1. Compute each of the following on an 11-hour clock.

   (a) $6 \oplus 8$

$$\begin{aligned} 6 \oplus 8 &= (6+8) \bmod 11 \\ &= 14 \bmod 11 \\ &= 3 \end{aligned}$$

   (b) $5 \otimes 9$

$$\begin{aligned} 5 \otimes 9 &= (5 \cdot 9) \bmod 11 \\ &= 45 \bmod 11 \\ &= 1 \end{aligned}$$

   (c) $5 \oslash 8$

$\otimes$	8
0	0
1	8
2	5
3	2
4	10
5	7
6	4
7	1
8	9
9	6
10	3

   So, $5 \oslash 8 = 2$ (since $8 \otimes 2 = 5$).

2. Suppose Nora has 2 pies of the same size. The pumpkin pie is cut into 5 equal slices and the cherry pie is cut into 7 equal slices. If Nora gives 2 slices of the pumpkin pie and 3 slices of the cherry pie to Janice, find the ratio of the amount of pie Nora has given away to the total amount of pie she had originally. Express your answer as a fraction in reduced form.

   Nora gave away $\frac{2}{5} + \frac{3}{7} = \frac{29}{35}$ of a pie.

   She started with 2 pies.

   So the ratio is $\dfrac{\left(\frac{29}{35}\right)}{2} = \frac{29}{70}$.

3. Perform each of the following calculations.

(a) $\frac{2}{3} \cdot 4\frac{1}{2}$

$$\frac{2}{3} \cdot 4\frac{1}{2} = \frac{2}{3} \cdot \frac{9}{2} = \frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}} \cdot \frac{\overset{3}{\cancel{9}}}{\underset{1}{\cancel{2}}} = \frac{3}{1} = 3$$

(b) $2.3 + \frac{1}{4}$

$$2.3 + \frac{1}{4} = 2.3 + 0.25 = 2.55$$

(c) $2.\overline{3} + 5.4$

$$2.\overline{3} + 5.4 = 2.3\overline{3} + 5.4 = 7.7\overline{3}$$

4. Convert each of the following decimals to fractions in reduced form.

(a) -4.365

$$-\frac{4365}{1000} = -\frac{873}{200}$$

(b) $12.1\overline{20}$

$$n = 12.1\overline{20} = 12.120202020....$$

$$\begin{aligned} 100n &= 1212.0202020..... \\ n &= \quad 12.120202020.... \\ \hline 99n &= 1199.9 \end{aligned}$$

$$n = \frac{1199.9}{99} = \frac{11999}{990}$$

5. For each pair of numbers, find a number that lies between them. (Note: Although for each pair there are many possible answers, you should give only one answer. If you give more than one answer, I will deduct points if any answer is incorrect.)

(a) $\frac{6}{5}, \frac{5}{4}$

$$\frac{6}{5} = 1.2, \ \frac{5}{4} = 1.25$$
$$\frac{6}{5} < \boxed{1.22} < \frac{5}{4}$$

(b) $-0.15, 0.15$

$$-0.15 < \boxed{0} < 0.15$$

(c) $0.744, 0.7\overline{4}$

$$0.744 < \boxed{0.7441} < 0.7444444.....$$

6. Suppose that Jordan makes $\$30,000$ per year now, and is offered the following choice. She can either take a 10% pay cut this year and receive a 20% pay raise next year, or she can receive no pay cut this year and a 10% pay raise next year. Determine which option she should take. You must fully justify your answer.

First Option:

Jordan makes $\$30,000 - 3,000 = \$27,000$ this year.

She makes $\$27,000 + (0.20)(\$27,000) = \$27,000 + \$5,400 = \$32,400$ next year.

Her final salary ends up at $\$32,400$.

Second Option:

Jordan makes $\$30,000$ this year.

She makes $\$30,000 + (0.10)(\$30,000) = \$30,000 + \$3,000 = \$33,000$ next year.

Her final salary ends up at $\$33,000$.

She should choose the second option.

7. Suppose that a map states that 1 inch is equivalent to 60 miles. Express each of the following as a fraction in reduced form or as a decimal, and be sure to include units in your answer (i.e., inches, miles, etc.)

   (a) How far is a trip that measures 3.5 inches on the map?

$$\frac{1}{60} = \frac{3.5}{x}$$
$$x = (3.5)(60) = 210 \text{ miles}$$

   (b) What would a 45 mile trip measure on the map?

$$\frac{1}{60} = \frac{x}{45}$$
$$45 = 60x$$
$$x = \frac{45}{60} = \frac{3}{4} \text{ inch}$$

   (c) How many feet would an 800 mile trip measure on the map?

$$\frac{1}{60} = \frac{x}{800}$$
$$800 = 60x$$
$$x = \frac{800}{60} = \frac{40}{3} \text{ inches } = \frac{40}{3} \cdot \frac{1}{12} \text{ foot} = \frac{40}{36} \text{ feet} = \frac{10}{9} \text{ feet}$$

8. Quick Calculations

   (a) If you pay \$2.40 for 4 cans that hold 5 ounces of juice each, how much did you pay per ounce of juice?

$$\frac{\$2.40}{20 \text{ oz.}} = \frac{240\not{¢}}{20 \text{ oz.}} = \frac{12\not{¢}}{1 \text{ oz.}} = 12 \text{ cents per ounce.}$$

   (b) Round the number 435.621785 to the hundredths place.

$$435.62$$

   (c) Fill in the blank:

$$17 \equiv \underline{2} \pmod 3$$