

SPAGHETTI SINE CURVES

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After you have finished constructing the spaghetti sine curve, answer the following questions to help clarify the patterns seen and concepts learned during the construction.

1. What is the radius of the circle? 1 spaghetti noodle
2. What is the circumference of the circle?  $C = 2\pi r$   $r = 1$   $C = 6.28$
3. Where would a triangle corresponding to 375 degrees be constructed? A corresponding angle would be made at  $15^\circ$
4. What is the period of the sine curve? That is, what is the wavelength—after how many degrees does the graph start to repeat?  
The period is  $2\pi$  and it repeats at  $360^\circ$
5. Compared with the radius, what is the height of the triangle at 30 degrees? This number is the sine of 30 degrees.  
At  $30^\circ$  the height of the triangle is almost exactly half;  $\sin 30 = .5$
6. Compared with the radius, what is the height of the triangle at 150 degrees, 330 degrees, and 570 degrees?  
The height of the triangles are almost half.
7. Compared with the radius, what is the height of the triangle at 45 degrees, 135 degrees, and 225 degrees?  
They are all the same height; about  $\frac{3}{4}$  or 0.707
8. If you build triangles only at the 15-degree, 30-degree, 45-degree, and so forth, marks, what is the smallest number of *different* triangles that you need to form to obtain the lengths needed to construct the graph of one period of the sine curve?  
You only need 5 triangles
9. Write a one-paragraph explanation to a classmate about why  $\sin 30$  equals  $\sin 150$ .  
In the unit circle the four quadrants mirror each other and  $30^\circ$  reflects over the y-axis. Also,  $150^\circ$  has a reference angle of  $30^\circ$ .

