

HW 3.4.1: Applications of Function Patterns

Use your knowledge of function patterns to answer the questions below. Calculators should be used to help with the calculations but not for regression.

Linear: $y = ax + b$

Quadratic: $y = ax^2 + bx + c$

Power: $y = a \cdot x^b$

Exponential: $y = a \cdot b^x$

Logarithm: $y = a + b \ln x$

- 1.) A house is bought in an up and coming Texas neighborhood. The table below shows the value of the house, $V(t)$, after owning the house for t years.

t in years	$V(t)$ value of house
2	\$150,000
4	\$225,000
6	\$337,500
8	\$506,250

- Determine the price of the home after 12 years.
- Use the function properties that you learned previously to make a conjecture as to the type of function that models the given data. What type of function models this pattern?
- Why can't you use the pattern to find $V(15)$?
- Find a particular equation for $V(t)$ and verify that all of the $V(t)$ values in the given table satisfy the equation. (leave your equation exact, avoid decimals in your equation)
- Use your equation to calculate $V(15)$.
- In what year (round to the nearest hundredth) will the house be worth 5 million dollars?

- 2.) A Cessna airplane is taking off on a runway. You start recording the velocity as a function of time slightly after it has started. Below is a table of your results.

t , observing in seconds	$V(t)$ in miles per hour
3	80
6	160
9	206.8
12	240

- Determine the velocity of the plane after 48 seconds.
- Use the function properties that you learned previously to make a conjecture as to the type of function that models the given data. What type of function models this pattern?
- Why can't you use the pattern to find $V(18)$?
- Find a particular equation for $V(t)$ and verify that all of the $V(t)$ values in the given table satisfy the equation.
- Use your equation to calculate $V(18)$.
- How long will it take the plane to reach 700 mph?

- 3.) Below is a table relating altitude, h , and atmospheric pressure $P(h)$.

Altitude above sea level (km)	Atmospheric Pressure (kPa)
2	80
4	64
6	51.2
8	40.96

- Determine the atmospheric pressure at 10 km above sea level.
- Use the function properties that you learned previously to make a conjecture as to the type of function that models the given data. What type of function models this pattern?

- c. Why can't you use the pattern to find $P(5)$?
- d. Find a particular equation for $P(h)$ and verify that all of the $P(h)$ values in the given table satisfy the equation. (leave your equation exact, avoid decimals in your equation)
- e. Use your equation to calculate $P(5)$.
- f. At what altitude will the atmospheric pressure reach 25 kPa?

4.) Below is a table relating speeds, s , of a vehicle and its stopping distance, $d(s)$.

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Speed (mph)	Stopping Distance (ft)
10	14.6
20	39.9
30	75.2
40	120.5
50	175.8

- a. Determine the stopping distance at 70 mph.
- b. Use the function properties that you learned previously to make a conjecture as to the type of function that models the given data. What type of function models this pattern?
- c. Why can't you use the pattern to find $d(25)$?
- d. Find a particular equation for $d(s)$ and verify that all of the $d(s)$ values in the given table satisfy the equation.
- e. Use your equation to calculate $d(25)$.
- f. At what speed will the stopping distance be 100ft?