

1. Allen is on the football team this year but he has poor time management skills. His mother told him that he is off the team if he fails anything in school. On his first math quiz he earned a 90, then he earned an 86 and an 82 on his next quiz.

- a. Is this discrete or continuous? discrete (can't have partial quizzes)
- b. Is this arithmetic, geometric, or neither? arithmetic
- c. Write an equation for the function.  $a_n = 90 - 4(n-1)$   $a_1 = 94 - 4n$   $a_0 = 94$   
 $90, 86, 82$   $(a_0 = 94)$   
 $a_1$
- d. Find  $f(7)$ .  $f(7) = 94 - 4(7)$   $f(x) = 94 - 4x$   
 $f(7) = 66$
- e. Explain the meaning of your answer.

on the 7<sup>th</sup> test, Allen received a score of 66

- f. Find  $x$  if  $f(x) = 58$   $x = 9$   
 $58 = 94 - 4x$

- g. Explain the meaning of your answer. on the 9<sup>th</sup> test Allen will get a score of 58%. Means Allen is off the team.  
 What impact?

2. A recovering heart attack patient is told to get on a regular walking program. The patient is told to walk a distance of 5 km the first week, 8 km the second week, 11 km the third week and so on for a period of 10 weeks. The equation for this scenario is given below.

$$d(w) = 2 + 3w$$

- a. Find  $d(7)$ .  $2 + 3(7) =$   
 $23$

- b. What does this value mean in the context of the problem?

the patient walks 23 km the 7<sup>th</sup> week

- c. If  $d(w) = 29$ , what is  $w$ ?  $29 = 2 + 3w$   
 $w = 9$

- d. What does this value mean in the context of the problem?

the 9<sup>th</sup> week, the patient walks 29 km

3. If groceries now cost Mr. Belby \$275 per week, he predicts that the cost will increase 10% per year due to inflation **AND** his 3 growing boys eating more and more each year.

a. Is this discrete or continuous? discrete (won't use partial weeks)

b. Is this arithmetic (geometric) or neither? \_\_\_\_\_

c. Write an equation for the function.  $f(x) = 275 * (1.1)^x$

d. Find  $f(10)$ . \$713.28  $275 * (1.1)^{10}$

e. Explain the meaning of your answer.

in year 10, groceries will cost \$713.28 per week

f. Find  $x$  if  $f(x) = \$535.90$ .  $\approx 7$   $535.90 = 275 * 1.1^x$   
 $1.9487 = 1.1^x$

(guess & check)

g. Explain the meaning of your answer.

groceries will cost \$535.90 per week around year 7

4. The first year a toy manufacturer introduces a new toy; its sales total \$495,000. The company expects its sales to drop 10% each succeeding year. The equation for this scenario is given below.

$$d(y) = 550,000(0.9)^y$$

a. Find  $d(3)$ .  $550,000 * 0.9^3$  \$400,950

b. What does this value mean in the context of the problem?

the 3<sup>rd</sup> year, the total sales will be \$400,950

c. If  $d(y) = \$292,293$  what is  $y$ ?  $292,293 = 550,000 (.9)^y$

$$0.53144 = .9^y \approx 6$$

d. What does this value mean in the context of the problem?

the total sales are \$292,293 in the 6<sup>th</sup> year

5. Mr. Belby buys a new BMW for \$51,000 dollars. The car loses 22% of its value each year.

a. Is this discrete or continuous? no partial years

b. Is this arithmetic, geometric, or neither? mult (%)

c. Write an equation for the function.  $f(x) = 51,000 * (.78)^x$   $100 - 22 = 78$

d. Find  $f(18)$ .  $51,000 * (.78)^{18}$  \$582.47

e. Explain the meaning of your answer.

@ year 18, the car is only worth \$582.47

f. Find  $x$  if  $f(x) = \$3316$ .  $\approx 11$   $3316 = 51,000 * .78^x$   
 $.0650 = .78^x$

g. Explain the meaning of your answer.

the car is worth \$3316 around year 11.

6. Mrs. Pischke loads \$150 on a coffee hound gift card. She spends \$8.50 at coffee hound each week. The equation for this scenario is given below.

$$d(w) = 150 - 8.50w$$

a. Find  $d(3)$ . Find  $d(20)$ .  $150 - 8.5(3)$   $150 - 8.5(20)$   
 $d(3) = 124.5$   $d(20) = -20$

b. What do these values mean in the context of the problem?

week 3 she has \$124.50 left on the card

week 20 she has -\$20 left -- this makes no sense. The card ran out of cash a while ago.

c. If  $d(w) = \$0$ , what is  $w$ ?

$$0 = 150 - 8.5w \quad w = 17.64$$

$$-150 = -8.5w$$

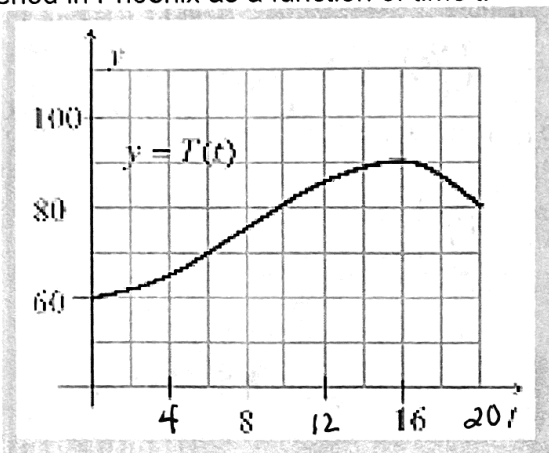
d. What does this value mean in the context of the problem?

Can't have partial weeks, so Mrs. Pischke can get through 17 weeks, but won't have enough on the card for the 18<sup>th</sup> week.

\* some tricky parts.

**APPLICATION**

7. The figure shows the graph of  $T$ , the temperature (in degrees Fahrenheit) over one particular 20-hour period in Phoenix as a function of time  $t$ .



Define the variables:

$T =$  temp.

$t =$  time

- Is the graph a function? Explain why or why not. *yes; no x has multiple y's*
- $t = 0$  corresponds to midnight. Estimate  $T(20)$  and what would we mean by  $T(20)$  in context?  *$\approx 80^\circ$  hour 20, so 8pm*
- What is the y-intercept? What does it represent in context?  *$60^\circ$*
- What is the highest temperature and at what time did it occur?  *$90^\circ$  @ time 0, midnight, it's  $60^\circ$*
- When was the temperature decreasing? Why?  *$90^\circ$  @ hr. 16, which is 4pm*
- If Anna wants to go for a two-hour hike and return before the temperature gets over 80 degrees, when should she leave? *from hr 16-20, from 4pm to 8pm  $\rightarrow$  nighttime cools down as sun goes down  
needs to be back by hour 10, so leave by hour 8 or 8am*
- Find  $t$  if  $T(t)=70$ . *6*

8. Swine flu is attacking Porkopolis. The function below determines how many people have swine where  $t =$  time in days and  $S =$  the number of people in thousands.

$$S(t) = 9t - 4$$

- Find  $S(4) = 9(4) - 4 = 32$
- What does  $S(4)$  represent in the context of the problem?  
 *$S(4) = 32$ , so 32 people infected in 4 days*
- Find  $t$  when  $S(t) = 23$   
 *$23 = 9t - 4$   
 $t = 3$*
- What does  $S(t) = 23$  represent?  
*23 people infected on day 3*
- Graph the function.

