Decimals

1. **Models.** Model each of the following using base 10 pieces with the whole as indicated.

<table>
<thead>
<tr>
<th>amount</th>
<th>whole = 1 block</th>
<th>whole = 1 flat</th>
<th>whole = 1 long</th>
</tr>
</thead>
<tbody>
<tr>
<td>.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.05</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. If you model a whole as 1 block, what is 1 flat times 1 flat?

3. If you model a whole as 1 flat, what is 1 long times 1 long?

4. **Which is larger?** In each pair below, identify which is larger. Put the appropriate comparison symbol in the box and explain how you know. How many ways can you think of to explain how you know?

   a) 0.34 □ 0.43
   b) 0.12 □ 0.04
   c) 0.41 □ 0.401
   d) 0.09 □ \( \frac{1}{9} \)
   e) 0.11 □ \( \frac{1}{11} \)
   f) \( \frac{2}{5} \) □ \( .4 \)
5. Use mental arithmetic to find values or estimates for the following. Explain your reasoning. If you give an estimate that you know is too low, give another estimate that you know is too high (and vice versa). Do you expect the exact value to be closer to the low estimate or the high estimate?
   a) $68 \times 0.5$
   b) $0.25 \times 48$
   c) $1.27 \times 10$
   d) $1.27 \div 10$
   e) $1.57 + 2.4 + 8.78$
   f) $39.37 \times 5.5$
   g) $23.82 \times 0.41$

6. Fill in the following table, rounding as indicated.

<table>
<thead>
<tr>
<th>amount</th>
<th>nearest tenth</th>
<th>nearest hundredth</th>
<th>two significant digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>.257</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.257</td>
<td></td>
<td></td>
<td>2.54</td>
</tr>
</tbody>
</table>
Some Percent Problems

1. One Thursday the vice-president of a small company was in a good mood and gave everyone in the company a 10% raise. When the president returned from his vacation on Monday, he immediately ordered to payroll department to cut everyone’s pay by 10% to rectify the error of the vice-president. A sharp accountant in payroll objected to the president’s plan. Why did he object? What would be the correct way to deal with the situation?

2. Of the three wards in Grand Rapids, 40% of the voters live in the third ward. If a mayoral candidate is pretty confident she will receive at least 60% of the vote in the third ward, what percent must she get in the other two wards to be elected?

3. In a certain town, 50% of the men are married and 60% of the women are married. Assuming that each married man is married to one married woman from the town and vice versa, what percentage of the town is male?

4. A college newspaper did a survey of students and found that
   - 10% of the women on campus smoke,
   - 20% of the men on campus smoke,
   - 30% of the smokers on campus are women,

   Are there more men or women on this campus? Is it possible to determine what percentage of the students are women? Is it possible to determine what percentage of the students smoke?

5. The town of Taxophobia has an unusual income tax system. No one is allowed to make more than $100,000. If you make less that $100,000, then your tax rate (as a percent) is equal to the number of thousands of dollars you make (rounded to the nearest $1000). For example, if you income is $25,000 then your tax rate is 25%.

   a) Alice made $25,000 last year. How much money did Alice get to keep after taxes?
   b) Bob made $100,000 last year. How much money did Bob get to keep after taxes?
   c) Bob wasn’t too happy about how last year went. This year Bob wants to keep as much money as possible. What income should he try for?
Fractions, Decimals, and Percents

Since fractions, decimals and percents are three notational ways of expressing the same number relationship, anything that can be expressed in one of these ways can be expressed in the other two as well. For each of the following exercises, give exact answers, not approximations.

1. Convert each of the following percents to an equivalent fraction and an equivalent decimal.
   
   a) 237.5%  
   b) 0.03%  
   c) 5.4%

2. Convert each of the following fractions to equivalent decimals and percents. Notice that some of these “terminate” (eventually “stop”). And others don’t.
   
   a) \(\frac{11}{8}\)  
   b) \(\frac{3}{7}\)  
   c) \(\frac{5}{16}\)

   d) \(\frac{1}{3}\)  
   e) \(\frac{129}{550}\)  
   f) \(\frac{5}{17}\)

   g) Do you notice anything special about the ones that do not terminate?

   h) Is there a quick way to tell (without actually doing the conversion) whether a fraction will have a terminating or nonterminating decimal representation?

3. Convert each of the following decimals to an equivalent fraction and an equivalent percent:
   
   a) 0.375  
   b) 0.\bar{5}  
   c) 2.4

   d) 0.65  
   e) 0.\bar{65}  
   f) 0.\bar{65}
Some Proportion Problems

1. Ice cream was on sale: 3 half gallon containers for $5.75. How much would 9 containers cost?

2. If I can paint 120 feet of fence in three hours, how many feet of fence can I paint in four hours? in five hours? in six hours?

3. Space Man Spif lands on the planet Og, where there are two countries, each with its own currency. If he can exchange 5 gros for 9 dulaks,
   a) How many dulaks is 15 gros worth?
   b) How many dulaks is 12 gros worth?

4. Van de Walle mentions at least three strategies for solving proportion problems: the unit-rate method, the scaling method, and the cross-product method.
   a) Which did you use for each problem above?
   b) For each problem where you used the cross-product method, go back and redo it using one of the other two methods.
   c) When (in general) is the unit-rate method especially nice to use?
   d) When (in general) is the scaling method especially nice to use?
   e) What are the advantages and disadvantages of the cross-product method?