

Name SOLUTIONS!

Each of the 18 questions is worth 5 points plus 1 point for each of 10 homework problems for a total of 100 points

Simplify the expression. Use positive exponents. Assume variables represent nonzero real numbers.

1) $\frac{6^2 x^8}{6^9 x^3}$

$$\frac{x^{8-3}}{6^{9-2}}$$

$$\boxed{\frac{x^5}{6^7}}$$

Use a combination of rules for exponents to simplify. Write answers with only positive exponents. Assume that all variables represent nonzero real numbers.

2) $\frac{(x^3 y^{-5})^4}{x^{-4} y^3}$

$$\frac{x^{12} y^{-20}}{x^{-4} y^3}$$

$$\frac{x^{12 - (-4)}}{y^{3 + 20}}$$

$$\boxed{\frac{x^{16}}{y^{23}}}$$

Perform the division. Write the answer with positive exponents.

3) $\frac{-9x^7 - 18x^5}{-3x^3}$

$$\frac{-9x^7}{-3x^3} - \frac{18x^5}{-3x^3}$$

$$3x^{7-3} - (-6)x^{5-3}$$

$$\boxed{3x^4 + 6x^2}$$

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$$4) \frac{16x^{10} - 14x^9 + 8x^8 + 10x^6 + 3x^4}{2x^8}$$

$$\frac{16x^{10}}{2x^8} - \frac{14x^9}{2x^8} + \frac{8x^8}{2x^8} + \frac{10x^6}{2x^8} + \frac{3x^4}{2x^8}$$

$$\boxed{8x^2 - 7x + 4 + \frac{5}{x^2} + \frac{3}{2x^4}}$$

Write the rational expression in lowest terms.

$$5) \frac{a^2 - 6a}{(a+9)(a-6)}$$

$$\frac{a(a-6)}{(a+9)(a-6)}$$

$$\boxed{\frac{a}{a+9}}$$

$$6) \frac{a^2 - 36}{a^2 + 9a + 18}$$

$$\frac{(a+6)(a-6)}{(a+6)(a+3)}$$

$$\boxed{\frac{a-6}{a+3}}$$

Write the expression in lowest terms.

$$7) \frac{m^2 - 9m}{9 - m}$$

$$\frac{m(m-9)}{-1(m-9)}$$

$$\boxed{-m}$$

Multiply. Write the answer in lowest terms.

$$8) \frac{k^2 + 11k + 28}{k^2 + 15k + 56} \cdot \frac{k^2 + 8k}{k^2 + 9k + 20}$$

$$\frac{(k+7)(k+4)}{(k+7)(k+8)} \cdot \frac{k(k+8)}{(k+4)(k+5)}$$

$$\boxed{\frac{k}{k+5}}$$

Divide. Write the answer in lowest terms.

$$9) \frac{4x - 4y}{36 - 9z} \div \frac{2y - 2x}{z - 4}$$

$$\frac{4(x-y)}{9(4-z)} \cdot \frac{(z-4)}{z(y-x)} \cdot \frac{1}{(-1)} \cdot \frac{1}{(-1)}$$

$$\frac{4(x-y) \cdot (z-4)}{9[(-1)(4-z)]2[(-1)(y-x)]}$$

$$\frac{4(x-y)(z-4)}{9(z-4)2(x-y)}$$

$$\frac{4}{9 \cdot 2}$$

$$\boxed{\frac{2}{9}}$$

Find the least common denominator (LCD).

10) $\frac{1}{40x^5}, \frac{1}{36x^4}, \frac{4}{90x^2}$

$$\frac{1}{2 \cdot 2 \cdot 2 \cdot 5 x^5}, \frac{1}{2 \cdot 2 \cdot 3 \cdot 3 x^4}, \frac{4}{2 \cdot 3 \cdot 3 \cdot 5 x^2}$$

$$\text{LCD} = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 x^5$$

$$= \boxed{360 x^5}$$

11) $\frac{1}{r^2 + 10r + 25}, \frac{1}{r^2 + 5r}$

$$\frac{1}{(r+5)(r+5)}, \frac{1}{r(r+5)}$$

$$\text{LCD} = \boxed{r(r+5)^2}$$

Perform the indicated operation and simplify.

12) $\frac{4}{r} + \frac{5}{r-3}$

$$\frac{4}{r} \cdot \frac{(r-3)}{(r-3)} + \frac{5}{(r-3)} \cdot \frac{r}{r}$$

$$\frac{4(r-3) + 5r}{r(r-3)}$$

$$\frac{4r - 12 + 5r}{r(r-3)}$$

$$\boxed{\frac{9r - 12}{r(r-3)} \text{ or } \frac{3(3r - 4)}{r(r-3)}}$$

Perform the indicated operation and simplify.

$$13) \frac{x}{x-4} + \frac{8}{x+4} - \frac{32}{x^2-16} \Rightarrow (x+4)(x-4)$$

$$\frac{x}{(x-4)} \cdot \frac{(x+4)}{(x+4)} + \frac{8}{(x+4)} \cdot \frac{(x-4)}{(x-4)} - \frac{32}{(x+4)(x-4)}$$

$$\frac{x(x+4) + 8(x-4) - 32}{(x+4)(x-4)}$$

$$\frac{x^2 + 4x + 8x - 32 - 32}{(x+4)(x-4)}$$

$$\frac{x^2 + 12x - 64}{(x+4)(x-4)}$$

$$\frac{(x+16)(x-4)}{(x+4)(x-4)}$$

$$\boxed{\frac{x+16}{x+4}}$$

Add or subtract. Write the answer in lowest terms.

$$14) \frac{4}{x-8} + \frac{8}{8-x}$$

$$\frac{4}{x-8} - \frac{8}{x-8}$$

$$\boxed{\frac{-4}{x-8}}$$

Solve the equation.

$$15) \frac{x-8}{3} = \frac{x+9}{8}$$

$$8(x-8) = 3(x+9)$$

$$8x - 64 = 3x + 27$$

$$5x = 91$$

$$\boxed{x = \frac{91}{5}}$$

$$16) \frac{2}{t} = \frac{t}{5t-12}$$

$$2(5t-12) = t \cdot t$$

$$10t - 24 = t^2$$

$$0 = t^2 - 10t + 24$$

$$(t-4)(t-6) = 0$$

$$t = 4, 6$$

$$17) \frac{5}{6} = \frac{8}{x+6}$$

$$5(x+6) = 6 \cdot 8$$

$$5x + 30 = 48$$

$$5x = 18$$

$$x = \frac{18}{5}$$

Solve the problem.

18) If 4 hours are required to type 12 pages, how many hours would be required to type 21 pages?

$$\frac{4}{12} = \frac{x}{21}$$

$$4 \cdot 21 = 12x$$

$$84 = 12x$$

$$x = 7$$

$$7 \text{ hrs}$$