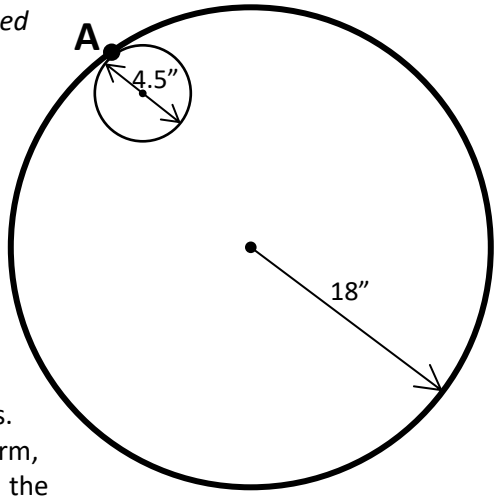
MATHCOUNTS® Problem of the Week Archive

Hula-Hoop Madness! – March 3, 2025

Problems & Solutions

First marketed by Wham-O in 1958, the Hula-Hoop was not patented until March of 1963. In the first four months of production, it is estimated that 25 million Hula-Hoops were sold. According to the Guinness Book of World Records, the record for the most Hula-Hoops twirled simultaneously by an individual, set in November of 2015, is 200. This record was set by Marawa Ibrahim. Another Hula-Hooper, Gregory Sean Dillon, is the fastest Hula-Hooper in the world, twirling at a rate of 243 revolutions per minute.



At the circus, a performer twirls a Hula-Hoop around her arm. Assume the Hula-Hoop has a radius of 18 inches, and the performer's arm is completely round with a diameter of 4 ½ inches. If point A of the Hula-Hoop is currently touching the performer's arm, after how many revolutions around her arm will point A first be on the performer's arm again?

*The circumference of the performer's arm is 4.5π inches, while the circumference of the Hula-Hoop is 36π inches. Point A of the Hula-Hoop will first touch the performer's arm again after 36π/4.5π = **8** revolutions.*

What fraction of the Hula-Hoop's circumference makes contact with the performer's arm during one successful revolution of the Hula-Hoop around her arm? Express your answer as a common fraction.

*With each revolution of the Hula-Hoop around the performer's arm, 4.5π inches of the Hula-Hoop comes in contact with her arm. That is equivalent to 4.5π/36π = **1/8** of the Hula-Hoop's circumference.*

During her act the performer twirls the Hula-Hoop without ceasing for 6 minutes at a rate of 2.5 revolutions per second. If she starts her act with point A of the Hula-Hoop touching her arm, how many times does point A again touch her arm during her 6-minute performance?

*Point A touches the performer's arm every 8 revolutions of the Hula-Hoop around her arm. Six minutes equals 6(60) = 360 seconds. So, in 6 minutes, twirling at a rate of 2.5 revolutions per second, the Hula-Hoop revolves around the performer's arm 360 × 2.5 = 900 times. We can see that the Hula-Hoop completes a series of 8 revolutions a total of 900/8 = 112.5 times. And 0.5 is equivalent to 4 revolutions, after which point A of the Hula-Hoop will not have made its way back around to her arm. This means her arm comes in contact again with point A of the Hula-Hoop **112** times during her act.*

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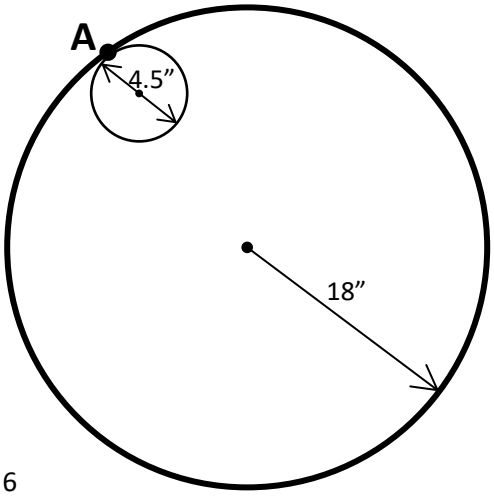

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