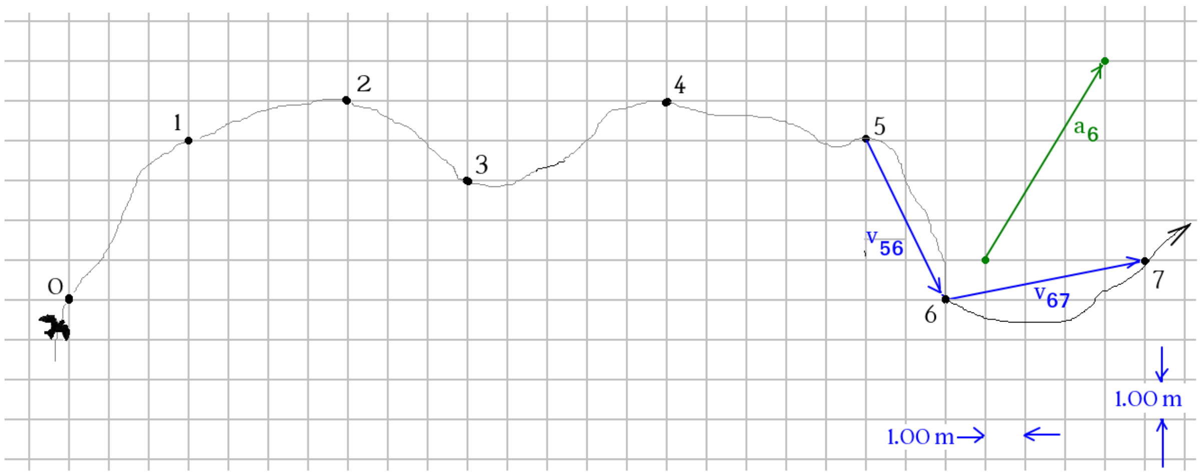
# Group Quiz 3

Group Number: Names:

Date:

Show all work. If you don't have enough room on this document, you can add pages.

**(1)** [15 total] An eagle is flying in the air and viewed form the side as shown below. Its location is marked and numbered at equal-time positions. The time between dots is one-half of a second $\boxed{(\Delta t) = 0.500\,\text{s}}$ and the grid shows one-meter squares $1.00\,\text{m} \times 1.00\,\text{m}$. Our goal is to construct a quantitative motion diagram for the eagle which includes a sequence of velocity arrows and corresponding acceleration arrows.




Each group is asked to complete two sets of computations:

| Group | Assigned interval | |
|---|---|---|
| 1 | $0 \to 1 \to 2$ | $1 \to 2 \to 3$ |
| 2 | $1 \to 2 \to 3$ | $2 \to 3 \to 4$ |
| 3 | $2 \to 3 \to 4$ | $3 \to 4 \to 5$ |
| 4 | $3 \to 4 \to 5$ | $4 \to 5 \to 6$ |

Several sheets of graph paper are included in this file. For each result you must clearly represent the magnitude and direction of the desired quantities. A graphic representation of the directions is acceptable. A model solution for $5 \to 6 \to 7$ is provided on the last page. Use a similar notation. Notice the scales for displacement, velocity, and acceleration; and the use of color.

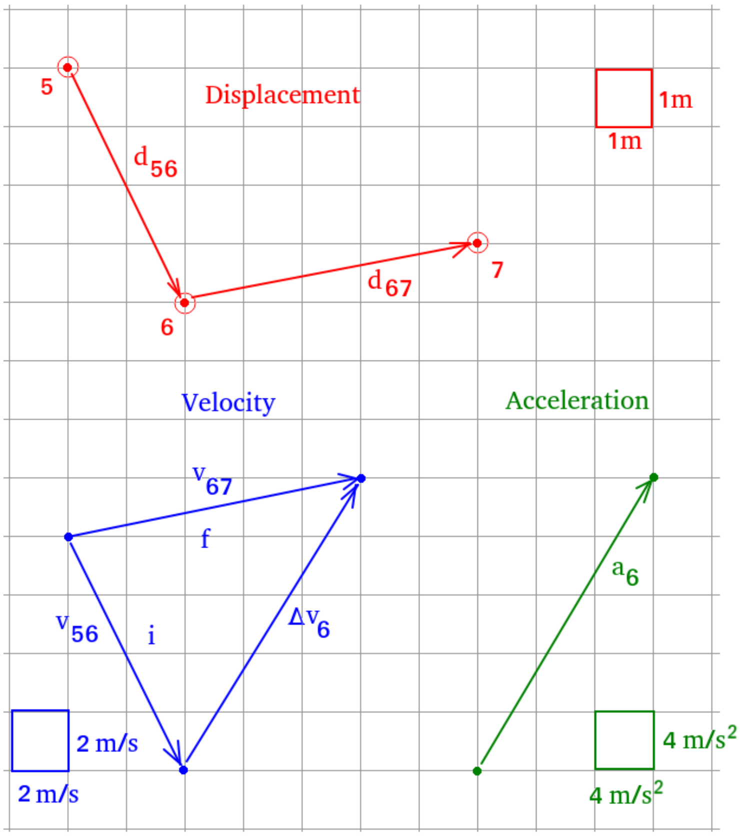
/4 **(1.a)** Determine the magnitude and direction of the displacements for your sets of points.

/6 **(1.b)** Determine the magnitude and direction of the velocities and changes in velocity for your sets of points.

/3 **(1.c)** Determine the magnitude and direction of the accelerations for your sets of points.

/2 **(1.d)** When complete, draw corresponding labeled arrows for your sets of points in the figure above. The model solution for $5 \to 6 \to 7$ is done.

## Model Solution for Points 5 → 6 → 7




Displacement:

$$d_{56} = \sqrt{(2)^2 + (4)^2} = 4.47\,\text{m}$$

$$d_{67} = \sqrt{(5)^2 + (1)^2} = 5.10\,\text{m}$$

Velocity:

$$v_{56} = \frac{d_{56}}{\Delta t} = \frac{(4.47)}{(0.500)} = 8.94\,\text{m/s}$$

$$v_{67} = \frac{d_{67}}{\Delta t} = \frac{(5.10)}{(0.500)} = 10.20\,\text{m/s}$$

$$\Delta v_6 = \sqrt{(2 \cdot 3)^2 + (2 \cdot 5)^2} = 11.66\,\text{m/s}$$

Acceleration:

$$a_6 = \frac{\Delta v_6}{\Delta t} = \frac{(11.66)}{(0.500)} = 23.3\,\text{m/s}^2$$