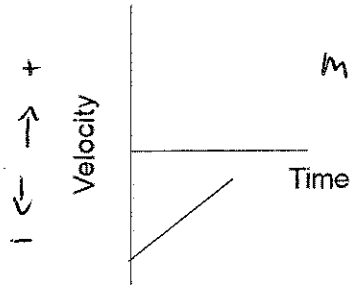
1. Circle the best answer in each row. (6)



$m = \vec{v} \Rightarrow$ -ve $\Rightarrow$ Constant

position:	positive	or	negative		
velocity:	zero	or	constant	or	changing
direction of motion:	positive	or	negative	or	N/A
type of motion:	no motion	or	uniform motion	or	uniformly accelerated motion
acceleration:	zero	or	constant	or	changing
direction of acceleration:	positive	or	negative	or	N/A

2. Circle the best answer in each row. (5)



$m = \vec{a} \Rightarrow$ +ve $\Rightarrow$ Constant

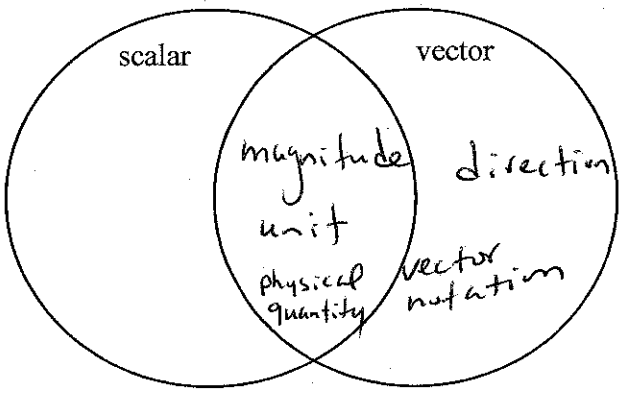
velocity:	zero	or	constant	or	changing
direction of motion:	positive	or	negative	or	N/A
type of motion:	no motion	or	uniform motion	or	uniformly accelerated motion
acceleration:	zero	or	constant	or	changing
direction of acceleration:	positive	or	negative	or	N/A

Part 5 – Short Response (Value – 11)

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

---

1. Complete the Venn Diagram below for scalar and vector quantities. (3)



2. Sketch the resultant for the two vectors shown. (1)

parallelogram method

3. If you add two velocities with magnitude of 23 m/s and 12 m/s, is it possible to obtain a resultant with magnitude of 37 m/s? Explain. (2)

Range of possible R values: 11 m/s – 35 m/s
Since 37 m/s is not within the range of possible values, it cannot be a resultant value.

4. If an object is moving with uniform motion, what can be said about the object's acceleration? (1)

If an object has uniform motion, its velocity is constant. If the velocity is constant, there is no acceleration.

5. The study of the how objects move is called Kinematics. (1)

6. Mechanics is the branch of physics that deals with the motion of objects. (1)

7. For what angle between two vectors will the minimum resultant occur? (1)

The minimum resultant occurs when the angle between vectors is 180°.

8. The sum of two or more vectors is called a(n) resultant. (1)

Part 6 – Physical Quantities (Value - 10)

Physical Quantity	Definition	Type of Quantity	Variable	Unit
acceleration	rate of change of velocity	vector	$\vec{a}$	m/s^2
position	Separation between an object and its reference point	vector	$\vec{d}$	m
time	interval between two events	scalar	t	s
distance	how far something has traveled	scalar	d	m
velocity	rate of change of position	vector	$\vec{v}$	m/s