

## Pre-Calculus

### Formative Ticket #10

October 6, 2020

#### Sinusoidal Models Word Problems

1.

$D(t)$  models the distance (in thousands of km) from the earth to the Moon  $t$  days after the moon's perigee (when it's closest to the earth). Here,  $t$  is entered in radians.

$$D(t) = -21 \cos\left(\frac{2\pi}{29.5}t\right) + 384$$

How many days after its perigee does the moon first reach 380 thousands of km from the Earth?  
Round your final answer to the nearest whole day.

2.

$E(t)$  models the daily amount of energy (in kilojoules, kJ) that a solar panel in Pago Pago generates,  $t$  days after the autumn equinox. Here,  $t$  is entered in radians.

$$E(t) = 624 \sin\left(\frac{2\pi}{365}t\right) + 8736$$

What is the first day after the autumn equinox that the solar panel generates 8400 kJ?  
Round your final answer to the nearest whole day.

3.

Antonio's toy boat is bobbing in the water under a dock. The vertical distance  $H$  (in cm) between the dock and the top of the boat's mast  $t$  seconds after its first peak is modeled by the following function. Here,  $t$  is entered in radians.

$$H(t) = 5 \cos\left(\frac{2\pi}{3}t\right) - 35.5$$

How long does it take the toy boat to bob down from its peak to a height of  $-35$  cm?  
Round your final answer to the nearest tenth of a second.