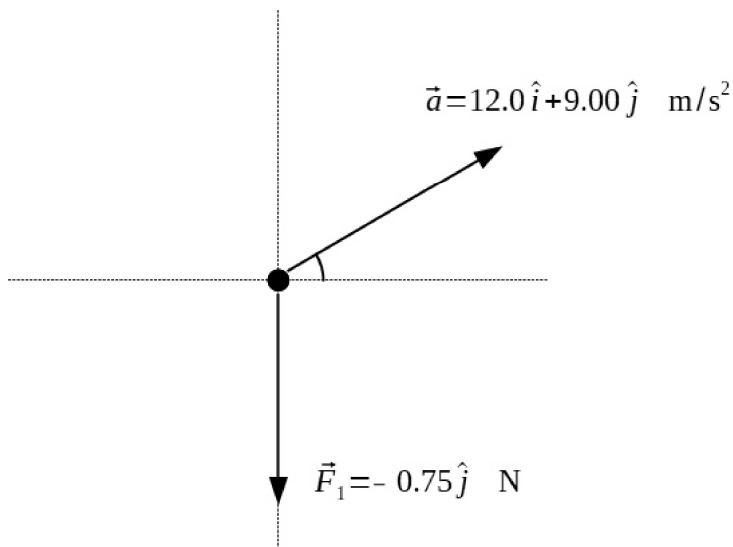**Each question has page has weight**

Sample Exam #1

Problem

1. The figure shows an object with a mass of 0.135 kg and an acceleration of $\vec{a} = 12.0\,\hat{i} + 9.00\,\hat{j}\ \frac{m}{s^2}$. Two forces act on the object. One of the forces is shown in the figure: $\vec{F}_1 = -0.75\,\hat{j}$ N. What is the second force?

$$\vec{a} = 12.0\,\hat{i} + 9.00\,\hat{j}\ \ m/s^2$$

$$\vec{F}_1 = -\,0.75\,\hat{j}\ \ N$$

An object follows a circular path for half a revolution as shown in the figure below. The radius for the path is 1.25 m. The particle starts at rest, and takes 3.00 s to reach the final position shown in the figure.
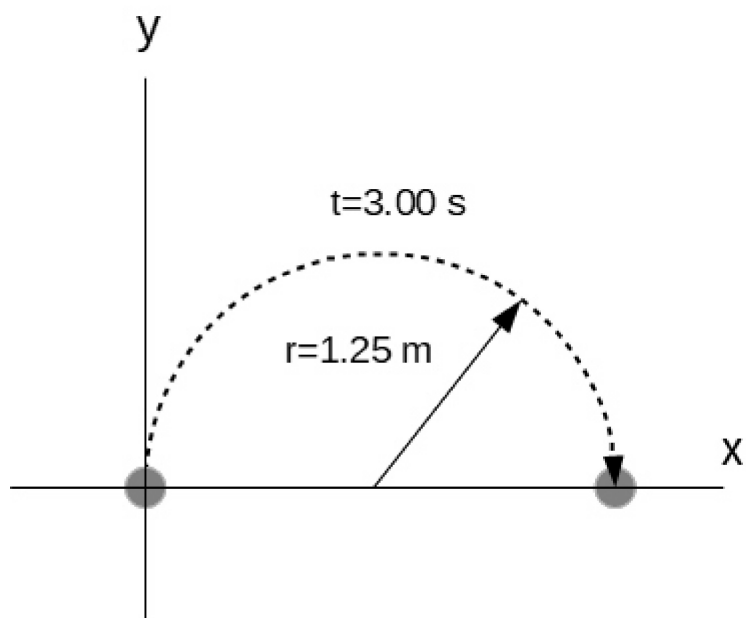
Please answer the following questions.

2. What was the average speed of the object?

.

3. What was the average velocity of the object?

4. If ball player can throw a ball at 30.0° above the horizontal to a point 75.0 m away on a level field, how high could he throw the ball assuming he threw the ball straight upwards at the same speed? Assume there is no air resistance.

.

5. Two rocks are thrown at the same time from the top of the same cliff. Graphs of the horizontal and vertical velocity as a function of time are shown for each rock. The coordinate system is defined with up the positive vertical direction, and the away from the base of the cliff the positive horizontal direction. You may ignore air resistance. *For all parts to this question you must explain your answer clearly and concisely*
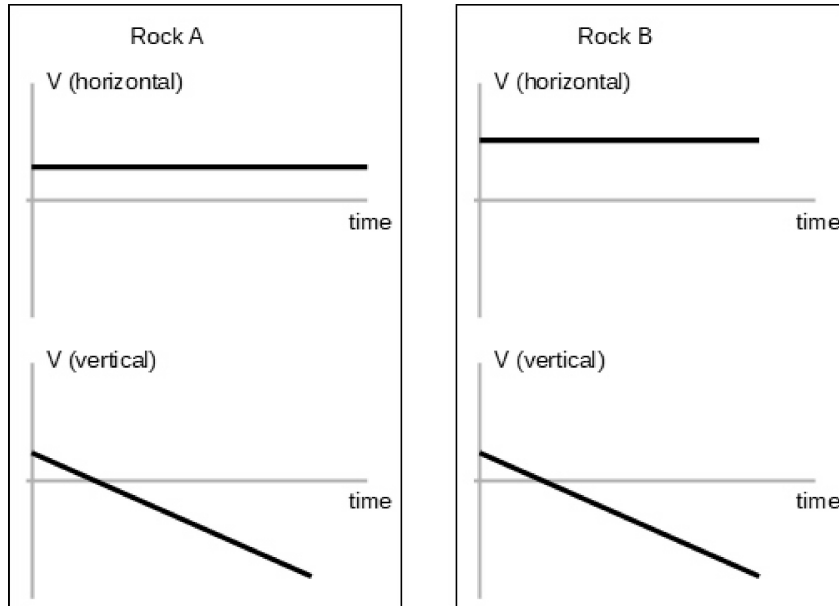
A) Which rock was thrown with the greatest initial speed, or were they thrown with the same speed?

B) Which rock was thrown at the greatest initial angle measured relative to the positive horizontal direction, or were they thrown at the same angle?

C) Which rock hits farthest from the base of the cliff, or do they hit at the same distance?

D) Which rock hits the ground first, or do they hit at the same time?

6. Please answer the following questions of vectors

A) Convert $\vec{C} = -5.00\,\hat{i} - 4.00\,\hat{j}$ to polar notation.

B) What is $\vec{E} - 2\vec{F}$ given:

$$\vec{E} = 2.00\,\hat{i} - 4.00\,\hat{j}$$
$$\vec{F} = -7.00\,\hat{i} - 6.00\,\hat{j}$$

C) What is $\vec{A} \bullet (\vec{A} \times \vec{B})$?   (note $\vec{A}$ and $\vec{B}$ are not given)