1. [10 pts. each] Write in lowest terms.

   (a) $\dfrac{2x^2 - 5x}{16x - 40}$

   (b) $\dfrac{25m^2 - n^2}{25m^2 - 10mn + n^2}$

2. [10 pts. each] Multiply or divide as indicated, and write in lowest terms.

   (a) $\dfrac{s^3 t^2}{10 s^2 t^4} \div \dfrac{8 s^4 t^2}{5 t^6}$

   (b) $\dfrac{t^2 - 49}{t^2 + 4t - 21} \cdot \dfrac{t^2 + 8t + 15}{t^2 - 2t - 35}$

3. [10 pts. each] Add or subtract as indicated, and write in lowest terms.

   (a) $\dfrac{5}{12x^5 y^2} + \dfrac{5}{18x^4 y^5}$

   (b) $\dfrac{5x}{x + 3} + \dfrac{x + 2}{x} - \dfrac{6}{x^2 + 3x}$

4. [10 pts.] Simplify the complex fraction:
$$\dfrac{1 - \dfrac{2}{3x}}{9 - \dfrac{4}{x^2}}$$

5. [10 pts. each] Solve each equation.

   (a) $\dfrac{4}{7 - a} = \dfrac{2a}{a + 3}$

   (b) $\dfrac{3}{z} + \dfrac{z}{z + 2} = \dfrac{4}{z^2 + 2z}$

6. [10 pts.] Solve for r: $I = \dfrac{nE}{R + nr}$.

7. [15 pts.]   Lord Umberbottom lives in a flat in London. Some days he rides his penny-farthing to the pub at Piccadilly Circus, while other days he walks. When he rides his pennyfarthing, he gets to the pub 36 minutes faster than when he walks. If his average walking speed is 3 mph and his average riding speed is 12 mph, how far is it from his flat to the pub?

8. [10 pts.] A swimming pool can be filled in 12 hours if water enters through a pipe alone, or in 30 hours if water enters through a hose alone. If water is entering through both the pipe and the hose, how long will it take to fill the pool?

9. [10 pts. each] Solve each system of equations. If the system is inconsistent or has dependent solutions, say so.

(a)
$$\begin{cases} 3x + 2y = 13 \\ 4x - y = -1 \end{cases}$$

(b)
$$\begin{cases} \frac{1}{4}x - \frac{1}{5}y = 9 \\ 5x - y = 0 \end{cases}$$

10. [10 pts.] Simplify the root $\sqrt{(-q)^2}$.

11. [10 pts.] Write with radicals: $(2m)^{-2/3}$.

12. [10 pts. each] Simplify each expression. Write all answers with positive exponents. Assume that all variables represent positive real numbers.

(a) $x^{2/5} \cdot x^{-1/4}$

(b) $\dfrac{c^{1/6}h^{-5/6}}{(c^3 h)^{1/3}}$

FORMULAS:
$A^3 + B^3 = (A + B)(A^2 - AB + B^2)$
$A^3 - B^3 = (A - B)(A^2 + AB + B^2)$