$max = 13.75$

$min = 10.53$

$Per. = 12$

$Ampl = \dfrac{13.75 - 10.53}{2} = 1.61$

$V.S = \dfrac{13.75 + 10.53}{2} = 12.14$

$Per = 12 = \dfrac{2\pi}{k}$

$k = \dfrac{2\pi}{12} = \dfrac{\pi}{6}$

$y = A\cos(kt - c) + h$

$y = -1.61\cos\left(\dfrac{\pi}{6}t - c\right) + 12.14$

$13.75 = -1.61\cos\left(\dfrac{\pi}{6}(6) - c\right) + 12.14$
$-12.14 \qquad\qquad\qquad\qquad\qquad -12.14$

$\dfrac{1.61}{-1.61} = \dfrac{-1.61\cos(\pi - c)}{-1.61}$

$-1 = \cos(\pi - c)$

$\cos^{-1}(-1) = \pi - c$

$\pi = \pi - c$
$-\pi \qquad -\pi$

$0 = -c$
$0 = c$

$\boxed{y = -1.61\cos\left(\dfrac{\pi}{6}t\right) + 12.14}$

$y = 1.61\sin\left(\dfrac{\pi}{6}t - 1.66\right) + 12.14 \longrightarrow t = 9.5$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad y = 11.86\ hrs$

b. Sept. 30 $\Rightarrow t = 9.5$

$y = -1.61\cos\left(\dfrac{\pi}{6}(9.5)\right) + 12.14$

$y = 11.72\ hrs$

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