

Simplify completely

$$1. \frac{\cancel{1} \cdot \cancel{2} 1}{\cancel{2} 4 \cancel{1} 6} = \frac{1}{32}$$

$$2. \frac{8}{36} \div \left( \frac{3}{9} \cdot \frac{1}{15} \right) \rightarrow \frac{2}{9} \div \frac{1}{45}$$

$$\frac{2}{9} \div \left( \frac{1}{3} \cdot \frac{1}{15} \right) = \frac{2}{9} \cdot \frac{\cancel{45} 5}{1}$$

$$= 10$$

$$3. \frac{3^4 \cdot 9^2}{(3 \cdot 4)^3} = \frac{3^4 \cdot 9^2}{3^3 \cdot 4^3} = \frac{\cancel{3} \cdot \cancel{3} \cdot \cancel{3} \cdot 3 \cdot 9^2}{\cancel{3} \cdot \cancel{3} \cdot \cancel{3} \cdot 4^3}$$

$$= \frac{243}{64}$$

$$4. 15 \cdot x^3 \cdot 4^8 \cdot z^2 \rightarrow .2 \cdot .2$$

$$4. \frac{15x^3y^8z^2}{5xy^6z^4} = \frac{3x^2y^2}{z^2}$$

$$5. \frac{x^2 + 3x - 10}{x^2 - 4} = \frac{(x+5)\cancel{(x-2)}}{(x+2)\cancel{(x-2)}} = \frac{x+5}{x+2}$$

$$6. \frac{2x^2 + 5x - 12}{x^3 + 64} = \frac{(2x-3)(x+4)}{(x+4)(x^2-4x+16)}$$

$$= \frac{2x-3}{x^2-4x+16}$$

$$7. \underline{x^2 - 2x - 15} \cdot \underline{x^2 + 4x + 4}$$

$$x^2 + 5x + 6 \quad x + 1$$

$$\frac{(x-5)\cancel{(x+3)}}{\cancel{(x+3)}\cancel{(x+2)}} \cdot \frac{\cancel{(x+2)}(x+2)}{x+1}$$
$$= \frac{(x-5)(x+2)}{x+1}$$

$$8. \frac{6x^2 + 13x - 5}{2x + 5} \div \frac{9x^2 - 1}{x + 4}$$

$$9. \frac{3}{7} - \frac{1}{4}$$

$$10. \quad \frac{8 \cdot x}{5x} - \frac{3 \cdot 5}{x5}$$

$$\frac{8x-15}{5x}$$

$$11. \quad \frac{7}{x} - \frac{5}{y} \quad \frac{7y-5x}{xy}$$

$$12. \quad \frac{6(x-1)}{(x+3)(x-1)} + \frac{2x(x+3)}{(x-1)(x+3)}$$

$$= \frac{6x-6 + 2x^2+6x}{(x+3)(x-1)}$$

$$= \frac{2x^2 + 12x - 6}{(x+3)(x-1)}$$

$$= \frac{2(x^2 + 6x - 3)}{(x+3)(x-1)}$$

$$13. \quad \frac{4-x}{x+6} - \frac{x+6}{x-2}$$

$$x^2 + 12x + 36$$

$$\frac{(4-x)(x-2) - (x+6)(x+6)}{(x+6)(x-2)}$$

$$= \frac{4x - 8 - x^2 + 2x - x^2 - 12x - 36}{(x+6)(x-2)}$$

$$= \frac{-2x^2 - 6x - 44}{(x+6)(x-2)}$$

$$= \frac{-2(x^2 + 3x + 22)}{(x+6)(x-2)}$$

$$14. \quad \frac{x+5}{x^2-4} - \frac{3+x}{x-2}$$

$$15. \quad \frac{x+5}{x^2-4} - \frac{3+x}{(x-2)^2}$$

$$16. \quad \frac{7}{x-2} - \frac{3}{2-x}$$

$$x-2 = -1(-x+2) \\ = -1(2-x)$$

$$\frac{7}{x-2} + \frac{3}{x-2}$$

$$= \frac{10}{x-2}$$

$$17. \quad \frac{-2}{3x+9} + \frac{4}{24-6x} - \frac{5}{x+2}$$

$$3(x+3)$$

$$-6(x-4)$$

$$x+2$$

$$-6(x+3)(x-4)(x+2)$$

$$\frac{x}{4} - \frac{2}{8} + \frac{1}{12}$$

$$4$$

$$4 \cdot 2$$

$$4 \cdot 3$$

# The Ultimate Challenge!

$$\left[ \frac{5}{x^2-x-6} + \frac{1}{-x^2+2x+3} - \frac{3x}{x^2+3x+2} \right] \div 3x^2-13x-3$$