Lesson 2.1.2

2-12. a. Answers vary.

b. There is a strong positive linear association between the field of view and the distance from the wall.

c. One possibility using the data provided is $\hat{w} = 1.66 + 0.13d$ where w is the width in inches and d is the distance in inches

d. Slopes will vary. An example of an interpretation is a prediction that an increase of one inch distance from the wall will result in an expected increase of 0.13 inches in the field of view. The y-intercepts will vary, but the interpretation is a prediction at a distance of zero the field of view will be 1.66 inches. That is, the diameter of the tube is predicted to be 1.66 in.

2-13. Using the provided data, 1.66 + 0.13(1800 inches) converts to 6.55 yards; 1.66 + 0.13(6120 inches) converts to 22.15 yards.

2-14. a. (0.5)(6.55 + 22.15)(120) = 1722 square yards, a trapezoid.

b. $\frac{1722}{(120)(53.30)} = 26.9\%$

c. He will see 20.85 yards of the 0 yard line. $\frac{20.85}{53.3} = 39.1\%$

2-15. a. Strong positive linear association with one apparent outlier at 2.3 cm.

b. Answers may vary. One possibility: He reversed the coordinates of (4.5, 2.3) when he graphed the data. Another: the paint has been scraped off or chewed off this pencil.

c. An increase of 1 cm length is expected to increase the mass by 0.25 g.

d. $1.4 + 0.25(11.5) \approx 4.3$ g

e. When the pencil is so short there is no paint left, the pencil is expected to have a mass of 1.4 g.

2-16. a. Answers will vary. This is one possible answer. * is the outlier

Length (cm)	2.3*	3.8	5.2	6.3	7.2	8.5	9.3	9.8	10.7	12.6	13.7
Mass (g)	4.5*	2.3	2.7	2.8	3.0	3.4	3.6	3.8	4.1	4.3	4.7

b. Answers may vary—if the reason for the outlier chosen in part (b) of problem 2-15 was because of human error, as in the sample answer, then it is probably best to leave the outlier out. If the reason for the outlier was more natural, then it might make more sense to include it.

c. Answers will vary based on numbers in table. Using provided table, answers INCLUDING OUTLIERS are below, with some possible symbols in parentheses, though other symbols are possible if defined. Mean of length ($\bar{x}$ or $\bar{l}$) = 8.127 cm, sd of length (s_x or s_l) = 3.57 cm, mean of mass ($\bar{y}$ or $\bar{m}$) = 3.564 g, sd of mass (s_y or s_m) = 0.795 g. Answers with provided data NOT including outliers: mean of length = 8.71 cm, sd of length = 3.164 cm, mean of mass = 3.47 g, sd of mass = 0.772 g

d. Answers will vary. This is a preview of residuals. With provided table, if outlier included, residual = 0.132 g (actual value is 0.132 grams higher than predicted). If outlier is not included, residual = –0.108 (actual value is 0.108 grams lower than predicted).

2-17. a. A hand-drawn best-fit line should follow the center of the general trend of the data.

b. One of many options: $y = 32 – 2.0x$

c. About 3.0 points using model provided.

d. The player's score is very far from the prediction in the model and does appear to go against the pattern, but the pattern is not very strong to begin with; it is possible the student is an outlier but it is also possible that you should simply accept that the pattern is not very strong, with this student as evidence.

2-18. a. Quantitative, since a boxplot can only display quantitative data. The data is numeric, not counts in named categories.

b. Sample responses: Using the 1.5 IQR rule, there is at least one diet soda (with zero calories) that is an outlier, the maximum calories are 160, half the sodas have between 100 and 140 calories, the IQR is 40; the median soda is 120 calories; the distribution is skewed left, not symmetric.

