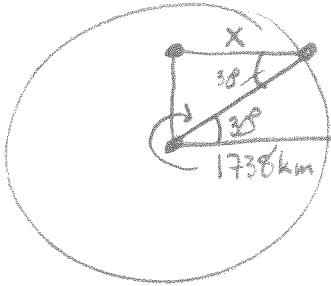# Math 112: #4 A/B

1. Assume the moon is a sphere with a radius of 1738 *km*, and it takes the moon 27.3217 earth days (24 hours) to rotate. Estimate the linear speed in kilometers per hour at which a point at 30° latitude travels at as it revolves about the moon's axis. Round to two decimal places at each step.

$$\cos 30° = \frac{x}{1738_{km}}$$

$$1738_{km}\cos 30° = x = 1505.15 \, km$$
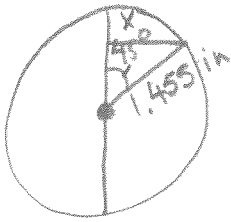
$$\text{linear speed} = v = \frac{s}{t} = \frac{r\theta}{t}$$

$$= \frac{1505.15_{km} \cdot 2\pi}{27.3217 \cdot 24}$$

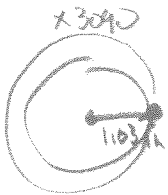$$= \frac{3010.3\pi \, km}{655.72 \, hours}$$

$$= 14.42 \, kph$$

2. A major league curveball spins at about 3090*rpm* for an average pitch. Estimate the linear speed in mph of a point on the stitches if it is at a 45° angle from the axis of rotation? A baseball has a diameter of 2.91*in*. Round final answer to two decimal places.

$$\sin 45° = \frac{x}{1.455 \text{in}}$$

$$1.455_{\text{in}} \sin 45° = x = 1.03 \text{in}$$

$$\text{Linear Speed} = \frac{s}{t} = \frac{r\theta}{t} = \frac{1.03_{\text{in}} \cdot 2\pi \cdot 3090}{\min}$$

$$= \frac{6365.4\pi \text{ in}}{\min} \times \frac{60 \min}{1 \text{ hour}} \times \frac{1 \text{ ft}}{12 \text{ in}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}}$$

$$= 6.03\pi \text{ mph}$$

$$= 18.94 \text{ mph}$$