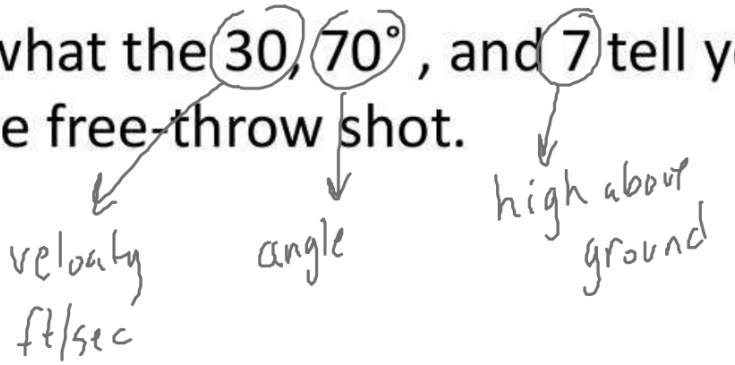
Suppose that when a basketball player releases the ball, its center is 15.8 feet from the center of the basket. The basket is 10 ft above the floor. A free-throw will go in the basket if the center of the ball is within 4 in. of the center of the basket. The ball follows a path that can be described by the following parametric equations.

$x = 30t \cos 70^\circ$ $\qquad$ $y = 30t \sin 70^\circ - 16t^2 + 7$

a. Explain what the 30, 70°, and 7 tell you about the free-throw shot.



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b. What is the maximum height of the basketball?

$\text{time} = \frac{-b}{2a} = \frac{-30\sin 70^\circ}{2(-16)}$

$y = 19.4 \text{ ft}$

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c. At what time t does the ball reach the basket?

$10 = 30t \sin 70^\circ - 16t^2 + 7$

$t \approx 1.648$ sec

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d. Assuming that the person shoots the ball on an accurate path toward the center of the basket, will the shot go in the basket? Explain your reasoning.

$t = 1.68$ to get 10ft high

$X = 16.9$ ft

Not as a swish

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e. Find the initial velocity, v, that the ball should be shot with to make a basket. Assuming the same angle.

$x = vt\cos 70^\circ$

$\frac{15.8}{v\cos 70^\circ} = \frac{vt\cos 70^\circ}{v\cos 70^\circ}$

$\frac{46.2}{v} = t$

$y = vt\sin 70^\circ - 16t^2 + 7$

$y = v\left(\frac{46.2}{v}\right)\sin 70^\circ - 16\left(\frac{46.2}{v}\right)^2 + 7$

$v = 29.06 \text{ ft/sec}$