Numbers of Endangered Species

<table>
<thead>
<tr>
<th></th>
<th>United States only</th>
<th>United States and foreign</th>
<th>Foreign only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals</td>
<td>262</td>
<td>51</td>
<td>493</td>
</tr>
<tr>
<td>Plants</td>
<td>378</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>640</td>
<td>61</td>
<td>494</td>
</tr>
</tbody>
</table>

1a) About what fraction of the total number of endangered species are found only in foreign countries?

\[
\frac{493}{1,195} \approx \frac{500}{1,200} = \text{About } \frac{5}{12}
\]

1b) How many times more endangered plant species are there in the United States than in foreign countries?

\[
\frac{378 \text{ USA}}{1 \text{ FOREIGN}} = 378 \text{ times more}
\]

1c) About what percent of the total number of endangered animals lives only in the United States?

\[
\frac{262 \text{ USA}}{806 \text{ Total Animals}} = 0.325 \rightarrow 32.5\
\]

1d) What is the approximate ratio of Endangered Plants to Endangered Animals in the United States only? Use numbers in your ratio that are easy to relate to.

\[
378:262 \rightarrow \frac{378}{262} = 1.44 \approx 1.5 \text{ to } 1
\]

1e) What is the difference between the number of endangered animals found in both the United States and foreign countries and the number of endangered plants found in both the United States and foreign countries?

\[
51 - 10 = 41
\]

2) Write the data in the rate situations below as two different unit rates with a label for each rate.

2a) Latanya's 15 mile commute to work each day takes an average of 40 minutes.

\[
\frac{15 \text{ miles}}{40 \text{ min}} \rightarrow 0.375 \frac{\text{mi}}{\text{min}} \text{ or } 2\frac{2}{3} \frac{\text{min}}{\text{mi}}
\]

2b) In a 5 minute test, one computer printer produced 90 pages of output.

\[
\frac{5 \text{ min}}{90 \text{ pages}} \rightarrow 0.05 \frac{\text{min}}{\text{page}} \text{ or } 18 \frac{\text{pages}}{\text{min}}
\]

2c) A long distance telephone call lasts 20 minutes and costs $4.50.

\[
\frac{20 \text{ min}}{4.50} \rightarrow 0.44 \frac{\text{min}}{\$} \text{ or } 60.25 \frac{\$}{\text{min}}
\]

2d) Put a star next to the unit rate in part 2c that shows a unit price.
3) The Elsie Dairy uses a machine that fills 56 cartons of milk in 2 hours.

3a) Make a rate table showing the number of cartons filled in 1, 2, 3, ..., 10 hours.

\[
\begin{array}{cccccccccc}
& H & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
C & 28 & 56 & 84 & 112 & 140 & 168 & 196 & 224 & 252 & 280 \\
\end{array}
\]

\[
\frac{56C}{2H} = \frac{28C}{1H} \\
\]

3b) How many cartons will be filled in 6.5 hours? Show your work.

\[
\frac{28C}{1H} = \frac{X}{6.5H} \\
X = 182
\]

3c) How long will it take to fill 343 cartons? Show your work.

\[
\frac{28C}{1H} = \frac{343C}{X} \\
X = 12.25
\]

3d) If the machine ran continuously for 7 days, how many cartons would it fill? Show your work.

\[
\frac{28C}{1H} = \frac{X}{24H} \approx 105 \text{ cartons/day} \times 7 \\
X \approx 4704
\]

3e) Write an equation that expresses the relationship between the number of cartons \( C \) and the number of hours \( H \).

\[ C = 28H \]

3f) Use your equation to find how many cartons can be filled in 15 minutes. Show all steps: equation, substitution and answer steps! Be mindful of the units in your equation.

\[
16 \text{ min} = \frac{1}{4} \text{ of an hour} \rightarrow C = 28 \left( \frac{1}{4} \right) = 7 \text{ cartons}
\]

3g) What is the constant of proportionality in the equation you wrote in part e? Label your answer.

28 - It tells the # of cartons per hour

3h) Write a different equation with the same unit rate as in the equation you wrote in part e, but that has a unit rate that does NOT represent a constant of proportionality. Describe why 3e’s equation has a constant of proportionality and your new equation does not. Use the characteristics of the graphs of each equation in your description.

\[ H = \frac{1}{28} C \]

- Technically it works but you wouldn't fill \( \frac{1}{28} \) of a carton
- Goes through (0, 0)
- Has 2 unit rates
- Straight line
4) If you want to eat the most pizza possible, should you sit at a small table with 5 people sharing 3 pizzas or at a large table that has 6 people sharing 4 pizzas? Solve this problem using 2 different methods.

\[
\frac{5 \text{ people}}{3 \text{ pizzas}} = \frac{20 \text{ people}}{12 \text{ pizzas}} \quad \text{vs.} \quad \frac{6 \text{ people}}{4 \text{ pizzas}} = \frac{18 \text{ people}}{12 \text{ pizzas}}
\]

**Small**

**LARGE**

For problems 5-7, define a variable first. Then set up and solve a proportion. Conclude with a therefore sentence.

5) Ryan's older brother attends college and is saving to buy a used car that costs $2,200. If he makes $156.00 every 2 weeks as a student tutor at the college, how many weeks will it take him to save enough money to buy the car? (Assume that his brother gets paid weekly, not daily.)

\[
\frac{\$156.00}{2 \text{ weeks}} = \frac{\$2,200}{x} \quad \text{So after } 29 \text{ weeks}
\]

6) Jackie has a paper route in her neighborhood. It takes her 50 minutes to deliver newspapers to the 40 customers on her route.

a) How long will it take Jackie to complete her route if she adds 20 more customers in her neighborhood?

\[
\frac{50 \text{ min}}{40 \text{ cust}} = \frac{x}{60 \text{ cust}} \quad x = 75 \text{ min}
\]

b) Only 30 out of Jackie's 40 customers get the Sunday paper. How long does it take Jackie to deliver her papers on Sunday?

\[
\frac{50 \text{ min}}{40 \text{ cust}} = \frac{x}{30 \text{ cust}} \quad x = 37.5 \text{ min}
\]

7) The ratio of boys to girls at DMS is 3 to 4. If the whole school has 1,200 students, how many girls are there in the school?

\[
3B : 4G \rightarrow \frac{4G}{7G} = \frac{x}{1,200} \quad x = 686.0
\]

For problems 8 and 9, set up and solve proportions to find the missing side lengths.

8) Given \(JKLM \sim PQRS\), find \(QR\).

\[
\frac{4.8}{12} = \frac{3.6}{x} \quad x = 9
\]

9) In problem 9, what is the scale factor of the two figures? Label it small to large or large to small.

\[
\frac{12}{4.8} = \frac{5}{2} \quad \text{Small to Big} \quad \frac{3.6}{12} = \frac{3}{2} \quad \text{Big to Small}
\]
11) Find values that make each sentence correct. Show your work.

\[
a) \quad \frac{42}{56} = \frac{a}{21} \quad \quad b) \quad \frac{2.5}{f} = \frac{7.5}{12} \quad \quad c) \quad \frac{35.7}{40.8} < \frac{b}{40} \quad \quad d) \quad \frac{x}{30} \geq \frac{4}{10} \quad \frac{12}{30}
\]

\[D = 15.75 \quad f = 4 \quad \text{or} \quad B = 36 \quad \text{or} \quad \text{More} \quad \text{or} \quad x = 12 \quad \text{or} \quad \text{More} \]

12) One box of cereal is 20 ounces and costs $3. A smaller box of the same type of cereal is 12 ounces and costs $2. Use unit prices to compare which size box is the better buy.

\[\frac{20 \text{ oz}}{\$3} = \$0.157/\text{oz.} \quad \text{vs.} \quad \frac{12 \text{ oz}}{\$2} = \$0.17/\text{oz.}\]

13) Toys 'R Us buys Lego sets from the manufacturer and then marks them up 40% before selling them to their customers. If Toys 'R Us sells a particular Lego set for $89.99, what amount did the store pay for it when buying from the manufacturer? Show your work.

\[\text{S.P.} = \$89.99 \quad \rightarrow \quad \frac{100\%}{140\%} = \frac{BP}{SP} \quad \rightarrow \quad \frac{100}{140} = \frac{x}{89.99} \quad \text{or} \quad \text{BP} = \$64.28\]

14) Rocky's Bike Shop has a sale where the bike shop pays the customer's tax. By law, Rocky has to charge 7% sales tax, so he thinks of an inventive way to take the tax off the bill. Rocky decides to give each customer a 7% discount off the price of his bikes.

The customer pays the discounted price plus tax. Will this amount be the same as the original price? Use a mountain bike selling for $252 before the discount is applied to help you explain your answer.

\[\frac{\$252}{x} = \frac{100}{93} \quad \rightarrow \quad \$384.36 \times 0.07 = \$26.41 \quad \text{or} \quad \text{GT} = \$250.77 \quad \text{No!}\]

15) Madeline and Gracie go to lunch at Uncle Sam's Subs. They only have $28 to spend in all. They have to pay 7% sales tax on the meal and they want to leave a 20% tip based on the amount of the meal. What is the most they can spend on their meal? Show your work.

\[x = \text{Meal Price} \quad \rightarrow \quad \text{Total} = 1.27 \times (1.27\% \text{ of } x) \quad \text{or} \quad \frac{100}{127} = \frac{x}{28} \quad \text{or} \quad \frac{127}{28} = \frac{100}{x} \quad \text{or} \quad \text{x} = \$22.05\]

16a) Find the percentage of chimp food mix that is high fiber and the percentage of mix that is high protein if the unit rate is 4. Note: The unit rate in this case is the number of scoops of high-fiber food per one scoop of high-protein food. Show your work.

\[4 \text{ HF} : 1 \text{ P} \quad \rightarrow \quad \frac{4 \text{ HF}}{5} = 80\% \quad \text{or} \quad \frac{1 \text{ HP}}{5} = 20\%\]

16b) The zookeeper has 18 scoops of high-fiber chimp food. How many scoops of high-protein food should he add to the mix described in part a? Show your work.

\[\frac{4 \text{ HF}}{1 \text{ P}} = \frac{18 \text{ HF}}{x} \quad \rightarrow \quad \text{x} = 4.5 \text{ scoops high protein} \]