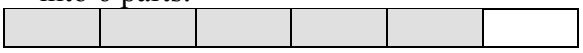
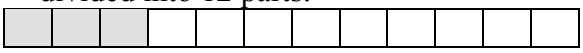
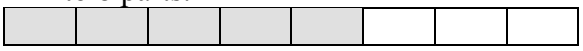
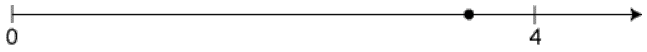
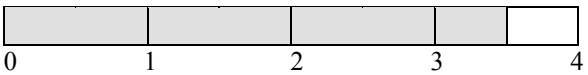
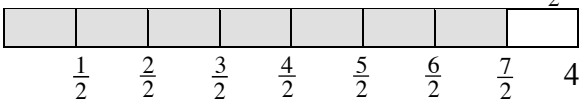
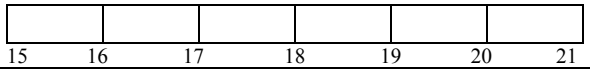
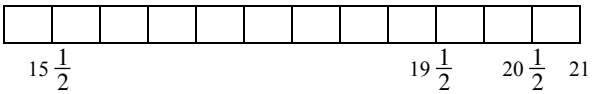
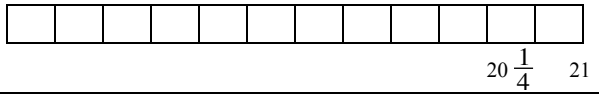
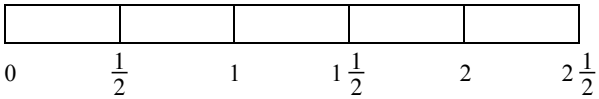
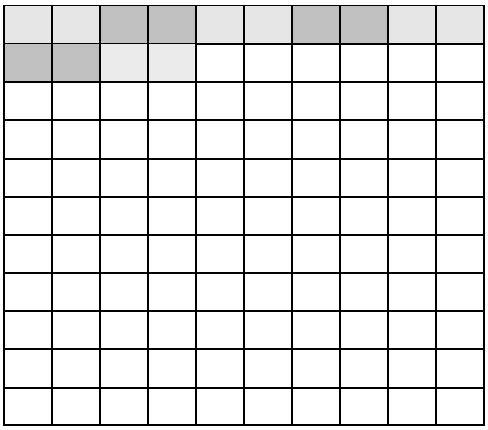
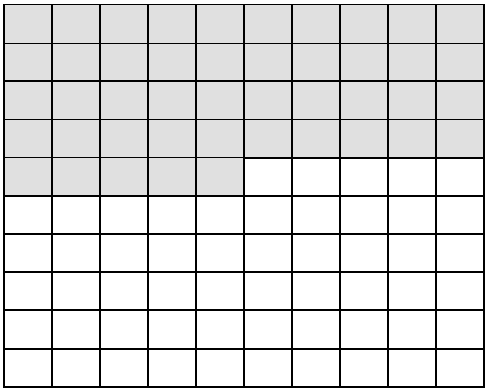
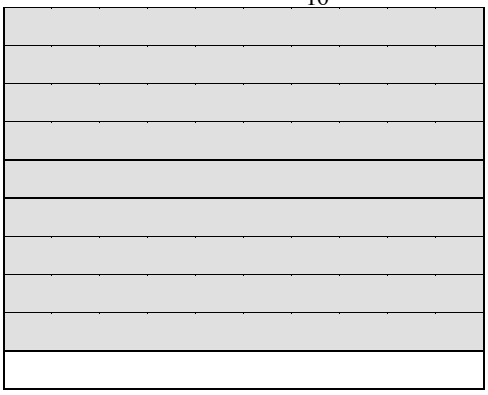
Bits and Pieces 1: Homework Examples from ACE
Investigation 1: Questions 8, 31, 35
Investigation 2: Questions 36, 40,52, 56, 62
Investigation 3: Questions 14, 44, 51.
Investigation 4: Questions 3, 16, 17, 18, 19, 33.

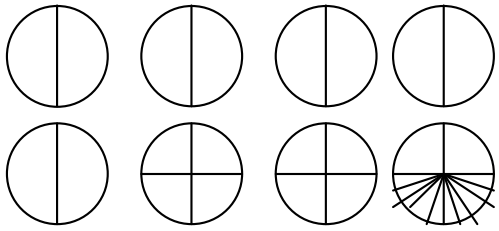
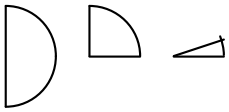
ACE Question	Possible Answer
ACE Investigation 1	
8. For parts a – c, sketch the gauge and tell whether the container is almost empty, about half-full, or almost full. a. five-sixths of a full dispenser. b. three-twelfths of a full dispenser. c. five-eighths of a full dispenser.	8. **This question refers to benchmarks: 0, a half, 1.** a. To show $\frac{5}{6}$ we need to show a "whole" divided into 6 parts.  This is almost full. b. To show $\frac{3}{12}$ we need to show a "whole" divided into 12 parts.  This is almost empty. c. To show $\frac{5}{8}$ we need to show a "whole" divided into 8 parts.  This is about half-full.
35. Use fraction strips or some other method to name the point with a fraction.  	35. **This question illustrates how important it is to understand what the "whole" is before beginning to divide it into parts**. The following is a sketch of a fraction strip. The only marks on the original line were 0 and 4, so the entire strip represents 4. Folding in half and half again will produce marks for 1, 2 and 3. The marked point is between 3 and 4.  Folding one more time, so that the "whole" is now divided into 8 equal parts puts the marked point at 3 and half. (If the fraction strip represented 1 then the marked point would be at

	$\frac{7}{8}$. But each "eighth" piece of the strip actually represents "half". The marked point is at $\frac{7}{2}$.) 
31. Dario made 3 pizzas which he sliced into quarters. After considering how many people he would be sharing with, he thought to himself, "Each person can have a half." a. Is it possible that there was only one other person to share with? How? b. Is it possible that there were 5 other people to share with? How? c. Is it possible that there were 11 other people to share with? How?	**35.** **This question illustrates how the actual amount can vary, but still be called a "half," depending on the size of the "whole."** **a.** If there was only one other person to share with then Dario's comment means that Dario will have **half of the total amount** of pizza, and so will the other person. (This would mean one and a half pizzas each.) b. If there were 5 other people to share with then Dario's comment would mean that each person could have **half of a pizza**. (6 people each getting half of a pizza would use a total of 3 pizzas.) c. If there were 11 other people then each person would get a quarter of a pizza. Dario's comment would have to mean that each person gets **half of a half-pizza.** (12 quarters would be the same as 3 pizzas.)
ACE Investigation 2	
36. On a number line from 0 to 10, where is $\frac{13}{3}$ located?	36. Students might think of this as a fraction strip problem, where they have to fold a strip that represents 10 into 10 sections, and then fold each of these sections into thirds, so that each piece represents one third of 1. Counting 13 thirds will place this quantity one third of the way between 4 and 5. OR, students might reason that $\frac{3}{3}$ is 1, so $\frac{6}{3} = 2$, $\frac{9}{3} = 3$, $\frac{12}{3} = 4$, so $\frac{13}{3}$ is 4 and $\frac{1}{3}$.
40. Copy the number line below and locate and label marks representing 16, $15\frac{1}{2}$, $19\frac{1}{2}$, $20\frac{1}{4}$.  	40. The number line shown represents numbers from 15 to 21. To show whole numbers on this line we need to divide this length into 6 equal parts. This locates 16. 

	Then we see that we have to show numbers that involve halves. So each of these pieces should be divided in half.  This leaves $20\frac{1}{4}$ to be located. For this we need to subdivide the space between 20 and 21 into 4 pieces, not just 2. $20\frac{1}{4}$ is halfway between 20 and $20\frac{1}{2}$. 
52. **Find the largest common factor of 6 and 9.**	52. 6 is 2 groups of 3, 9 is 3 groups of 3. 3 is a common factor.
56. **Write a fraction equivalent to $\frac{6}{9}$**	56. $\frac{6}{9}$ means the same as $\frac{\text{2 groups of 3}}{\text{3 groups of 3}}$ or $\frac{2}{3}$. Renaming in this way depends on being able to regroup the numerator and denominator in terms of the common factor. 
62. **Copy the number line below. Estimate and mark where the number 1 would be:**	62. Since the ends of the line are 0 and $\frac{5}{2}$, we can divide the length into 5 pieces, each representing one half. 

ACE Investigation 3	
14. Find a decimal equivalent for the fraction $\frac{7}{50}$.	14. Students have several ways they can think about this. They might use a hundreds grid, find that 2 small squares represent $\frac{1}{50}$, and then shade $\frac{7}{50}$. So $\frac{7}{50} = 14\%$. This strategy works well when the denominator is **a factor** of 100.  OR Students might rename the fraction, a strategy that works well when the denominator is a **factor** of 100. $\frac{7}{50} = 50\overline{)7.00} = \frac{14}{100} = 14\%$. OR Students might divide the denominator into the numerator to produce a decimal. $7.00 \div 50$ (set up as a long division $50\overline{)7.00}$) = $0.14 = 14\%$. This strategy works well when the denominator is not a factor of 100.

44. Which is greater, 0.45 or 0.9? Draw a picture if it helps explain your thinking.	44. Students might think in terms fractions. 0.45 $\frac{45}{100}$ and 0.9 = $\frac{9}{10}$ or $\frac{90}{100}$. Thus 0.9 > 0.45. OR they might think in terms of a hundreds grid (useful up to 2 decimal places). The first shows 0.45, or $\frac{45}{100}$.  This grid shows 0.9 or $\frac{9}{10}$. 
51. Ten students went to a pizza parlor together. They ordered eight small pizzas. a. How much will each student receive if they share the pizzas equally? Express your answer as a fraction and as a decimal. b. Explain how you thought about the problem.	51. a. $\frac{8}{10}$ or $\frac{4}{5}$ or 0.8 of a pizza. b. Students might draw 8 pizzas divided into halves, which would give each person a half. This leaves 3 pizzas left over, which can then be subdivided into quarters, giving each person a

Draw a picture that would convince someone that your answer is correct.	quarter. This leaves a half pizza leftover, which will have to be divided into 10 slices, each $\frac{1}{20}$ of a pizza. So each person gets $\frac{1}{2} + \frac{1}{4} + \frac{1}{20}$ or renaming this in terms of 20ths. Thus. Each share is $\frac{10}{20} + \frac{5}{20} + \frac{1}{20} = \frac{16}{20}$.  Each person's share:  OR Each pizza might be divided into 10 pieces and each person gets 8 of these small pieces, or $\frac{8}{10}$ OR They might do a long division 8.0÷ 10 = 0.8.
ACE Investigation 4	
3. Decide which is the best score on a quiz. A. 15 points out of 25. B. 8 points out of 14. C. 25 points out of 45. D. 27 points out of 50	3. Students might think first in terms of a benchmark. They can compare each of these to one half or 50%. However, since each is more than one half, this strategy is not helpful in making comparisons. Students might rename each fraction with a denominator of 100. $\frac{15}{25} = \frac{\text{how many?}}{100}$. If we subdivide each $\frac{1}{25}$ into 4 pieces we have four $\frac{1}{100ths}$. So $\frac{15}{25} = \frac{60}{100} = 60\%$.

<table>
<tr>
<td></td>
<td>This does not work so easily for $\frac{8}{14}$. We can not easily subdivide $\frac{1}{14ths}$ into $\frac{1}{100ths}$. Students MIGHT think of asking, “What would we have to multiply 14 by to make 100? So we can multiply the numerator by the same.” More likely, they will divide 8.00 ÷ 14 = 0.5714 = 57% (approx).

Likewise, $\frac{25}{45} = 25 \div 45 = 0.555.. = 56\%$ (approx).

$\frac{27}{50} = \frac{54}{100} = 54\%$.

The best score is A, 60%.</td>
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<tr>
<td>16.
<table><tr><td>Preference</td><td>Out of 150 dogowners</td><td>Out of 200 cat owners</td></tr><tr><td>Human food only</td><td>75</td><td>36</td></tr><tr><td>Pet food only</td><td>45</td><td>116</td></tr><tr><td>Human and pet food</td><td>30</td><td>48</td></tr></table>
What kind of food do the greatest number of dog owners say is favored by their pets? Write this number as a fraction, a decimal, and a percent of the total dog owners.</td>
<td>16.
75 out of 150 dog owners say their pets prefer human food only. $\frac{75}{150} = \frac{1}{2} = 0.5 = 50\%$.</td>
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<tr>
<td>17.
What kind of food do the greatest number of cat owners say is favored by their pets? Write this number as a fraction, a decimal, and a percent of the total cat owners surveyed.</td>
<td>17.
116 out of 200 cat owners say their pets prefer pet food only. $\frac{116}{200} = \frac{58}{100} = 0.58 = 58\%$.</td>
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<tr>
<td>18.
Suppose only 100 dog owners were surveyed, with similar results. Estimate how many would have answered in each of the three categories.</td>
<td>18.
This question asks students to predict from the fractions given out of 150: $\frac{75}{150}$, $\frac{45}{150}$, $\frac{30}{150}$.

Students might try to rename each of these with a denominator of 100 (which would be the same as writing each as a percent).
$\frac{75}{150} = \frac{1}{2} = \frac{50}{100}$.
$\frac{45}{150} = \frac{3}{10} = \frac{30}{100}$.
$\frac{30}{150} = \frac{2}{10} = \frac{20}{100}$.</td>
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19.

Suppose 50 cat owners were surveyed, with similar results. Estimate how many would have answered in each of the three categories.

19.

The original fractions are $\frac{36}{200}$, $\frac{116}{200}$, $\frac{48}{200}$.

Renaming these with denominator 50:

$\frac{36}{200} = \frac{18}{100} = \frac{9}{50}$.

$\frac{116}{200} = \frac{58}{100} = \frac{29}{50}$.

$\frac{48}{200} = \frac{24}{100} = \frac{12}{50}$.

33.

The following percents are a good set of benchmarks to know because they have nice fraction equivalents and some nice decimal equivalents for each percent. Copy the table and enter the fraction and decimal equivalents for each percent. Use your table until you have learned these relationships.

%	10	$12\frac{1}{2}$	20	25	30	$33\frac{1}{3}$	50	$66\frac{2}{3}$	75
FR									
Dec									

33.

%	10	$12\frac{1}{2}$	20	25	30
FR	$\frac{10}{100} = \frac{1}{10}$	$\frac{12.5}{100} = \frac{1}{8}$	$\frac{20}{100} = \frac{1}{5}$	$\frac{25}{100} = \frac{1}{4}$	$\frac{30}{100} = \frac{3}{10}$
D	0.1	0.125	0.2	0.25	0.3

%	$33\frac{1}{3}$	50	$66\frac{2}{3}$	75
FR	$\frac{33\frac{1}{3}}{100} = \frac{1}{3}$	$\frac{50}{100} = \frac{1}{2}$	$\frac{66\frac{2}{3}}{100} = \frac{2}{3}$	$\frac{75}{100}$
D	0.33 (approx)	0.5	0.667(approx)	0.75