**Algebra Basics Review** **Name: SOLUTIONS**

1) For each of the following, identify the major terms, and then identify the major factors in each of the major terms. (2 mark each)

a) $6 - 2\pi r + 7t$

| Major Terms | Factors in Term |
|---|---|
| 6 | 6 |
| $-2\pi r$ | $-2, \pi, r$ |
| $7t$ | $7, t$ |

b) $4(x-3) + 5x^2$

| Major Terms | Factors in Term |
|---|---|
| $4(x-3)$ | $4, x-3$ |
| $5x^2$ | $5, x^2$ |
| | |

c) $3 - 2x + 7x^2 - x^4$

| Major Terms | Factors in Term |
|---|---|
| 3 | 3 |
| $-2x$ | $-2, x$ |
| $7x^2$ | $7, x^2$ |
| $-x^4$ | $-x^4$ |

d) $3x(x+1) - 4x^2(x^2-1)$

| Major Terms | Factors in Term |
|---|---|
| $3x(x+1)$ | $3,\ x\ , x+1$ |
| $-4x^2(x^2-1)$ | $-4, x^2, x^2-1$ |
| | |

e) $7(3x-5)^6$

| Major Terms | Factors in Term |
|---|---|
| $7(3x-5)^6$ | $7, (3x-5)^6$ |
| | |

f) $3x^2(4x-3)^8 - 8x^3(4x-3)^7$

| Major Terms | Factors in Term |
|---|---|
| $3x^2(4x-3)^8$ | $3, x^2, (4x-3)^8$ |
| $-8x^3(4x-3)^7$ | $-8, x^3, (4x-3)^7$ |

2) Use the distributive property to expand the following and then simplify by collecting like terms. (2 marks each)

a) $(4x+2)(3x-1)$
$= 12x^2 + 6x - 4x - 2$
$= 12x^2 + 2x - 2$

b) $(x^2 + 4x - 2)(2x-3)$
$= 2x^3 + 8x^2 - 4x - 3x^2 - 12x + 6$
$= 2x^3 + 5x^2 - 16x + 6$

c) $3xy^2 + 6x^2y - x(y^2 - 4xy)$
$= 3xy^2 + 6x^2y - xy^2 + 4x^2y$
$= 2xy^2 + 10x^2y$

d) $4(x+1)(2x-1) - (-3x+4)(x-1)$
$= 4(2x^2 + 2x - x - 1) - (-3x^2 + 4x + 3x - 4)$
$= 8x^2 + 4x - 4 + 3x^2 - 7x + 4$
$= 11x^2 - 3x$

3) Simplify the following (if possible): (2 marks each)

a) $3x^2 \times (-2x^4)$

$= -6x^{2+4}$

$= -6x^6$

b) $9x^3 \div 3x^{-2}$

$= 3x^{3-(-2)}$

$= 3x^5$

c) $3x^2 + (-2x^4)$

d) $\frac{9x^7y^2}{2x^3y^7}$

$= \frac{9x^{7-3}}{2y^{7-2}}$

$= \frac{9x^4}{2y^5}$

e) $\left(\frac{6x^4}{15x^2}\right)^{-3}$

$= \left(\frac{2x^2}{5}\right)^{-3}$

$= \frac{5^3}{2^3x^6}$

$= \frac{125}{8x^6}$

f) $\left(\frac{3x^{-2}}{18x^{-7}}\right)^2$

$= \left(\frac{1x^5}{6}\right)^2$

$= \frac{x^{10}}{6^2}$

$= \frac{x^{10}}{36}$

4) Simplify the following fractions by combining exponentials and cancelling common factors. Break up the fractions if needed to cancel factors. (2 marks each)

a) $\frac{42x^3(x+3)}{-6x^2(x+3)(x-3)}$

$= \frac{-7x^{3-2}}{(x-3)}$

$= \frac{-7x}{(x-3)}$

b) $\frac{25}{(x+1)} \times \frac{14(2x-1)}{5(x-1)} \times \frac{2(x+1)}{35(2x-1)}$

$= \frac{5}{1} \times \frac{2}{1(x-1)} \times \frac{2}{5}$

$= \frac{1}{1} \times \frac{2}{1(x-1)} \times \frac{2}{1}$

$= \frac{4}{x-1}$

c) $\frac{25(3x-4)^3(x-4)}{15(x-4)^4}$

$= \frac{5(3x-4)^3}{3(x-4)^{4-1}}$

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

d) $\frac{\frac{4}{(2x-3)}}{\frac{16}{7x(2x-3)^2}}$

$= \frac{4}{(2x-3)} \times \frac{7x(2x-3)^2}{16}$

$= \frac{1}{1} \times \frac{7x(2x-3)^{2-1}}{4}$

$= \frac{7x(2x-3)}{4}$

e) $\frac{3(2x-5)^4-2(x+1)}{6(2x-5)^2}$

$= \frac{3(2x-5)^4}{6(2x-5)^2} - \frac{2(x+1)}{6(2x-5)^2}$

$= \frac{1(2x-5)^{4-2}}{2} - \frac{1(x+1)}{3(2x-5)^2}$

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

f) $\frac{8x(x+3)^2-7\sqrt{x}(x+3)+5(x+3)^4}{(x+3)^4}$

$= \frac{8x(x+3)^2}{(x+3)^4} - \frac{7\sqrt{x}(x+3)}{(x+3)^4} + \frac{5(x+3)^4}{(x+3)^4}$

$= \frac{8x}{(x+3)^{4-2}} - \frac{7\sqrt{x}}{(x+3)^{4-1}} + 5$

$= \frac{8x}{(x+3)^2} - \frac{7\sqrt{x}}{(x+3)^3} + 5$

5) Solve the following addition/subtraction problems using the Lowest Common Denominator and reduce to lowest terms. (3 marks each)

a) $\frac{5}{6}+\frac{2}{3}-\frac{1}{2}$ LCD$= 2*3=6$

$=\frac{5}{6}+\frac{2}{3}*\frac{2}{2}-\frac{1}{2}*\frac{3}{3}$

$=\frac{5}{6}+\frac{4}{6}-\frac{3}{6}$

$=\frac{6}{6}=1$

b) $\frac{13}{30}+\frac{5}{12}-\frac{7}{15}$ LCD$= 3*2*2*5=60$

$=\frac{13}{30}*\frac{2}{2}+\frac{5}{12}*\frac{5}{5}-\frac{7}{15}*\frac{4}{4}$

$=\frac{26}{60}+\frac{25}{60}-\frac{28}{60}$

$=\frac{23}{60}$

c) $\frac{5x}{6}+\frac{2}{5}$ LCD$= 5*2*3=30$

$=\frac{5x}{6}*\frac{5}{5}+\frac{2}{5}*\frac{6}{6}$

$=\frac{25x}{30}+\frac{12}{30}$

$=\frac{25x+12}{30}$

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

$=\frac{1}{3x}*\frac{2x+1}{2x+1}+\frac{2}{2x+1}*\frac{3x}{3x}$

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

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

e) $\frac{5}{6(x+1)(x-3)}+\frac{1}{2(x-1)(x-3)}-\frac{2}{3(x+1)}$ LCD$= 2*3*(x+1)*(x-1)*(x-3)$

$=6(x+1)(x-1)(x-3)$

$=\frac{5}{6(x+1)(x-3)}*\frac{x-1}{x-1}+\frac{1}{2(x-1)(x-3)}*\frac{3(x+1)}{3(x+1)}-\frac{2}{3(x+1)}*\frac{2(x-1)(x-3)}{2(x-1)(x-3)}$

$=\frac{5(x-1)}{6(x-1)(x+1)(x-3)}+\frac{3(x+1)}{6(x-1)(x+1)(x-3)}-\frac{4(x-1)(x-3)}{6(x+1)(x-1)(x-3)}$

$=\frac{5x-5+3x+3-4(x^2-4x+3)}{6(x-1)(x+1)(x-3)}$

$=\frac{8x-2-4x^2+16x-12}{6(x-1)(x+1)(x-3)}$

$=\frac{-4x^2+24x-14}{6(x-1)(x+1)(x-3)}$

$=\frac{-2x^2+12x-7}{3(x-1)(x+1)(x-3)}$

f) $\frac{2}{15x^4}-\frac{3}{5x^2(x-1)}$ LCD$= 5*3*x^4(x-1)$

$=15x^4(x-1)$

$=\frac{2}{15x^4}*\frac{x-1}{x-1}-\frac{3}{5x^2(x-1)}*\frac{3x^2}{3x^2}$

$=\frac{2x-2-9x^2}{15x^4(x-1)}$