

Show all work neatly and systematically for full credit. Total points: 104 (#1 - #12, 3 points each; #13 - #30, 4 points each)

Factor the polynomial completely. If the polynomial cannot be factored, say it is prime.

1) $28x^5 + 8x^3 - 20x$

7) $3x^2y + 12xy - 63y$

2) $xy + 8x - 5y - 40$

8) $x^2 - x - 48$

3) $x^2 + 11x + 18$

9) $3x^3 - 3$

4) $9x^2 + 11x - 14$

10) $72x^3 - 632x^2 + 448x$

5) $9x^2 - 16$

11) $10x^2 + 21x + 9$

6) $15(x + 7) - y(x + 7)$

12) $25x^2 - 60xy + 36y^2$

List all numbers for which the rational expression is undefined.

$$13) \frac{x^2 - 4}{15x^2 + 8x + 1}$$

Perform the indicated operation and simplify if possible.

$$16) \frac{5}{x+1} \cdot (3x+3)$$

Simplify the rational expression.

$$17) \frac{b-a}{a^2-b^2}$$

Solve the equation by factoring.

$$14) 3x^2 = 4x + 7$$

Simplify, if possible.

$$18) \frac{t^2 - 4t + 4}{t^2 + 4t + 4} \div \frac{(t-2)}{(t+2)} \div \frac{3t+6}{t^2-4}$$

Simplify the rational expression.

$$15) \frac{2x+2}{10x^2+16x+6}$$

Simplify.

$$19) \frac{x+4+\frac{4}{x}}{x+7+\frac{10}{x}}$$

Solve the problem.

- 20) The width of a rectangle is 6 kilometers less than twice its length. If its area is 140 square kilometers, find the dimensions of the rectangle.

Perform the indicated operation. Simplify, if possible.

$$23) \frac{3x + 24}{x^2 - 2x - 8} - \frac{x + 20}{x^2 - 2x - 8}$$

Perform the indicated operation and simplify if possible.

$$24) \frac{x^2 - 25}{x^2 - 5x} \div \frac{x^2 + 4x + 1}{2x + 8}$$

Simplify the rational expression.

$$21) \frac{4m^3 - 4m^2 - 8m}{m^2 - 3m + 2}$$

Solve the equation by factoring.

$$25) 25t^3 - 16t = 0$$

Perform the indicated operation and simplify if possible.

$$22) \frac{y^2 - 10y + 24}{2y + 12} \cdot \frac{y + 6}{3y - 12}$$

Perform the indicated operation and simplify if possible.

$$26) \frac{7a}{a^2 + 2a - 8} - \frac{2}{a + 4}$$

Perform the indicated operation and simplify if possible.

$$29) \frac{x + 5}{x^2 + 11x + 28} + \frac{5x + 8}{x^2 + 5x - 14}$$

$$27) \frac{16}{x^2 - 1} + \frac{8}{x + 1}$$

Solve the equation.

$$30) \frac{10}{a - 10} = \frac{a}{a - 10} - 3$$

Solve the equation.

$$28) \frac{5}{y - 4} = \frac{2}{y + 4}$$