Stealth Bomber Circular Motion Activity

Observe the plane flying. Draw the force diagram of the plane below:

Create an equation between the mass of the plane and the horizontal component of the tension force (use the angle from the vertical in your equation):

This horizontal component of the tension is the force that causes the circular motion, also known as the centripetal force. The theoretical equation for centripetal force is $F\_{c}=\frac{mv^{2}}{r}$ We will be testing this equation today. V is the velocity of the plane. Manipulate the equation for centripetal force so it is in terms of the radius (r) and the time it takes to go around once called the period (T):

If we think about the triangle that the string creates below, create an equation for the relationship T(h) the period as it depends on the height:

Θ

h



R

We will be testing this relationship and if it is true, then the equation for centripetal force is correct.

|  |  |
| --- | --- |
| Height from ceiling (m) | Period (sec) |
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|  |  |

Graph this data below and then draw a trend line.



Calculate the slope of your trend line.

From the discussion in class, what should this slope of the trend line be equal to? Calculate the percentage error of this data.