Worksheet Answer Key

**Worksheet 1: The Case of the Doubtful Distance**

1. Route A = 8,000 ft. (5 units + 3 units = 8 units · 1,000 feet)
   Route B = 10,000 ft. (4 units + 5 units + 1 unit = 10 units · 1,000 feet)
   Route C = 12,000 ft. (1 unit + 3 units + 2 units + 2 units + 2 units = 12 units · 1,000 feet)
2. Route A = 8,000 ft. / 2,000 ft. per hr. = 4 hours

**Take-Home Activity 1: The Case of Sweet Leaves**

-x leaves setting up a proportion. In this case, \( \frac{30}{90} = \frac{x}{x} \) leaves.

**Take-Home Activity 2: The Case of the Kid Bargain Hunter**

1. Costs for each rental company:
   - Uncle Teddy's: \( $300 \cdot 2 = $600.00 \)
   - Cheap Wheels: \( 0.60 \cdot 1,150 = $690.00 \)
   - Smooth Ride: \( $100 \cdot 2 + 0.40 \cdot 1,150 = 200 + 460 = $660.00 \)
   - The family should use Let's Go because it's the cheapest.

**Take-Home Activity 3: The Case of the Kid Bargain Hunter**

1. t = \( \frac{220w + 0.10n}{w} \), where t = total cost, w = number of weeks rented, n = number of miles driven

Now Try This:
Let's Go formula is t = $220w + .10n
Develop a formula for Smooth Ride:
\[ t = 100w + .40n \]
Since the trip is for two weeks, substitute 2 for w in both formulas and set them equal to each other since they both equal t.
220 + .10n = 100 + .40n
Subtract 100 + .10n from both sides:
220 + .10n - 100 = 120 + .00n
Divide both sides by .01 leaving n = 800

**Worksheet 2: A Case of Interest**

1. After two years students will have the $500 they deposited plus interest calculated using the formula \( I = p \cdot r \cdot t \). Interest = \( 500 \cdot .049 \cdot 2 = \$49 \), so the students will have $500 + $49 = $549

2–3. Using the growth formula \( y = a(1+r)^t \); after two years the students will have $500(1 + .048)^2$ or $549.15. So this is the better deal.

Now Try This: Students will need to solve the following equation to figure out how much they need to raise: 600 = \( a(1.05)^2 \), 600 = \( a(1.1025) \), 600/1.1025 = a, a = \$544.22

Take It Further: Five years with both simple interest and compound interest.

**Bonus Worksheet 2: The Case of the Smelly Sandwich**

1. Growth rate = 100% per week, written as 1.0 as a decimal
2. 10 bacteria per cubic centimeter
3. 1,000 bacteria per cubic centimeter
4. Weeks
5. 10(1 + 1.0)^3 = 10 · 32 = 320 bacteria per cubic centimeter, so the sandwich was in the locker at least five weeks which is more than a month.
6. 10(1 + 1.0)^1 = 640 bacteria per cubic centimeter and 10(1 + 1.0)^3 = 1,280 bacteria per cubic centimeter, so the sandwich has been in the locker between six and seven weeks.

**Take-Home Activity 2: The Case of the Decaying Car**

1. Current value = \( 20,000(1 – .20)^3 = 20,000 \cdot .8^3 = 20,000 \cdot .512 = 15,360.00 \)

2. Using the decay formula, the value after six years = \( 20,000(1 – .20)^6 = 20,000 \cdot .8^6 = 20,000 \cdot .262144 = 5,242.88 \). Since the car's value was $8,192.00 after four years, the amount of the decline in value in the next two years would be $8,192.00 – \( 5,242.88 = $2,949.12 \)

Now Try This:
3. 30,000(1 – .20)^3 = 30,000 · .8^3 = 30,000 · .512 = $15,360.00

25,000(1 – .20)^2 = 25,000 · .8 = $20,000.00

40,000(1 – .20)^1 = 40,000 · .8 = 40,000 · .64 = $25,600.00

3. 400 = 20 mph

4. 900 = 30 mph

5. 225 = 15 mph

6. 144 = 12 mph

Now Try This:
7. 10(1 + 1.0)^3 = 10 · 32 = 320 bacteria per cubic centimeter

**Worksheet 3: The Case of the Screeching Tires**

1. Tire Tracks 1 = \( 24 \cdot 66 \frac{2}{3} = 24 \cdot 202 \) = 5,952 bacteria per cubic centimeter

2. Tire Tracks 2 = \( 24 \cdot 66 \frac{2}{3} = 1,600 \) = 40 mph

3. Tire Tracks 3 = \( 24 \cdot 104 \frac{1}{6} = 2,500 \) = 50 mph

Two of the three cars exceeded the 20 mph speed limit.

Take It Further: Answers will vary.

**Bonus Worksheet 3: The Case of the Tardy Transportation**

1. Elm Street route: 5-minute run time + (2 minutes at light 1 · .5 probability at light 1) + (2 minutes at light 2 · .5 probability at light 2) + (2 minutes at light 3 · .5 probability at light 3) to 5-minute run time + 2 minutes · .5 probability · 3 lights = 8 minutes

Washington Road route: 5-minute run time + 1 minute · .1 probability · 4 lights = 5.4 minutes + 5 minutes, 24 seconds

The Washington Road route is usually faster.

2. The probability of a red light plus the probability of a green light equals 100%. Expressed as a decimal, 100% = 1. So, the probability of a green light on Washington Road is \( 1 – \) the probability of a red light or \( 1 – .1 = .9 \)

The probability of two green lights in a row on Washington Road = .9 · .9 = .81 or 81.0%

3. The probability of four green lights in a row on Washington Road = .9 · .9 · .9 · .9 = .656 or 65.6%

Take-Home Activity 3: The Case of the Kid Bargain Hunter