Statistics on the 83

FISH IN THE FINGER LAKES
Fishermen in the Finger Lakes Region have been recording the dead fish they encounter while fishing in the region. The DEC monitor the pollution index for the Finger Lakes Region. The data table below show this information for the past ten years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Pollution Index</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>2.5</td>
<td>147</td>
</tr>
<tr>
<td>1991</td>
<td>2.6</td>
<td>130</td>
</tr>
<tr>
<td>1992</td>
<td>8.3</td>
<td>210</td>
</tr>
<tr>
<td>1993</td>
<td>3.4</td>
<td>130</td>
</tr>
<tr>
<td>1994</td>
<td>1.3</td>
<td>114</td>
</tr>
<tr>
<td>1995</td>
<td>3.8</td>
<td>162</td>
</tr>
<tr>
<td>1996</td>
<td>11.6</td>
<td>208</td>
</tr>
<tr>
<td>1997</td>
<td>6.4</td>
<td>178</td>
</tr>
<tr>
<td>1998</td>
<td>7.7</td>
<td>213</td>
</tr>
<tr>
<td>1999</td>
<td>4.6</td>
<td>189</td>
</tr>
</tbody>
</table>

1) a) Enter the data and produce a scatter plot. Use the Index as the x-variable and the deaths as the y-variable.

b) What is the meaning of slope in this model?

c) Determine the equation of the line of best fit.

d) Predict the number of dead fish for a pollution index of 15.

e) What pollution index would result in the death of 150 fish?

* using the STAT, EDIT feature of the TI83+, the Index will be placed in L1 and the Deaths in L2.
* using the window shown STAT PLOT 1 (2nd Y=) is turned on and following the directions in (a) L1 contains the Index (x) and L2 contains the number of deaths (y).
* using the WINDOW, set the xmin/Max and ymin/Max appropriately.
* using the GRAPH, show the scatter plot.

2) Discussing which mathematical model best fits this data can be a very rich classroom conversation. When working with paper and pencil, this can be demonstrated using a piece of "linguine." In this model the slope of the line of best fit is:

\[
\text{deaths per unit of pollution.}
\]

* To determine the line of best fit using the calculator the STAT CALC feature is used and #4 LinReg is selected. By entering the arguments L1, L2, (2nd #1, 2nd #2) we are assured of the correct data sets being used in the calculation. Then we have to tell the calculator where to place the regression line VARS ; Y-VARS 1 (Function), Y 1 ENTER.
* In order to graph the Linear Regression Line just found we select the Y= menu and place our cursor at the function location of our choice.
* using the GRAPH, the scatter plot gives us a mathematical model with which to make predictions. Using this model you can answer parts (d) and (e).
DESCRIBING ONE-VARIABLE DATA

*Topic 1  Histograms and Frequency Tables from Raw Data
(Explorations: pgs. 11 - 13)
  a) set up the plot
  b) set up the window

c) Why does City Hall appear to be taller after you change the Xscl = 20 ?

*Topic 3  Stem-and-Leaf Plots and Dot Plots
(Explorations: pgs. 14 - 16)
  a) Show the stem-and-leaf plot from the data given:

3
4
5
6
7
8
9

*Topic 6  Box Plots and Five-Number Summary
(Explorations: pg. 21)
  a) What is the Five-Number Summary ?

minX_______ Q1_______ med_______ Q3_______ maxX_______

FISH IN THE FINGER LAKES
(scatter plot)
1) ENTER DATA  2) STAT PLOT  3) ZOOM STAT  4) GRAPH
5) GUESS       6) SPAGHETTI  7) TI83+ LINE  8) ax + b
9) VARS  10) Line placement  11) Y2 placed  12) Y2 ENTER
13) Regression line  14) Y1 & Y2 ON  15) GRAPHEd  16) Y2 ONLY
17) ANSWER d  18) 2nd CALC- 1  19) X=15  20) Delete outlier
21) GUESS 22) SPAGHETTI 23) 2nd 0 24) DOWN TO D

25) Diagn. on 26) TI83+ LINE 27) ax + b 28) Line placement

Outliers: Outliers are anomalous values in the data. In statistics, an outlier is a data point that deviates so widely from the mass of your data that it can safely be ignored. One of the values in the list you enter is a significant outlier from the rest.

29) Y4 placed 30) Correlation 31) Y3 & Y4 only 32) GRAPHED

33) Y4 ONLY 34) Answer d 35) 2nd CALC- 1 36) X = 15

HEIGHTS OF TALL BUILDINGS IN PHILADELPHIA
(Histogram & Box Plots)
1) Send & Receive 2) PHILY 3) TRANSMIT 4) RECEIVE

5) STAT EDIT 6) STAT PLOT 7) ZOOM 9 8) TRACE

9) WINDOW 10) Nice Limits 11) X-scl = 20 12) X-scl = 150

13) Class Limits 14) (L1+L2)/2 15) Frequency 16) Relative Freq.

17) Mod. Box Plot 18) Outliers 19) Mod. vs. Whisker 20) Side by Side

YOU DID IT!
GOOD LUCK WITH YOUR STUDENTS!
Grades

* we want to try and make a best fit line for the data.
a) First use your spaghetti to "best fit" the data, then sketch
   a line that closely fits the data.
b) Second, locate two points on the line.
c) Then solve for \( m \) and then \( b \).
The data represents hours slept (x) vs. grades (y) :
(4, 60); (5, 64); (6, 76); (7, 74); (7, 81); (7, 85); (7, 90); (8, 83); (8, 88); (9, 89)
y = mx + b

\[
60 = (7)4 + b
\]
\[
60 - 28 = b \quad \text{thus} \quad y = 7x + 32
\]
PROGRAMMING

1) BEETLE

Dot
ClrDraw
"20(X>22)(X<74)" Y/
1 Xmin
97 Xmax
100 Xscl
1 Ymin
65 Ymax
100 Yscl
Shade(Y/,(400-(X-43)-)+20)
Shade(-"(36-(X-31)-)+20,Y/)
Shade(-"(36-(X-61)-)+20,Y/)
Shade(Y/,(150-(X-61)-)+20)

2) LOAN

Disp "AMOUNT"
Input L
Disp "YEARS"
Input T
Disp "INTEREST RATE"
Input R
Disp "PMT PER YEAR"
Input N
(R/100)/N I
(L*I)/(1-(1+I)^(-N*T)) P
Disp "PAYMENT IS"
Disp P

3) MICKEY

ClrHome
Func
4 Xmin
36 Xmax
0 Xscl
7 Ymin
33 Ymax
0 Yscl
ClrDraw
Shade(28-"(16-(X-28)-),28+"(16-(X-28)-))
Shade(28-"(16-(X-12)-),28+"(16-(X-12)-))
Shade(14-.5*(4-(X-20)-),14+.5*((4-(X-20)-))
Shade(18-1.5*(1-(X-22)-),18+1.5*(1-(X-22)-))
Shade(18+2/3*(9-(X-13)-),20+(7/8)*(64-(X-20)-))
Shade(18-1.5*(1-(X-22)-),20+(7/8)*(64-(X-20)-))
Shade(20+2*(4-(X-22)-),20+(7/8)*(64-(X-20)-))
Shade(20+2*(4-(X-18)-),20+(7/8)*(64-(X-20)-))
DrawF 18.5+(5/2)*(1-(X-22)-)
DrawF 18.5-(5/2)*(1-(X-22)-)
DrawF 18.5+(5/2)*(1-(X-18)-)
DrawF 18.5-(5/2)*(1-(X-18)-)
DrawF 15+(1/3)*(9-(X-20)-)
DrawF 22+(1-(X-22)-)
DrawF 22+"((1-(X-18)-)
DrawF 14-"(3/5)*(100-(X-20)-)
DrawF 10-.5*(16-(X-20)-)
DrawF 14+.5*(1-(X-27))-  
DrawF 14+(1/2)*(1-(X-13))-  
Shade(12-.75*(16-(X-20))-14.5-(3/7)*(49-(X-20))-)