Name: $\qquad$ Date: $\qquad$

## Comparing Properties of Functions Given in Different Forms

Two robots are programmed to go through an obstacle course. They proceed using different methods, so they move through at different speeds. Which robot will make it farther into the obstacle course? How do you know?

1. $\left\{\begin{array}{l}\text { Robot One: } f(x)=-3(x-2)^{2}+12 \\ \text { Robot Two: } g(x)=2^{x+3}-8\end{array}\right.$
2. Three turtles are running a race. They are free to roam in any direction. The following are their information from the starting line in $\boldsymbol{t}$ number of seconds.
Elmer: $E(t)=4 t \quad$ Fred: $F(t)=2(t-3)^{2}-12 \quad$ George: $G(t)=\frac{1}{2} \bullet 3^{x-2}-1$

- Which turtle is winning the race at $t=2$ ?
- Which turtle is winning the race at $t=6$ ?


## Comparing Quadratic Functions to Other Functions

Exponential functions have a fixed number as the base and a variable number as the exponent.

Let's fill out the table to compare linear, quadratic and exponential functions over time.

| $x$ | Linear <br> $y=2 x+2$ | Quadratic <br> $y=x^{2}+2$ | Exponential <br> $y=2^{x}$ |
| :---: | :---: | :---: | :---: |
| 0 |  |  |  |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |

3. Calculate and compare the slopes for each function from $x_{1}=0$ to $x_{2}=1$. Do the same for $\mathrm{x}_{1}=5$ to $\mathrm{x}_{2}=8$.

| Linear's R.O.C | Quadratic's R.O.C. | Exponential's R.O.C. |
| :--- | :--- | :--- |
| Whose R.O.C. is the steepest? |  |  |

*VERY IMPORATANT TO KNOW!
Conclusion over a LONG period of time the $\qquad$
function will exceed the value of the other functions.

