6.4 Fit a Line to Data and Predict with Linear Models

NOTES

Scatterplot:

Positive Correlation	Negative Correlation	No Correlation

Best-Fitting Line:

Linear Regression::

x	-2	-1	0	1	2	3
y	4	2	1	-2	-1	-2

STEP 1: Entering in the data into two lists (L_1 and L_2)

- Hit STAT
- Choose **1:Edit** by either hitting 1 or ENTER .
  If necessary, clear out any old data in the lists:
    Use ▲ to get cursor to cover L1 at top of list; press CLEAR ENTER. Repeat process for L2.
- Type the data values for the independent (x) variable in column L1. Hit ENTER after each entry.
- When you finished entering data in L1, hit ▶ and then enter the data values for the dependent (y) variable in column L2.

STEP 2 Getting the regression equation (and storing it into the equation editor)

- Hit STAT then ▶ to CALC
- Choose **4:LinReg(ax+b)** (Either scroll down to 4 and then hit ENTER, or simply hit 4)

- Hit ENTER

The coefficients of your linear regression equation (*a* and *b*) will be displayed on your homescreen. The linear regression equation will be stored in the equation editor in Y1.

x	-1	0	1	2	4
y	3	3	1	0	-3

Find the equation of the best-fitting line.

Approximate the value of y for x = 3 and x = 10.

Approximate the value of x when y = -18

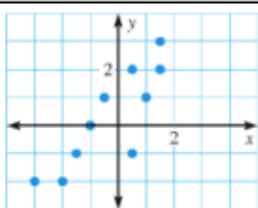Zero of a Function:

Find the zero:

Try This!

SUMMARY:

6.4 Fit a Line to Data and Predict with Linear Models   PRACTICE
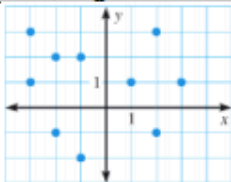
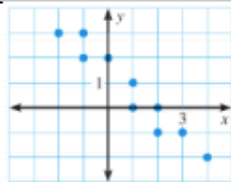Directions: Tell whether x and y show a positive, negative or no correlation.

1)

2)

3)

Directions: Find the equation of the best-fitting line. Approximate the value of y for x = 5.

4)

X	0	2	4	6	7
Y	2	7	14	17	20

Find the equation of the best-fitting line. Approximate the value of y for x = 10.

5)

X	0	1	2	3	4
Y	20	32	39	53	63

Find the zeroes of the function.

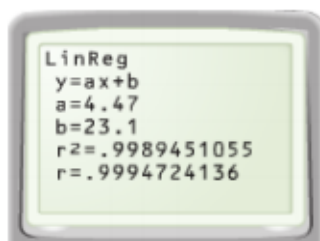| 6) f(x) = 7.5x - 20	7) $f(x) = \frac{1}{8}x + 2$	8) f(x) = -0.5x + .75

Describe and correct the error made in finding the zero of the function y = 2.3x − 2

9) y = 2.3(0) − 2

   y = -2

Describe and correct the error in finding an equation of the best-fitting line using a graphing calculator.
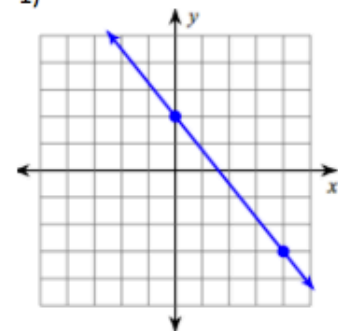
10)

Equation of the best-fitting line is
y = 23.1x + 4.47.

```
LinReg
y=ax+b
a=4.47
b=23.1
r2=.9989451055
r=.9994724136
```

SKILLZ REVIEW

| Find the slope of the line.	Simplify.	Solve.
1)	2) $6 + 2(5 - 3k)$	3) $0 = -3 + \dfrac{m}{3}$
4)	5) $9(3m - 4) - 2m$	6) $6x - 6 = -90$
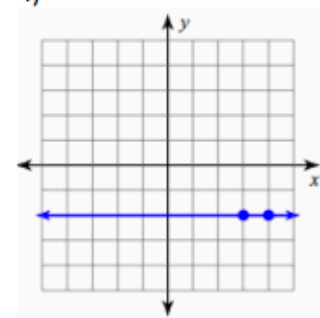
APPLICATION

Writing a linear model given two sets of data and use that model to make predictions.

* ❖ The following data represents Slurpee sales reported by 7-11 during the years 1997-2007.
* ❖ In this table 0 represents 1997 and 10 represents 2007.

Years *since* 1997	Sales (in thousands)
0	21
1	18
2	20
3	17
6	12
8	15
10	10

1) Make a scatter plot of the data. Label your axes.
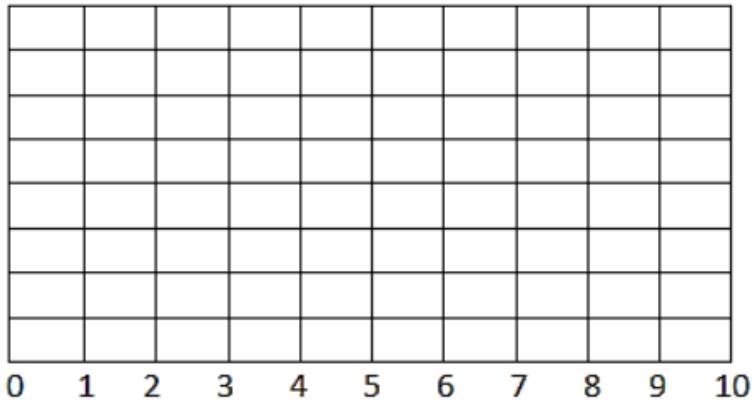
0   1   2   3   4   5   6   7   8   9   10

2) Draw a line of best fit.

3) Determine the equation that represents the line. Show and explain each step.

4) Assuming the data continues to show linear growth, algebraically compute the Slurpee sales for 7-11 in the year 2013.

5) If each Slurpee profits $0.65, how much money will 7-11 make in the year 2013 off of Slurpees alone.

Writing a linear model given two sets of data and use that model to make predictions.

❖ The following data represents the pizza sales reported by Nat's during the years 2000-2009.

❖ In this table 0 represents 2000 and 9 represents 2009.

Years *since* 2000	Sales (in thousands)
0	22
1	27
2	31
4	33
7	34
8	45
9	42

1) Make a scatter plot of the data.
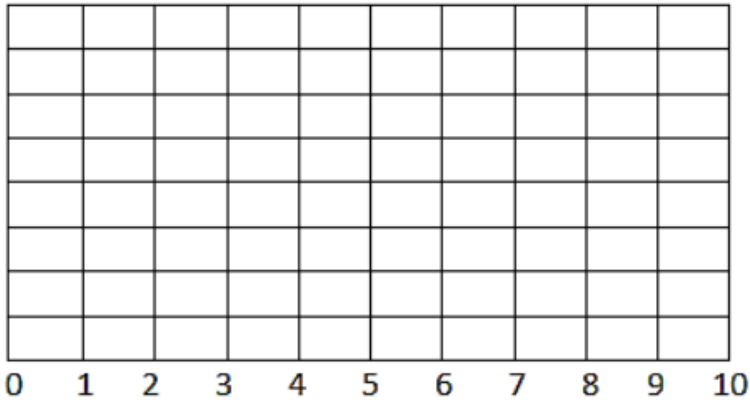
```
0   1   2   3   4   5   6   7   8   9   10
```

2) Draw a line of best fit.

3) Determine the equation that represents the line. Show and explain each step.

4) A)Assuming the data continues to show linear growth, algebraically compute the pizza sales for Nat's in the year 2025.

B) If each pizza profits $3.25, how much money will Nat's make in the year 2025 off of pizza alone?

Candle Burning

REAL WORLD MATH   WWW.TAPINTOTEENMINDS.COM

How long do you think it will take for the candle to burn out?

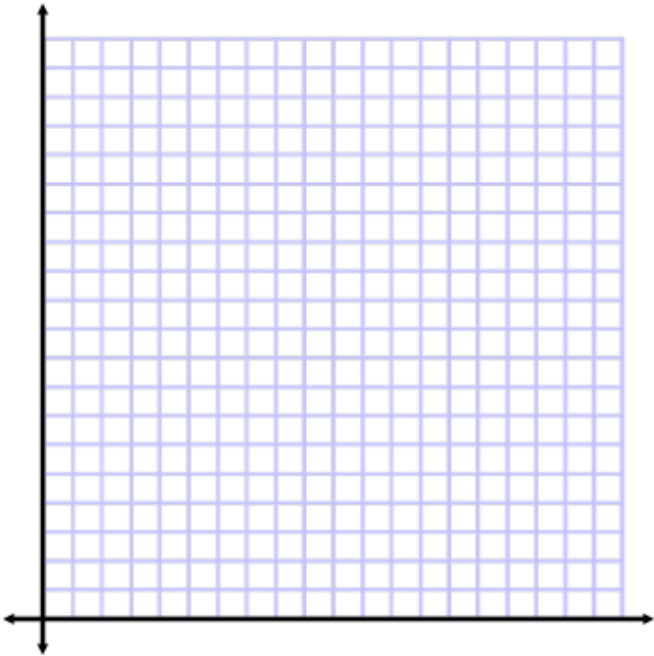Too Big: _____

Too Small: _____

Your Best Guess:

What do you notice?

Draw a sketch of what's happening:

Act 2

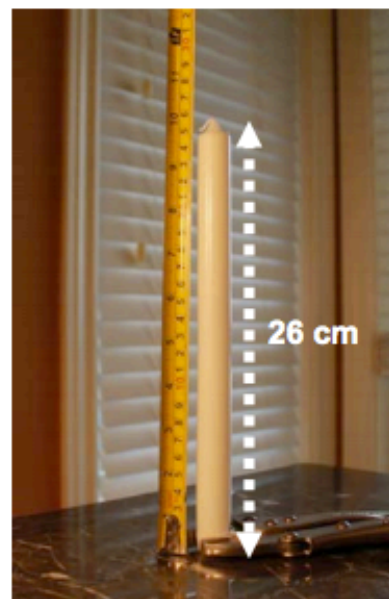What information do you think we need to know?

Given information:

| Describe the trend in the relationship.	Predict when the candle will burn out. Is this an interpolation or extrapolation?

Sequel: What if...

How long would it take for the same width candle with a height of 26 cm to burn out?

26 cm

What *could* the table of values look like if the relationship between *height of the candle* and *time* was perfectly linear? (a perfectly straight line)

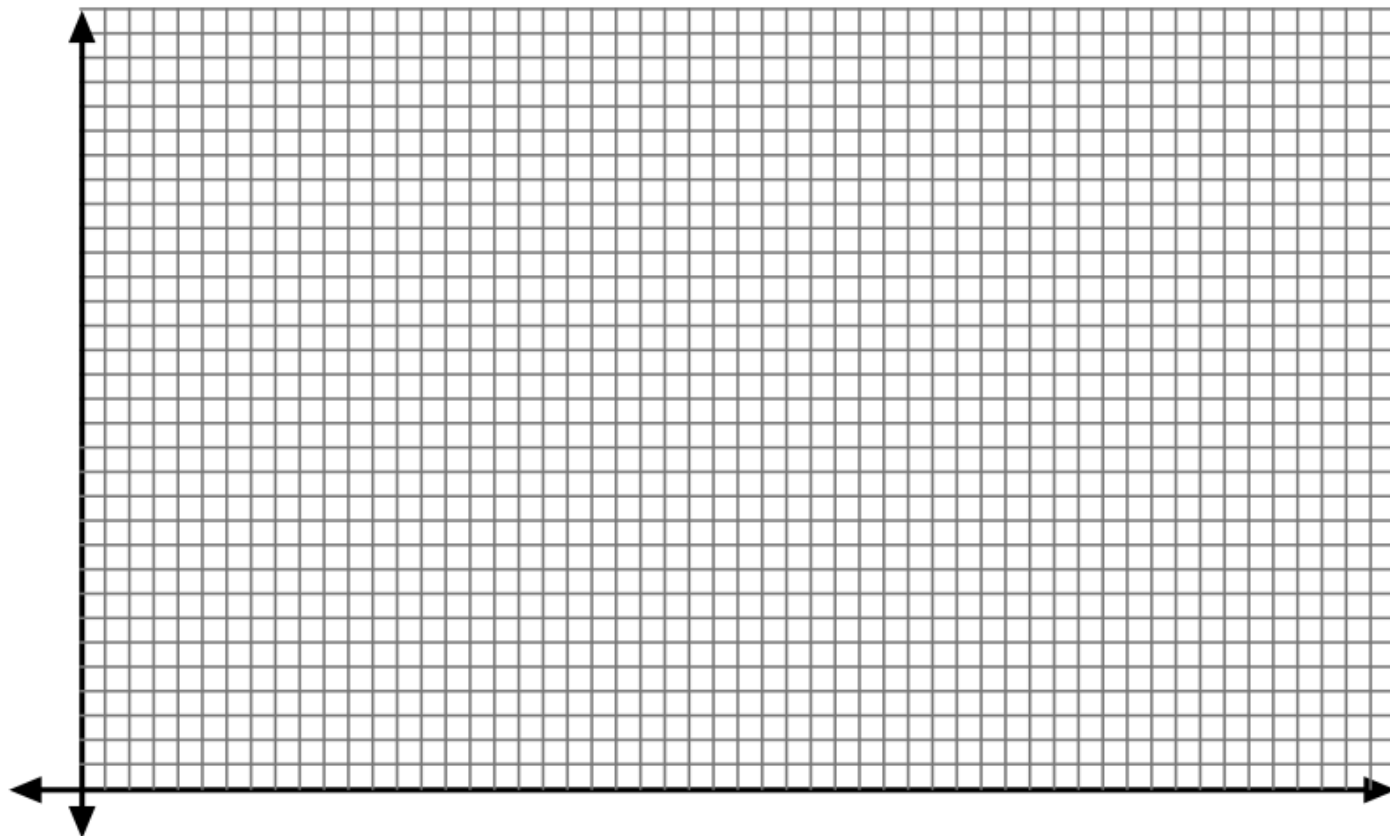|	

intoTeenMinds.com
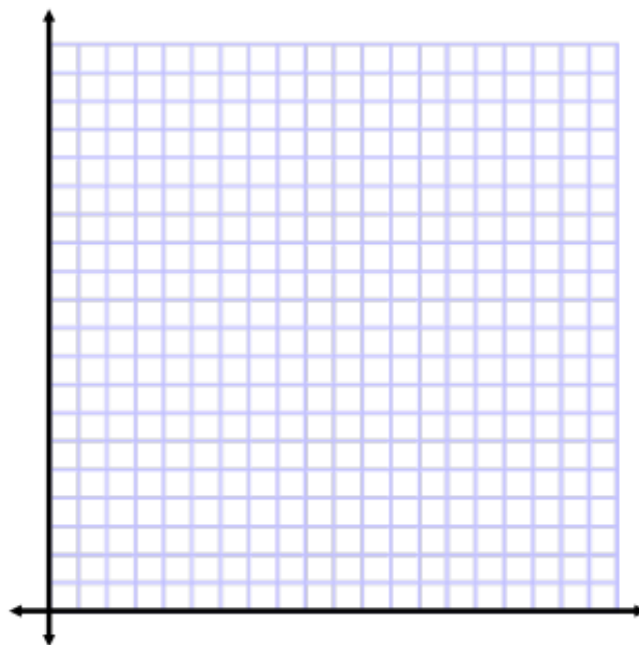
LEAVING ON A JET PLANE

(Activity replaces your Mastery Check)

1. Start at United Airline's San Francisco hub. (http://www.united.com/)
2. Choose six destinations. Use only non-stop flights.
3. Fill in the chart.

FLIGHT LOG

Destination	Airline Code	Depart	Arrive	Travel Time	Time in Minutes	Cost	Airplane	Distance
Los Angeles								
Newark								
Denver								

Time v. Miles

Label axis and include units

Equation: _____

What is your rate? What does it mean?

What is your initial condition? What does it mean?

Cost v. Miles

Label axis and include units

Equation: _____

What is your rate? What does it mean?

What is your initial condition? What does it mean?