

September 4

SWBAT: Write functions for the horizontal and vertical motion of a bug.

- 1) Write an equation of the line with slope = 2 and goes through the point (1, 5).

$$y - y_1 = m(x - x_1)$$

$$y - 5 = 2(x - 1)$$

$$y = 2x + 3$$

$$y = y_1 + m(x - x_1)$$

- 3) Solve:  $x^3 + 2 = 10$

$$\begin{array}{r} x^3 + 2 = 10 \\ -2 \quad -2 \\ \hline x^3 = 8 \\ \sqrt[3]{x^3} = \sqrt[3]{8} \\ x = 2 \end{array}$$

$$(x^3)^{1/3} = 8^{1/3}$$

$$x = 8^{1/3}$$

- 5) Solve:  $\frac{3x-7}{x} = 2$

$$\begin{array}{r} \frac{3x-7}{x} = 2 \\ 3x-7 = 2x \\ -3x \quad -3x \\ -7 = -x \\ 7 = x \end{array}$$

$$\frac{3x-7}{x} = \frac{2}{1}$$

- 2) Solve:  $2x^2 - 18 = 0$

$$\begin{array}{r} 2x^2 - 18 = 0 \\ +18 +18 \\ \hline 2x^2 = 18 \\ \frac{2x^2}{2} = \frac{18}{2} \\ x^2 = 9 \\ \sqrt{x^2} = \sqrt{9} \\ x = 3 \text{ AND } x = -3 \end{array}$$

- 4) Factor:  $2x^2 - 24x$


$$2x^2 - 24x = 2x(x - 12)$$

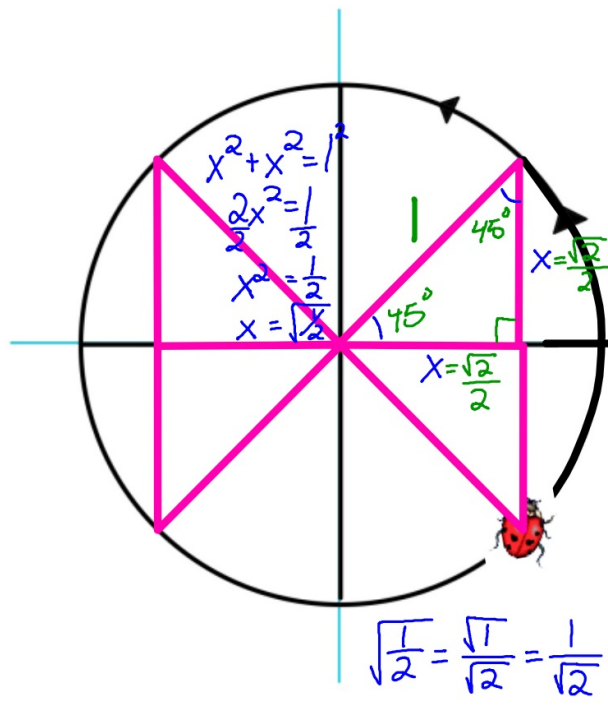
$$2(x^2 - 12x)$$

$$x(2x - 24)$$

$$(2x+0)(x-12)$$

Can you cancel the 3x and x?

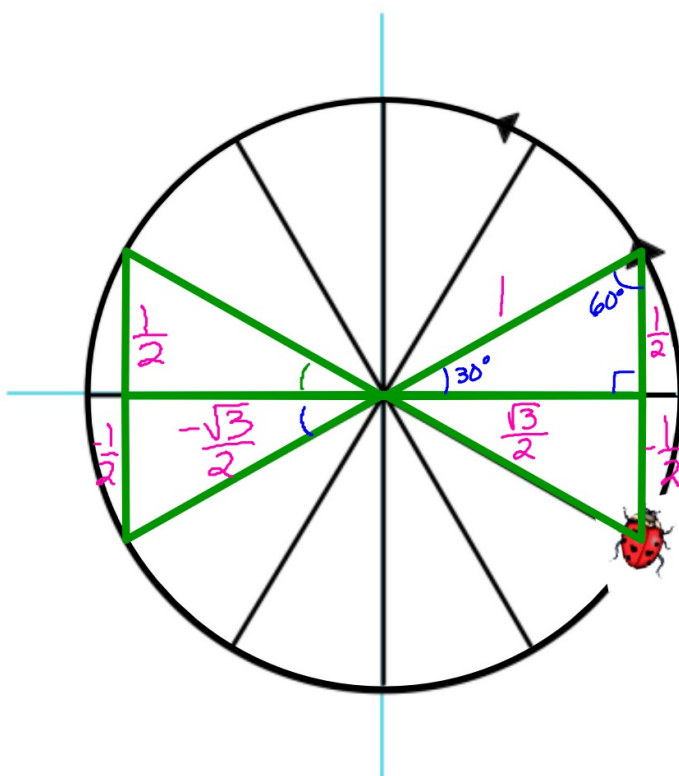
How might our two graphs change if the bug was on a  
CIRCLE TRACK? 



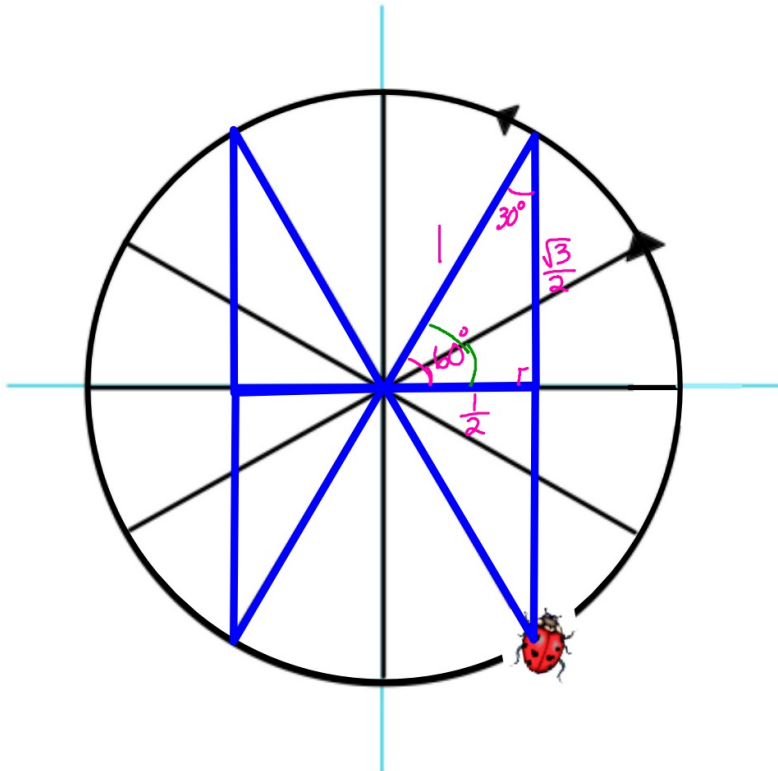
actual

estimated

| $t$ | $P(t)$                                       |  |
|-----|--|--|
| 0   | (1, 0)                                       |  |
| 1   | $(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$   |  |
| 2   | (0, 1)                                       |  |
| 3   | $(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$  |  |
| 4   | (-1, 0)                                      |  |
| 5   | $(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$ |  |
| 6   | (0, -1)                                      |  |
| 7   | $(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$  |  |
| 8   | (1, 0)                                       |  |



| $t$      | $P(t)$                                |  |
|----------|---------------------------------------|--|
| 0        | (1, 0)                                |  |
| $2/3$    | $(\frac{\sqrt{3}}{2}, \frac{1}{2})$   |  |
| $4/3$    | $(\frac{1}{2}, \frac{\sqrt{3}}{2})$   |  |
| $6/3$ 2  | (0, 1)                                |  |
| $8/3$    | $(-\frac{1}{2}, \frac{\sqrt{3}}{2})$  |  |
| $10/3$   | $(-\frac{\sqrt{3}}{2}, \frac{1}{2})$  |  |
| $12/3$ 4 | (-1, 0)                               |  |
| $14/3$   | $(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$ |  |
| $16/3$   | $(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$ |  |
| $18/3$ 6 | (0, -1)                               |  |
| $20/3$   | $(\frac{1}{2}, -\frac{\sqrt{3}}{2})$  |  |
| $22/3$   | $(\frac{\sqrt{3}}{2}, -\frac{1}{2})$  |  |
| $24/3$ 8 | (1, 0)                                |  |



| $t$            | $P(t)$                                |  |
|----------------|---------------------------------------|--|
| 0              | $(1, 0)$                              |  |
|                |                                       |  |
| $\frac{4}{3}$  | $(\frac{1}{2}, \frac{\sqrt{3}}{2})$   |  |
| 2              | $(0, 1)$                              |  |
| $\frac{8}{3}$  | $(-\frac{1}{2}, \frac{\sqrt{3}}{2})$  |  |
|                |                                       |  |
| 4              |                                       |  |
|                |                                       |  |
| $\frac{16}{3}$ | $(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$ |  |
| 6              |                                       |  |
| $\frac{20}{3}$ | $(\frac{1}{2}, -\frac{\sqrt{3}}{2})$  |  |
|                |                                       |  |
| 8              |                                       |  |

|  |                | X    | Y    |
|--|----------------|------|------|
|  | Time           | C(t) | S(t) |
|  | 0              | 1    | 0    |
|  | $\frac{2}{3}$  | .866 | .5   |
|  | 1              | .707 | .707 |
|  | $\frac{4}{3}$  | .5   | .866 |
|  | 2              | 0    | 1    |
|  | $\frac{8}{3}$  |      |      |
|  | 3              |      |      |
|  | $\frac{10}{3}$ |      |      |
|  | 4              |      |      |
|  | $\frac{14}{3}$ |      |      |
|  | 5              |      |      |
|  | $\frac{16}{3}$ |      |      |
|  | 6              |      |      |
|  | $\frac{20}{3}$ |      |      |
|  | 7              |      |      |
|  | $\frac{22}{3}$ |      |      |
|  | 8              |      |      |

$C(t)$

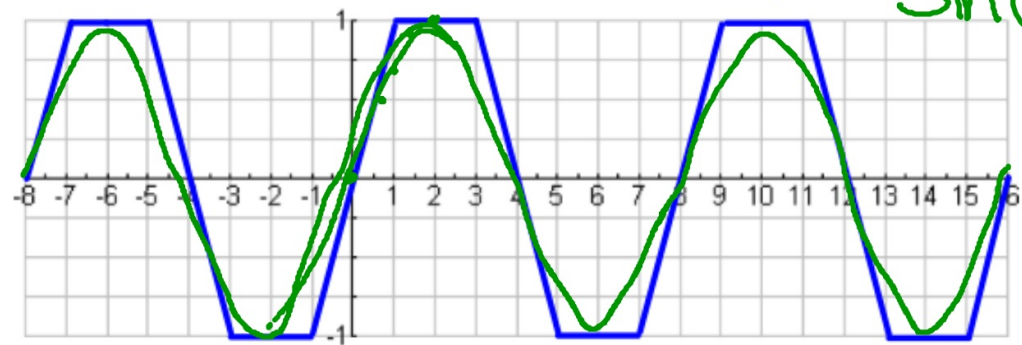
| $C(t)$ | $S(t)$ |
|--------|--------|
| 1      | 0      |
| .866   | .5     |
| .707   | .707   |
| .5     | .866   |
| 0      | 1      |

$S(t)$



$\cos(\theta)$

$\sin(\theta)$



| Time           | $C(t)$ | $S(t)$ | degrees | $\cos(\theta)$       | $\sin(\theta)$       |
|----------------|--------|--------|---------|----------------------|----------------------|
| 0              |        |        | 0       | 1                    | 0                    |
| $\frac{2}{3}$  |        |        | 30      | $\frac{\sqrt{3}}{2}$ | $\frac{1}{2}$        |
| 1              |        |        | 45      | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{2}}{2}$ |
| $\frac{4}{3}$  |        |        | 60      | $\frac{1}{2}$        | $\frac{\sqrt{3}}{2}$ |
| 2              |        |        | 90      | 0                    | 1                    |
| $\frac{8}{3}$  |        |        | 120     |                      |                      |
| 3              |        |        | 135     |                      |                      |
| $\frac{10}{3}$ |        |        | 150     |                      |                      |
| 4              |        |        | 180     |                      |                      |
| $\frac{14}{3}$ |        |        | 210     |                      |                      |
|                |        |        | 225     |                      |                      |
|                |        |        | 240     |                      |                      |
|                |        |        | 270     |                      |                      |
|                |        |        | 300     |                      |                      |
|                |        |        | 315     |                      |                      |
|                |        |        | 330     |                      |                      |
| 8              |        |        | 360     |                      |                      |

