

Mid-Chapter Quiz for Chapter 4

1. $(t^3)^{-4}(3t^3) = t^{-12}(3t^3)$
 $= 3t^{-12+3}$
 $= 3t^{-9}$
 $= \frac{3}{t^9}$
2. $(3x^2y^{-1})(4x^{-2}y)^{-2} = 3x^2y^{-1} \cdot 4^{-2}x^4y^{-2}$
 $= 3 \cdot \frac{1}{4^2} \cdot x^{2+4}y^{-1+(-2)}$
 $= \frac{3}{16}x^6y^{-3}$
 $= \frac{3x^6}{16y^3}$
3. $\frac{10u^{-2}}{15u} = \frac{10}{15}u^{-2-1} = \frac{2}{3}u^{-3} = \frac{2}{3u^3}$
4. $\frac{(10x)^0x^{-2}}{(x^2)^{-1}} = \frac{x^{-2}}{x^{-2}} = 1$
5. (a) $13,400,000 = 1.34 \times 10^7$
 (b) $0.00075 = 7.5 \times 10^{-4}$
6. (a) $(3 \times 10^3)^4 = 3^4 \times 10^{12} = 81 \times 10^{12} = 8.1 \times 10^{13}$
 (b) $\frac{3.2 \times 10^4}{16 \times 10^7} = \frac{3.2}{16} \times 10^{-3} = 0.2 \times 10^{-3} = 2 \times 10^{-4}$
7. $y(y - 4) \neq 0$
 $y \neq 0$
 $y - 4 \neq 0$
 $y \neq 4$
 $D = (-\infty, 0) \cup (0, 4) \cup (4, \infty)$
8. $h(x) = \frac{x^2 - 9}{x^2 - x - 2}$
 (a) $h(-3) = \frac{(-3)^2 - 9}{(-3)^2 - (-3) - 2}$
 $= \frac{9 - 9}{9 + 3 - 2} = \frac{0}{10} = 0$
 (b) $h(0) = \frac{0^2 - 9}{0^2 - 0 - 2}$
 $= \frac{-9}{-2} = \frac{9}{2}$
 (c) $h(-1) = \frac{(-1)^2 - 9}{(-1)^2 - (-1) - 2}$
 $= \frac{1 - 9}{1 + 1 - 2} = \frac{-8}{0} = \text{undefined}$
 (d) $h(5) = \frac{5^2 - 9}{5^2 - 5 - 2}$
 $= \frac{25 - 9}{25 - 5 - 2} = \frac{16}{18} = \frac{8}{9}$
9. $\frac{9y^2}{6y} = \frac{3y}{2}$
10. $\frac{8u^3v^2}{36uv^3} = \frac{2u^2}{9v}$
11. $\frac{4x^2 - 1}{x - 2x^2} = \frac{(2x - 1)(2x + 1)}{x(1 - 2x)}$
 $= \frac{(2x - 1)(2x + 1)}{-x(2x - 1)}$
 $= \frac{2x + 1}{-x}$
12. $\frac{(z + 3)^2}{2z^2 + 5z - 3} = \frac{(z + 3)(z + 3)}{(2z - 1)(z + 3)}$
 $= \frac{z + 3}{2z - 1}$
13. $\frac{7ab + 3a^2b^2}{a^2b} = \frac{ab(7 + 3ab)}{a^2b}$
 $= \frac{7 + 3ab}{a}$
14. $\frac{2mn^2 - n^3}{2m^2 + mn - n^2} = \frac{n^2(2m - n)}{(2m - n)(m + n)}$
 $= \frac{n^2}{m + n}$
15. $\frac{11t^2}{6} \cdot \frac{9}{33t} = \frac{11t^2(9)}{6(33t)} = \frac{t}{2}$

$$16. (x^2 + 2x) \cdot \frac{5}{x^2 - 4} = \frac{x(x+2)5}{(x-2)(x+2)}$$

$$= \frac{5x}{x-2}$$

$$17. \frac{4}{3(x-1)} \cdot \frac{12x}{6(x^2+2x-3)} = \frac{4(12x)}{3(x-1)6(x+3)(x-1)}$$

$$= \frac{8x}{3(x-1)^2(x+3)}$$

$$= \frac{8x}{3(x-1)(x^2+2x-3)}$$

$$18. \frac{5u}{3(u+v)} \cdot \frac{2(u^2-v^2)}{3v} \div \frac{25u^2}{18(u-v)} = \frac{5u \cdot 2(u-v)(u+v) \cdot 18(u-v)}{3(u+v)(3v)(25u^2)}$$

$$= \frac{4(u-v)^2}{5uv}$$

$$19. \frac{\frac{9t^2}{3-t}}{6t} \cdot \frac{t-3}{t-3} = \frac{-9t^2}{6t} = -\frac{3t}{2}$$

$$20. \frac{\frac{10}{x^2+2x}}{15} = \frac{\frac{10}{x(x+2)}}{15} \cdot \frac{x(x+2)(x+1)}{x(x+2)(x+1)}$$

$$= \frac{10(x+1)}{15x}$$

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

21. (a) Verbal Model:

Average cost

 =

Total cost

 \div

Number of units

Equation: Average cost = $\frac{6000 + 10.50x}{x}$

(b) Average cost when $x = 500$ units are produced = $\frac{6000 + 10.50(500)}{500} = \22.50

Section 4.4 Adding and Subtracting Rational Expressions

$$1. \frac{5}{8} + \frac{7}{8} = \frac{5+7}{8} = \frac{12}{8} = \frac{3}{2}$$

$$3. \frac{5x}{8} - \frac{7x}{8} = \frac{-2x}{8} = \frac{-x}{4}$$

$$5. \frac{2}{3a} - \frac{11}{3a} = \frac{2-11}{3a} = \frac{-9}{3a} = \frac{-3}{a}$$

$$7. \frac{x}{9} - \frac{x+2}{9} = \frac{x-(x+2)}{9} = \frac{x-x-2}{9} = \frac{-2}{9}$$

$$9. \frac{z^2}{3} + \frac{z^2-2}{3} = \frac{z^2+z^2-2}{3} = \frac{2z^2-2}{3}$$

$$11. \frac{2x+5}{3} + \frac{1-x}{3} = \frac{2x+5+1-x}{3} = \frac{x+6}{3}$$

$$13. \frac{3y}{3} - \frac{3y-3}{3} - \frac{7}{3} = \frac{3y-(3y-3)-7}{3}$$

$$= \frac{3y-3y+3-7}{3}$$

$$= \frac{-4}{3}$$

$$15. \frac{3y-22}{y-6} - \frac{2y-16}{y-6} = \frac{3y-22-(2y-16)}{y-6}$$

$$= \frac{3y-22-2y+16}{y-6}$$

$$= \frac{y-6}{y-6}$$

$$= 1, y \neq 6$$