SHARP

**Worksheet 8 Memorandum: Algebraic Expressions (Term 2)**

**Grade 8 Mathematics**

1. a) 5 b) -15

2. a) $x, y, z \text{ and } p$ b) $x$

3. a) i) 4 ii) $-7x$ iii) -9 iv) 3rd degree

v) $6x^2y - 7xy^3 + 8xy - 9$ $x = 3, \quad y = -3$

$= 6(3)^2(-3) - 7(3)(-3)^3 + 8(3)(-3) - 9$

$= -18(9) - 21(-27) + 8(-9) - 9$

$= -162 + 567 - 72 - 9$

$= 324$

b) i) 5 ii) 11n iii) 12 iv) 3rd degree

v) $11mn + 12m^2n^2 - 15m^3 + 3n^3 + 12$ $m = 2, \quad n = -1$

$= 11(2)(-1) + 12(2)^2(-1)^2 - 15(2)^3 + 3(-1)^3 + 12$

$= -22 + 12(4)(1) - 15(8) + 3(-1) + 12$

$= -22 + 48 - 120 - 3 + 12$

$= -85$

c) i) 3 ii) -16b iii) 0 iv) 3rd degree

v) $11ab^3 - 16a^2b + 4a^3b$ $a = -2, \quad b = 2$

$= 11(-2)(2)^3 - 16(-2)^2(2) + 4(-2)^3(2)$

$= -22(8) - 32(4) + 8(-8)$

$= -176 - 128 - 64$

$= -368$

4. a) $4x(3x+7)-8x(2x-4)$

$=12x^2+28x-16x^2+32x$

$=-4x^2+60x$

b) $y(3y^2-8xy+4x^2)+3x(2y-4xy)$

$=3y^3-8xy^2+4x^2y+6xy-12x^2y$

$=3y^3-8xy^2-8x^2y+6xy$

c) $6(5x-12)-9x(2x^2-3x+7)$

$=30x-72-18x^3+27x^2-63x$

$=-18x^3+27x^2-33x-72$

d) $y^2(4y^2-8)-4y(y^3+6y)$

$=4y^4-8y^2-4y^4-24y^2$

$=-32y^2$

e) $y(8x+3y-4)-(3x+7y^2)$

$=8xy+3y^2-4y-3x-7y^2$

$=-4y^2+8xy-3x-4y$

f) $4x^2y(3xy-7x^2+8y^2)-3xy^2(12xy-8)$

$=12x^3y^2-28x^4y+32x^2y^3-36x^2y^3+24xy^2$

$=12x^3y^2-28x^4y-4x^2y^3+24xy^2$

g) $11xyz(3x+4y-12z)+3x^2yz$

$=33x^2yz+44xy^2z-132xyz^2+3x^2yz$

$=36x^2yz+44xy^2z-132xyz^2$

h) $8xy^2(7x^2y-3xy)+3(4x^3y^3-7xy^3)$

$=56x^3y^3-24x^2y^3+12x^3y^3-21xy^3$

$=68x^3y^3-24x^2y^3-21xy^3$

i) $\frac{1}{2}xy(8xy+12x^2-14y^2)-3x^2(7y^2-11xy)$

$=4x^2y^2+6x^3y-7xy^3-21x^2y^2+33x^3y$

$=-17x^2y^2+39x^3y-7xy^3$

j) $\frac{1}{3x}(6xy+12x^2y)-\frac{1}{4y}(16y^2x+24x^2y^2)$

$=2y+4xy-4xy-6x^2y$

$=-6x^2y+2y$

5. a) $\frac{15x^3+35xy^2-45x^2y}{5x}$

$=\frac{15x^3}{5x}+\frac{35xy^2}{5x}-\frac{45x^2y}{5x}$

$=3x^2+7y^2-9xy$

b) $\frac{13xy-26x^2y+39x}{13xy}$

$=\frac{13xy}{13xy}-\frac{26x^2y}{13xy}+\frac{39x}{13xy}$

$=1-2x+\frac{3}{y}$

c) $\frac{-64t^3+48t^2-16t}{8t^2}$

$= -\frac{64t^3}{8t^2}+\frac{48t^2}{8t^2}-\frac{16t}{8t^2}$

$= -8t+6-\frac{2}{t}$

d) $\frac{5x^2y+20xy-15}{20}$

$= \frac{5x^2y}{20}+\frac{20xy}{20}-\frac{15}{20}$

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

e) $\frac{16x^2-8x^2}{4x^2-1}$

$= \frac{8x^2}{4x^2-1}$

f) $\frac{16x^3-8x^2+24x^4}{5x^3+3x^3}$

$= \frac{16x^3-8x^2+24x^4}{8x^3}$

$= \frac{16x^3}{8x^3}-\frac{8x^2}{8x^3}+\frac{24x^4}{8x^3}$

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

g) $\frac{6a^4b^2+12a^2b^4-18a^2b^2}{2ab(3ab)}$

$= \frac{6a^4b^2+12a^2b^4-18a^2b^2}{6a^2b^2}$

$= \frac{6a^4b^2}{6a^2b^2}+\frac{12a^2b^4}{6a^2b^2}-\frac{18a^2b^2}{6a^2b^2}$

$= a^2+2b^2-3$

h) $\frac{18x^2y^2-36x^4y^2+54x^2y^4-63xy}{3x^2(-3y^2)}$

$= \frac{18x^2y^2-36x^4y^2+54x^2y^4-63xy}{-9x^2y^2}$

$= \frac{18x^2y^2}{-9x^2y^2}-\frac{36x^4y^2}{-9x^2y^2}+\frac{54x^2y^4}{-9x^2y^2}-\frac{63xy}{-9x^2y^2}$

$= -2+4x^4-6y^2+\frac{7}{xy}$

i) $\frac{-81x^2y^2+21x-15xy+18x^3y+9}{9xy-12xy}$

$= \frac{-81x^2y^2+21x-15xy+18x^3y+9}{-3xy}$

$= \frac{-81x^2y^2}{-3xy}+\frac{21x}{-3xy}-\frac{15xy}{-3xy}+\frac{18x^3y}{-3xy}+\frac{9}{-3xy}$

$= 27xy-\frac{7}{y}+5-6x^2-\frac{3}{xy}$

j) $\frac{24x^3y+64xy-36y^2}{15x^2-9x^2+2x^2}$

$= \frac{24x^3y+64xy-36y^2}{8x^2}$

$= \frac{24x^3y}{8x^2}+\frac{64xy}{8x^2}-\frac{36y^2}{8x^2}$

$= 3xy+\frac{8y}{x}-\frac{9y^2}{2x^2}$

6. a) $(4xy^2)^2+\sqrt[3]{-27x^6}$

$= 16x^2y^4-3x^2$

b) $\sqrt{9x^2y^4+16x^2y^4}$

$= \sqrt{25x^2y^4}$

$= 5xy^2$

c) $\sqrt[3]{(5x^2yz^3)^3}$

$= 5x^2yz^3$

d) $\sqrt{64a^6b^{12}} + \sqrt[3]{64a^6b^{12}}$

$= 8a^3b^6 + 4a^2b^4$

e) $3x\left(\sqrt{9x^4}\right) + 3x\left(\sqrt[3]{-27x^6}\right)$

$= 3x(3x^2) + 3x(-3x^2)$

$= 9x^3 - 9x^3$

$= 0$

7. a) $3abc + 1$

$= 3(-4)(1)\left(\frac{2}{3}\right) + 1$

$= -8 + 1$

$= -7$

b) $4a^2 + 7b - 6c + 9abc^2$

$= 4(-4)^2 + 7(1) - 6\left(\frac{2}{3}\right) + 9(-4)(1)\left(\frac{2}{3}\right)^2$

$= 4(16) + 7 - 4 - 36\left(\frac{4}{9}\right)$

$= 64 + 7 - 4 - 16$
$= 51$

c) $6a + b(3a - 6c) + 12$

$= 6(-4) + 1\left(3(-4) - 6\left(\frac{2}{3}\right)\right) + 12$

$= -24 + (-12 - 4) + 12$

$= -12 - 16$

$= -28$

d) $\sqrt{9a^2c - ab}$

$= \sqrt{9(-4)^2\left(\frac{2}{3}\right) - (-4)(1)}$

$= \sqrt{6(16) + 4}$

$= \sqrt{100}$

$= 10$

e) $\frac{3a+12b^2-c}{a}$

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

$= -\frac{12}{-4} + \frac{12}{-4} - \frac{\frac{2}{3}}{-4}$

$= 3 - 3 + \frac{1}{6}$

$= \frac{1}{6}$