Calculators are not allowed. Answers may be left as reduced improper fractions, reduced mixed numbers, or decimals. Box your final answers.

1. (a) (5 points) Find the prime factorization of 54 and 144.

   (b) (5 points) Find the greatest common factor of 54 and 144.

   (c) (5 points) Find the least common multiple of 54 and 144.

   (d) (5 points) Evaluate $\dfrac{1}{54} - \dfrac{1}{144}$.

2. Perform the indicated operation(s) and give your answers in simplified form.

   (a) (5 points) $\dfrac{42}{25} \cdot \dfrac{18}{35} \cdot \dfrac{125}{12} \cdot \dfrac{8}{27}$

   (b) (5 points) $\dfrac{36}{49} \div \dfrac{18}{77}$

   (c) (5 points) $\dfrac{1}{2} + \dfrac{4}{15} - \dfrac{5}{12}$

   (d) (5 points) $\dfrac{1\frac{2}{5} + 2\frac{1}{3}}{1\frac{3}{20} - 1\frac{1}{12}}$

3. (5 points) Evaluate the following expression. $\left(\sqrt{\left(\frac{4}{21} \cdot \frac{7}{4} - \frac{10}{54} \cdot \frac{6}{5}\right) + 1}\right)^2$

4. (5 points) Solve the equation. $\dfrac{34}{x} = \dfrac{51}{33}$

5. (5 points) If 2 inches on a map represents 5 miles, how many miles long is a trail that measures $3\frac{1}{2}$ inches on the map?

6. (5 points) Including a 10% tax, a new toaster costs $16.50. How much does the toaster costs without tax.

7. (5 points) On Monday the price of a particular stock decreases by 10%. Then on Tuesday the price increases by 20%. So far this week, has the price of the stock increased or decreased overall? By what percent?

   Hint: It's not necessary, but it may help to assume the price of the stock begins at $100.

8. Let $w = -2$, $x = 3$, $y = -\dfrac{2}{3}$, and $z = -\dfrac{3}{5}$. Evaluate the following expressions.

(a) (5 points) $z(x^2 - y^2)$

(b) (5 points) $(w - y)(x - z)$

(c) (5 points) $w^3 - 3w^2x + 3wx^2 - x^3$

9. Simplify the expressions and give your answer without negative exponents.

   (a) (5 points) $\dfrac{3^{-2}a^3b^{-2}c^{-5}}{a^{-1}b^{-4}c^3}$

   (b) (5 points) $\left(\dfrac{2xy^{-2}}{3x^{-1}y^3}\right)^{-3}$