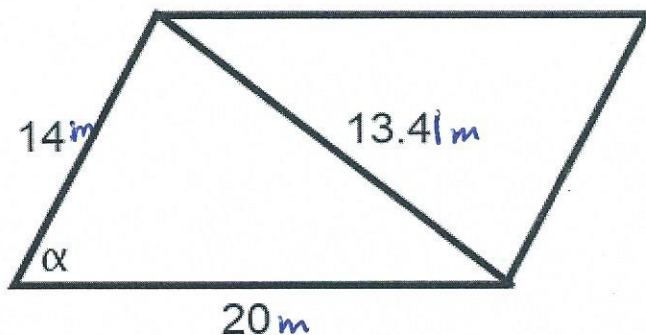


**Math 112: #30 A/B/C**

- A) A parallelogram has one side of length 14 m and another side of length 20 m, and its shorter diagonal has length 13.41 m. Find, to two decimal places, the (acute) angle between adjacent sides of the parallelogram.

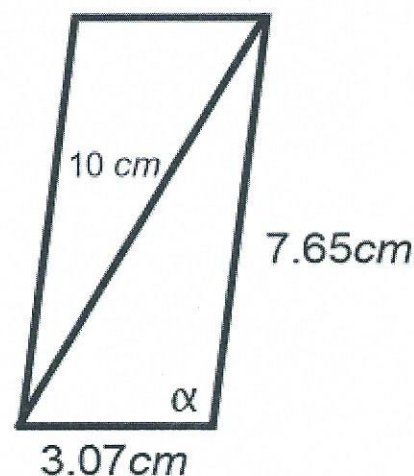


$$13.41^2 = 14^2 + 20^2 - 2 \cdot 14 \cdot 20 \cdot \cos \alpha$$

$$\frac{13.41^2 - 14^2 - 20^2}{-2 \cdot 14 \cdot 20} = \cos \alpha$$

$$\cos^{-1} \left( \frac{13.41^2 - 14^2 - 20^2}{-2 \cdot 14 \cdot 20} \right) = \alpha = 42.00^\circ$$

- B) A parallelogram has one side of length 7.65 cm and another side of length 3.07 cm, and its longer diagonal has length 10 cm. Find, to two decimal places, the (obtuse) angle between adjacent sides of the parallelogram.



$$10^2 = 3.07^2 + 7.65^2 - 2 \cdot 3.07 \cdot 7.65 \cos \alpha$$

$$\frac{10^2 - 3.07^2 - 7.65^2}{-2 \cdot 3.07 \cdot 7.65} = \cos \alpha$$

$$\cos^{-1} \left( \frac{10^2 - 3.07^2 - 7.65^2}{-2 \cdot 3.07 \cdot 7.65} \right) = \alpha = 133.03^\circ$$