

## Chapter 11 Find the Errors!

For use with Lessons 11-1 through 11-3

For each exercise, identify the error(s) in planning the solution or solving the problem. Then write the correct solution.

1. In how many ways can you arrange 5 books on a shelf?

$$5! = 5 + 4 + 3 + 2 + 1 = 15$$

There are 15 ways to arrange 5 books on a shelf.

2. A teacher is choosing 4 students from a class of 30 to represent the class at a science fair. In how many ways can the teacher choose the students?

$${}_{30}P_4 = \frac{30!}{(30-4)!} = \frac{30 \cdot 29 \cdot 28 \cdot 27 \cdot 26!}{26!} = 657,720$$

There are 657,720 ways to choose the students.

3. What is the theoretical probability of getting a sum of 9 on one roll of two fair number cubes?

There are 36 equally likely outcomes.

The favorable outcomes are those with a sum of 9: 3, 6 and 4, 5.

$$P(\text{sum } 9) = \frac{2}{36} = \frac{1}{18}$$

4. In a cooler there are 8 bottles of grape juice and 12 bottles of orange juice. There are also 6 blueberry yogurts and 9 strawberry yogurts. If you grab a bottle of juice and a yogurt without looking, what is the probability that you get a grape juice and a blueberry yogurt?

Event  $A$  = picking grape    Event  $B$  = picking blueberry

$$P(A \text{ and } B) = P(A) + P(B)$$

$$= \frac{8}{20} + \frac{6}{15}$$

$$= \frac{4}{5}$$

The probability that you get a grape juice and a blueberry yogurt is  $\frac{4}{5}$ , or 80%.

## Chapter 11 Find the Errors!

For use with Lessons 11-4 through 11-6

For each exercise, identify the error(s) in planning the solution or solving the problem. Then write the correct solution.

1. A survey asked 40 people where they learned about news of current events. What is the probability that a person gets the news online, given that the person is female?

|        | TV | Radio | Online | Newspaper |
|--------|----|-------|--------|-----------|
| Male   | 6  | 3     | 6      | 5         |
| Female | 5  | 3     | 8      | 4         |

$$P(\text{female and online}) = \frac{8}{40} = \frac{1}{5}$$

The probability that a person gets the news online given that the person is female is  $\frac{1}{5}$ , or 20%.

2. The frequency table shows the number of siblings students in a class have. What are the mean, median, and mode for the siblings per student?

| Siblings | 0 | 1 | 2 | 3 | 4 | 5 |
|----------|---|---|---|---|---|---|
| Students | 3 | 7 | 6 | 3 | 0 | 1 |

$$\text{Mean} = \frac{3(0) + 7(1) + 6(2) + 3(3) + 0(4) + 1(5)}{0 + 1 + 2 + 3 + 4 + 5} = 2.2$$

Median: 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 5

$$\text{The median is } \frac{1 + 2}{2} = 1.5.$$

Mode: Seven students have 1 sibling. The mode is 1.

3. What are the mean, variance, and standard deviation of these values?

62 41 54 60 49 58

$$\bar{x} = \frac{62 + 41 + 54 + 60 + 49 + 58}{6} = 54$$

$$\sigma^2 = \frac{(\sum(x - \bar{x})^2)}{n} = \frac{310^2}{6} \approx 16,016.67$$

$$\sigma = \sqrt{\sigma^2} \approx \sqrt{16016.67} \approx 126.56$$

| $x$        | $\bar{x}$ | $x - \bar{x}$ | $(x - \bar{x})^2$ |
|------------|-----------|---------------|-------------------|
| 62         | 54        | 8             | 64                |
| 41         | 54        | -13           | 169               |
| 54         | 54        | 0             | 0                 |
| 60         | 54        | 6             | 36                |
| 49         | 54        | -5            | 25                |
| 58         | 54        | 4             | 16                |
| <b>Sum</b> |           |               | <b>310</b>        |

## Chapter 11 Find the Errors!

For use with Lessons 11-7 through 11-9

For each exercise, identify the error(s) in planning the solution or solving the problem. Then write the correct solution.

1. A school wants to determine the average time it takes students to get to school. Every student coming off of a bus is surveyed. What is the sampling method used? Does the sample have a bias?

This is a random sample because each student is equally likely to be chosen. There is not likely to be any bias.

2. In a high school, 35% of the 3500 students participate in sports. The school board is proposing a participation fee to help with costs. To get student opinion, the school board randomly selects a committee of 6 students to join a discussion of the proposal. What is the probability that exactly 4 of the students participate in sports?

- The situation involves 6 repeated trials, 6 students selected at random.
- Each trial has two possible outcomes: A student participates in sports or not.
- The probability of success is constant, 0.35, throughout the trials because the sample is small compared to the size of the student body.

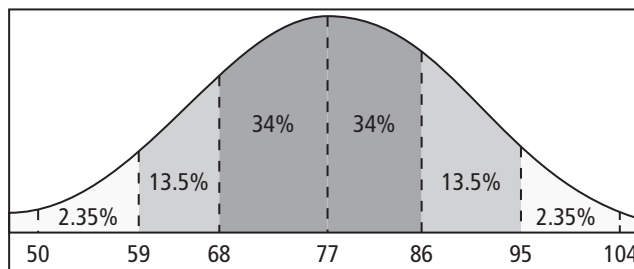
This is a binomial experiment with  $n = 6$ ,  $x = 4$ , and  $p = 0.35$ .

$$\begin{aligned} P(x) &= {}_n C_x P^x = {}_6 C_4 (0.35)^4 \\ &= 15(0.35)^4 \\ &\approx 0.23 \end{aligned}$$

The probability is about 23% that exactly 4 of the selected students participate in sports.

3. Students at a high school all took the same English test. The scores are approximately normally distributed with a mean of 77 and a standard deviation of 9. If 2500 students took the test, approximately how many scored above 86 or below 68?

Draw a normal curve.



$$P(\text{score} > 86 \text{ or } < 68) = 0.0235 + 0.135 + 0.135 + 0.0235 = 0.317$$

$$0.317 \cdot 2500 = 792.5$$

You would expect that about 793 students scored above 86 or below 68.