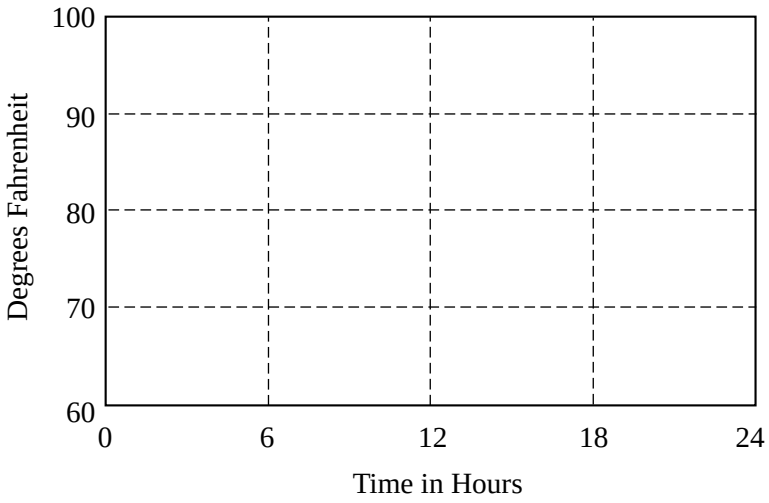
5. The temperature outside a house during a 24-hour period is given by

$$F(t) = 80 - 10\cos\left(\frac{\pi t}{12}\right), \ 0 \le t \le 24,$$

where $F(t)$ is measured in degrees Fahrenheit and t is measured in hours.

(a) Sketch the graph of F on the grid below.



(b) Find the average temperature, to the nearest degree Fahrenheit, between $t = 6$ and $t = 14$.

(c) An air conditioner cooled the house whenever the outside temperature was at or above 78 degrees Fahrenheit. For what values of t was the air conditioner cooling the house?

(d) The cost of cooling the house accumulates at the rate of \$0.05 per hour for each degree the outside temperature exceeds 78 degrees Fahrenheit. What was the total cost, to the nearest cent, to cool the house for this 24–hour period?

GO ON TO THE NEXT PAGE

6. A particle moves along the curve defined by the equation $y = x^3 - 3x$. The x–coordinate of the particle, $x(t)$, satisfies the equation $\dfrac{dx}{dt} = \dfrac{1}{\sqrt{2t+1}}$, for $t \geq 0$ with initial condition $x(0) = -4$.
   (a) Find $x(t)$ in terms of t.
   (b) Find $\dfrac{dy}{dt}$ in terms of t.
   (c) Find the location and speed of the particle at time $t = 4$.

END OF EXAMINATION