

Additional Practice

The temperature in Swainsboro over several weeks in the summer is given by the equation

$$y = 17 \cos\left(\frac{\pi}{12}t - \frac{13\pi}{12}\right) + 85$$

notice $T = \text{period}$
 $= 24 \text{ hrs}$

this is planet earth's

note the change in the problem

Where t is hours past midnight and y is the temperature.

answer
peak 102°
at $t=13$, 1 PM
coldest, $t=25$
or $t=1$, 68°

At what time is the temperature the hottest? Coolest? What are these temperatures?

There are two ways to work this problem

① Knowing about periods of sines and cosines plus phase shift or graphing it.

The peak of cosine occurs at angle of $0, 2\pi, 4\pi$, etc see unit circle so $\frac{\pi}{12}t - \frac{13\pi}{12} = 0$, $t=13$ so peak occurs at 13 hrs past midnight 1 PM

The minimum occurs at angle of $-\pi$ or $+\pi$ (see unit circle)

$\frac{\pi}{12}t - \frac{13\pi}{12} = \pi$, $\frac{\pi}{12}t = \frac{25\pi}{12}$, $t=25$, it also occurs at $t=1$

which is 24 hrs before $t=25$ [so 1 hr past midnight or 25 hrs past midnight]

The max temp is $17 + 85 = 102^\circ$

The minimum temp is $-17 + 85 = 68^\circ$

② If you graph it. Graph from 0 to 48 [2 periods]

Put y_{\max} at about 102 plus a little say 110. y_{\min} at 50

Graph

