① EXPLANATORY VARIABLE (OR PREDICTOR VARIABLE)
   HELPS EXPLAIN OR INFLUENCE CHANGE
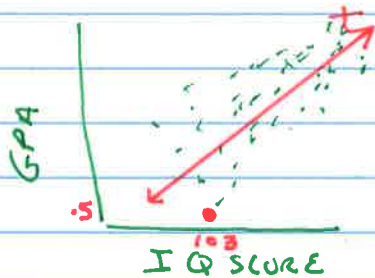   AND PLOTTED ON x-AXIS IS WATER TEMPERATURE

RESPONSE VARIABLE IS PLOTTED ON Y AXIS
   MEASURES THE OUTCOME IS WEIGHT CHANGE
        (GROWTH OF CORAL)

RESPONSE VAR.
WEIGHT CHANGE

water x
temp
EXPLANATORY VAR.

BOTH VARIABLES ARE QUANTITATIVE.

③

GPA

.5

IQ SCORE
103

ⓐ A POSITIVE ASSOCIATION WOULD
   MEAN THAT STUDENTS WITH
   HIGHER IQ'S TEND TO HAVE
   HIGHER GPA'S. THE PLOT
   SHOWS A POSITIVE ASSOCIATION.

ⓑ THE FORM IS ROUGHLY LINEAR BECAUSE A LINE
   THROUGH THE SCATTER PLOT OF POINTS WOULD
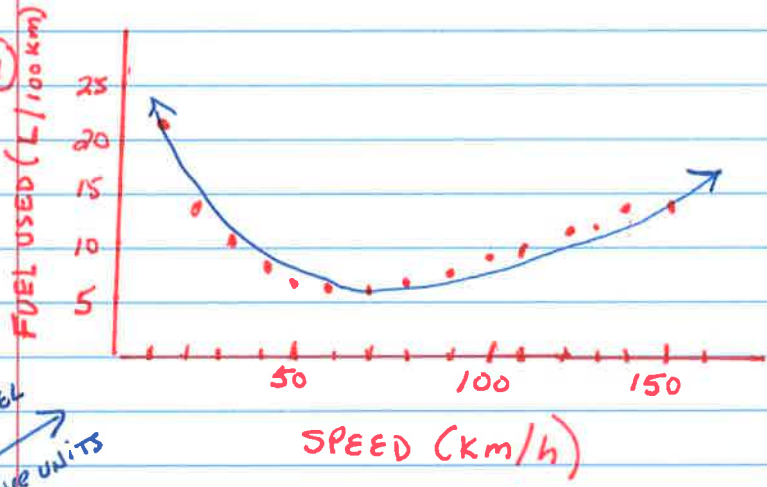   PROVIDE A GOOD SUMMARY.
   THE STRENGTH OF THE ASSOCIATION IS
   MODERATELY STRONG BECAUSE MOST OF THE
   POINTS WOULD BE CLOSE TO THE LINE

ⓒ AN IQ SCORE OF THE OUTLIER IS
   ABOUT 103 WITH A GPA AROUND 0.5.

9

(a)

FUEL USED (L / 100 KM)

25
20
15
10
5

50   100   150

SPEED (km/h)

MUST LABEL
X + Y + GIVE UNITS

CALCULATOR
L1 = SPEED
L2 = FUEL

* SET WINDOW TO
PLOT

XMIN = 0   YMIN = 0
XMAX = 160   YMAX = 25
XSCL = 20   YSCL = 5

(b) THE FORM OF THE PLOT IS CURVED.
HIGH AMOUNTS OF FUEL WERE USED FOR LOW
AND HIGH VALUES OF SPEED, AND LOW AMOUNTS OF
FUEL WERE USED BY DRIVING AT MODERATE
SPEEDS. THIS FORM MAKE SENSE BECAUSE
LOW FUEL EFFICIENCY OCCURS IN CITY
DRIVING (DRIVING AT LOW SPEEDS) AND
SPEEDING ON THE HIGH WAY (DRIVING
AT HIGH SPEEDS); WHILE BEST FUEL EFFICIENCY
OCCURS WHEN DRIVING AT MODERATE SPEEDS.

(c) THE ASSOCIATION BETWEEN SPEED AND
FUEL USED IS VERY STRONG BECAUSE
IF YOU SKETCH A CURVED LINE, THERE WILL
BE VERY LITTLE DEVIATION BETWEEN THE POINTS
AND THE CURVED LINE

(10) (a)

Resting Metabolic Rate (Calories burned) vs Body MASS (KG)
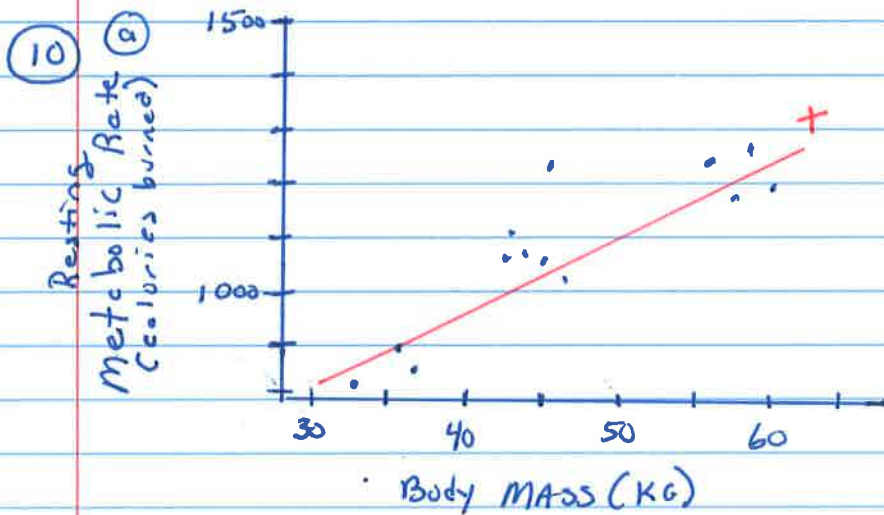
(b) ALWAYS DESCRIBE ASSOCIATION IN CONTEXT
AND INCLUDE ① DIRECTION ② FORM ③ STRENGTH

"There is a positive, linear, and
moderately strong association between
the women's body mass and their
resting metabolic rate."

Complete 3.1B Regression Internet Activity
If you were absent the activity is at the end of this packet

15 a) $r = .9$ d) $r = -.3$
b) $r = 0$ e) $r = -.9$
c) $r = .7$

17 a) Gender is categorical. Correlation applies only to 2 QUANTITATIVE VARIABLE
b) It is impossible to have a correlation of 1.09. Correlation is betwee -1 and 1.
c) A correlation $r = .23$ bushels is WRONG. CORRELATION HAS NO UNITS

21 a) $r = .87$ means there is a strong linear association between Salt content and Calories of hot dogs

b)

Sodium / Calories (axis labels)

POINT is NOT AN OUTLIER
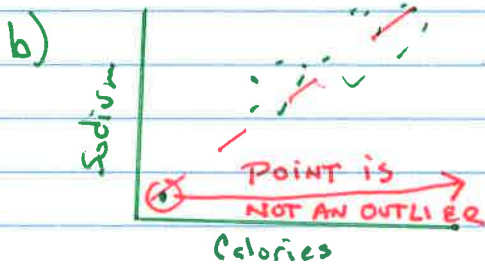
This point is probably close to the line of best fit. Removing a point that is close to the line tends to decrease the strength of the correlation.

**26** Mileage (mpg) vs SPEED (mph)
20 30 40 50 60
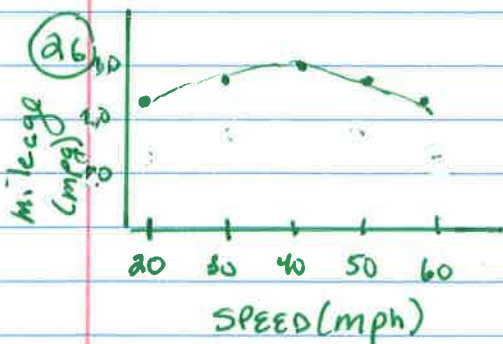
$r = 0$ The Correlation Coefficient r measures the strength of a LINEAR relationship between 2 QUANTITATIVE Variables. The plot shows a strong relationship; however it is a nonlinear relationship between speed and mileage.
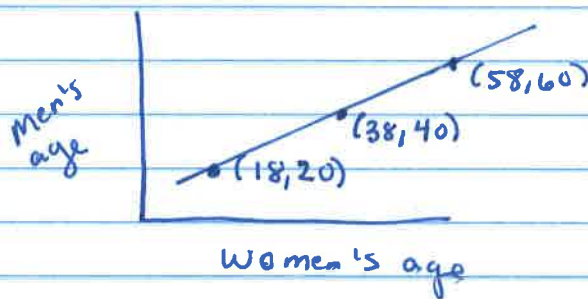
27 a) the price of oil will predict price of gas

↑ EXPLANATORY VAR   RESPONSE VAR

28 e) a strong positive association because we expect when oil increases so does gas; and we believe they are strongly associated

29 d)

mpg / weight — Japanese cars tend to be lighter in weight
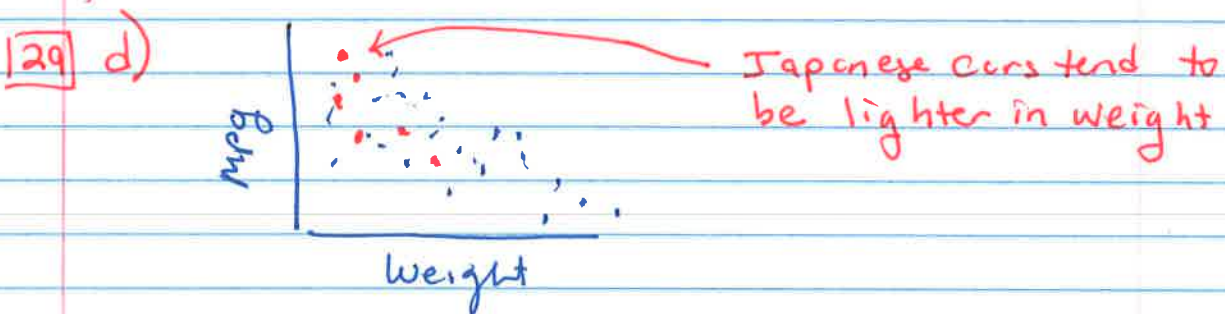
30 b) r=1 this would be a perfect association

Men's age / Women's age — (58,60) (38,40) (18,20)

31 c) IQ = 120-125   READING = 0-10 $c \to IQ = 124 + R = 10$

32 d) r=.5 The association is weak to moderately strong so the best answer is ⓓ

3.1B Regression Internet Activity   Name: _____

I. Guessing correlation   http://istics.net/stat/correlations/

   a) There are 4 graphs, guess the value of the correlation coefficient.

   b) For each set, how many did you get correct?

Do 5 data sets:

   Set #1: ____/4   Set #2: ____/4   Set #3: ____/4   Set #4: ____/4   Set #5: ____/4

II. Guessing Regression Line by Eye   http://www.ruf.rice.edu/~lane/stat_sim/reg_by_eye/

   a) Using the mouse, to draw a LSRL. How close you are? The MSE which is the average squared deviation of points from the line) is displayed. Write down the MSE. You can draw another line and see if you can lower the MSE and get a better fit line. Circle the lowest MSE.

   b) Now click the box that draws the line of best fit. Note any surprises you notice?

   c) Now guess the correlation coefficient and click the box on the right hand side with your guess.

   d) Finally click the "show r" to get the correct value and write down below

Do 3 sets:

Set #1: List the MSE for the lines you drew: _____
         For the LSRL, notice any surprises? _____
         Correlation Coefficient: your guess r= _____   the correct r= _____

Set #2: List the MSE for the lines you drew: _____
         For the LSRL, notice any surprises? _____
         Correlation Coefficient: your guess r= _____   the correct r= _____

Set #3: List the MSE for the lines you drew: _____
         For the LSRL, notice any surprises? _____
         Correlation Coefficient: your guess r= _____   the correct r= _____

III. Regression Applet- Investigate Influential points   http://www.stat.sc.edu/~west/javahtml/Regression.html

   a) At the bottom of the graph you will find the LSRL and r.

   b) See how adding points impacts your line. Add points by clicking on location of point.

   c) Write the equation (round 2 decimals) and value of r (round 3 decimals).

(Original) $\hat{y}$ = _____   r = _____

(10,200) $\hat{y}$ = _____   r = _____

(100,200) $\hat{y}$ = _____   r = _____

(200,100) $\hat{y}$ = _____   r = _____

(200,10) $\hat{y}$ = _____   r = _____

Which point(s) seem to have the greatest influence on changing the LSRL?