## SM2 HANDOUT 3-4 (Applications of Linear Equations)



Time (min.)



1) Describe in words what the graph is telling you.
2) $\qquad$ $=f($ _)
3) Independent variable: $\qquad$
4) Dependent variable: $\qquad$

You leave home on Friday afternoon for your weekend getaway. Heavy traffic slows you down for the first half of your trip but you make good time for the last half.
Graphically express your distance from home as a function of time.


It took you $\qquad$ min. to walk to the library on your $2^{\text {nd }}$ attempt.

Your new job pays $\$ 10$ per hour. After 6 months, you receive a promotion that gives you a wage increase of $\$ 5$ per hour.

1) Sketch a graph of your wage over your first year.


| Time <br> $(\mathrm{min})$ | $8: 03 \mathrm{AM}$ | $8: 04 \mathrm{AM}$ | $8: 05 \mathrm{AM}$ | $8: 06 \mathrm{AM}$ | $8: 07 \mathrm{AM}$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Height <br> $(\mathrm{ft})$ | 36,000 | 32,800 | 29,600 | 26,400 | 23,200 |

Notice how this date doesn't start at zero.
To write an equation, you need a y-intercept.
It is often easier to change the time to read "time since" some reference point.

| Time (min) <br> (since 8:03 AM) | 0 | 1 | 2 | 3 | 4 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Height (ft) | 36,000 | 32,800 | 29,600 | 26,400 | 23,200 |


(The table shows the altitude of an airplane.)
write equation: $y=m x+b$
$\rightarrow$ what is the slope?

$$
m=\frac{\text { rise }}{r u n}=\frac{-4000 f t}{\min }
$$

What is the y-intercept ?
$(0, b)$
$(0,36000)$
$y=-4000 x+36000$
TEST your equation. $\quad 32,000=-4,000(1)+36,000$
Equation is "true"

| Year 1990 1992 <br> Imports <br> (Billions \$) 52 55 |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| write equation: $\mathrm{y}=\mathrm{mx}+\mathrm{b}$ | 1996 | 1998 |

What is the equation of the line that can represent this data?

| Time | 11 AM | $11: 30$ <br> AM | 12 PM | $12: 30$ <br> PM | 1 PM |
| :---: | :---: | :---: | :---: | :---: | :---: |
| distance <br> (miles) | 50 | 75 | 100 | 125 | 150 |


| What is the equation of the line that can represent this data? |
| :--- |
| Time (min) 0 1 2 3 4 <br> Height (ft) 500 450 400 350 300 |
| Year 1900 1910 1920 1930 1940 <br> Population <br> (millions) 100 125 150 175 200 |$.$|  |
| :--- |

Find the equation that "models" the data.

| Time (yrs) | 1987 | 1991 | 1995 | 1999 | 2003 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Trade deficit <br> (Billions of \$'s) | 36.0 | 32.8 | 29.6 | 26.4 | 23.2 |



During the first 5 weeks of your exercise program you record your weight.

| End of <br> Week, $w$ | 0 | 1 | 2 | 3 | 4 | 5 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| weight, $y$ <br> (lb.) | 186 | 183 | 180 | 177 | 174 | 171 |

Determine the average rate of change of your weight during the 5 -week period.

Assuming your weight loss will continue at the same rate, write an equation that relates your weight to the number of weeks on the exercise program.

You decide to buy a new Honda Civic, but you are concerned about the value of the car depreciating over time. You search the Internet and obtain the following information.

## Suggested Retail Price: $\$ 20,905$ <br> Depreciation per year: $\$ 1750$ (assume constant)

1) What does this mean?

## 2) Complete the table.

" V " is the value of the car after " n " years of ownership

| n (years) | 0 | 1 | 2 | 3 | 5 | 8 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathrm{~V},(\$)$ |  |  |  |  |  |  |

3) Write the equation that predicts the value of the car based upon its age in the year.

A car rental company charges: $\$ 60$ per day plus $\$ 0.75$ per mile You decide the rent the car for a day. Fill in the remainder of the table.

Write the equation that predicts the cost of renting the car based upon how many miles are driven.

$$
C_{A}(m)=0.75 m+60
$$

| "m" <br> miles | Total <br> Cost |
| :---: | :---: |
| 0 |  |
| 50 |  |
| 100 |  |
| 150 |  |
| 200 |  |
| 250 |  |
| 300 |  |

How much would your bill be if you drove the car 525 miles?

## Hamburgers cost $\$ 5$ and drinks cost $\$ 2$.

If you can spend a total of $\$ 50$, fill in the total number of hamburgers and drinks that you can buy.

| Hamburgers | drinks |
| :---: | :---: |
| 0 |  |
| 2 |  |
| 4 |  |
| 6 |  |
| 8 |  |
| 10 |  |

