Lesson 3.1.3

3-20. a. The probability of randomly selecting a high school student who ate a banana at lunch is 0.65.

b. The probability of randomly selecting a high school student who did not eat an apple at lunch is 0.70.

c. $P(\text{A} \cap \text{B}) = 0.20$

d. $P(\bar{\text{A}} \cup \text{B}) = 0.20 + 0.45 + 0.25 = 0.90$

e. $P(\text{A} \cap \bar{\text{B}}) = 0.10$

f. $P(\text{B} \mid \text{A}) = \frac{0.20}{0.30} = 0.67$

g.

	B	$\bar{\text{B}}$	
A	$\boldsymbol{P(\text{A} \cap \text{B})}$	$\boldsymbol{P(\text{A} \cap \bar{\text{B}})}$	$P(\text{A})$
$\bar{\text{A}}$	$\boldsymbol{P(\bar{\text{A}} \cap \text{B})}$	$P(\bar{\text{A}} \cap \bar{\text{B}})$	$\boldsymbol{P(\bar{\text{A}})}$
	$P(\text{B})$	$\boldsymbol{P(\bar{\text{B}})}$	

3-21. a.

	Exercise	$\bar{\text{E}}$	
Eats fruits and veggies	0.25	0.08	0.33
$\overline{\text{Fv}}$	0.10	0.57	0.67
	0.35	0.65	1

b. Notation may vary: $P(\text{E} \cap \text{Fv}) = 25\%$

c. $P(\text{E} \cup \text{Fv}) = 43\%$

d. See table below. Yes, there is an association. You are more likely to select one who eat fruits and vegetables if you choose from those who also exercise: 71% of people that exercise eat fruits and vegetables, while only 12% of those who do not exercise eat fruits and vegetables.

	Exercise	$\bar{\text{E}}$
Eats fruits and veggies	$\frac{0.25}{0.35} = 71\%$	$\frac{0.08}{0.65} = 12\%$
$\overline{\text{Fv}}$	29%	88%

3-22. a. $P(\text{unacceptable}) = \frac{6+10+7}{33+59+40} = \frac{23}{132} = 17\%$, $P(\text{good}) = 100 - 17 = 83\%$

b. See the conditional relative frequency table below. The percentage of unacceptable audio was about the same for all three microphones. Any differences are probably due to natural sample-to-sample variability. No association. There is likely some other source for the sound quality problem.

Interview sound was:	Mic A	Mic B	Mic C
Good	82%	83%	83%
Unacceptable	18%	17%	18%

c. If $P(\text{good} \mid \text{A}) \approx P(\text{good})$ then the microphones are not associated with the sound quality.

3-23. a. $\frac{P(\text{A} \cap \text{B})}{P(\text{B})}$

b. $\frac{P(\text{A} \cap \text{B})}{P(\text{B})}$

c. $P(\text{A}) + P(\text{B}) - P(\text{A} \cap \text{B})$

d. $1 - P(\text{A}) - P(\text{B}) + P(\text{A} \cap \text{B})$

3-24. a.

	i	$\overline{\text{i}}$	
t	0.72	0.20	0.92
$\overline{\text{t}}$	0.03	0.05	0.08
	0.75	0.25	

b. $P(\text{i} \cap \overline{\text{t}}) = 0.03$

c. $P(\text{i} \mid \text{t}) = \frac{0.72}{0.92} = 0.783$

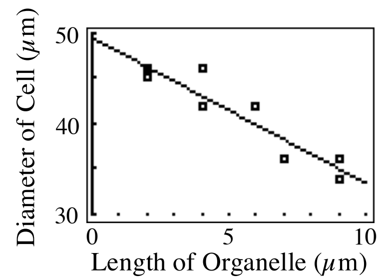
d. $P(\text{i} \mid \overline{\text{t}}) = \frac{0.03}{0.08} = 0.375$

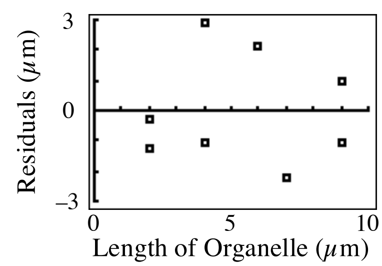
e. The fact that a sample of Canadian homes does or does not have a television would greatly change the probability of selecting one from the sample with internet access from 0.375 to 0.783.

3-25. There is a weak negative linear association: as dietary fiber is increased, blood cholesterol drops. 20.25% of the variability in blood cholesterol can be explained by a linear association with dietary fiber.

3-26. a. Create a scatterplot; compute and draw the LSRL; verify linearity with a residual plot; describe form, direction (including the slope and y-intercept in context), strength (including an interpretation of r and R^2), and possible outliers; draw upper and lower bounds to the model used for prediction.

b. See graphs at right. $y = 49.50 - 1.60x$. The linear model is appropriate because the residual plot shows no apparent pattern. The slope is –1.60 meaning that an increase of 1 μm in the length of the organelle is expected to decrease the diameter of the cell by 1.60 μm. The y-intercept of 49.50 means that a cell with no organelle has a length of 49.50 μm; this is possible even though it is an extrapolation. The correlation coefficient is $r = -0.928$ and $R^2 = 86.2\%$, so 86.2 percent of the variability in the diameter of the overall cell can be explained by a linear relationship with the diameter of the organelle. There are no apparent outliers. The upper bound can be given by $y = 52.42 - 1.60x$ and the lower bound by $y = 46.58 - 1.60x$.





3-27. a. Quantitative. This is a histogram. It is organized into categories but the categories are numeric.

b. Only that it is between 70 and 75 mph.

c. Possible answers: 50 to 55 mph or 50 to 65 mph.

d. $\frac{2}{16} = \frac{1}{8}$