***Pre-Calculus 11***

***Unit 3: Solving Quadratic Equations***

***Worksheet 3.1 – Factoring Polynomial Expressions***

1. Factor.
2. $x^{2}-16$ b) $25m^{2}-1$ c) $9-n^{2}$

d) $64x^{4}-81y^{2}$ e) $x^{2}-8x+12$ f) $m^{2}+5m-14$

g) $d^{2}+10d+16$ h) $a^{2}-4a+4$ i) $2x^{2}+7x+5$

j) $16m^{2}-40m+25$ k) $5n^{2}+14n-3$ l) $4x^{4}-12x^{2}-7$

m) $6c^{4}+10c^{2}+4$ n) $15a^{2}-39a+18$ o) $6x^{2}+9x-6$

1. Factor.
2. $x^{2}+xy-12y^{2}$ b) $m^{2}-12mn+27n^{2}$ c) $-4a^{2}+12ab+16b^{2}$

d) $-x^{2}+3xy$ e) $-5x^{2}+180y^{2}$ f) $-u^{4}-5u^{2}v^{2}+6v^{4}$

1. Factor.
2. $25m^{2}-16n^{2}$ b) $25\left(x+2\right)^{2}-16\left(3x-1\right)^{2}$

c) $a^{2}+3a+2$ d) $\left(x-1\right)^{2}+3\left(x-1\right)+2$

e) $2c^{2}+9c+4$ f) $2\left(x-3\right)^{2}+9\left(x-3\right)+4$

4. Factor.

 a) $3\left(2a+1\right)^{2}+\left(2a+1\right)-4$ b) $5(3x-2)^{2}+7(3x-2)$

 c) $4\left(m+3\right)^{2}-9\left(2m\right)^{2}$ d) $-\frac{1}{4}\left(2x\right)^{2}+25\left(2y^{3}\right)^{2}$

5. Factor.

 a) $12a^{2}-27b^{2}$ b) $25m^{4}n^{2}-36q^{2}$ c) $2x^{3}y+7x^{2}y-15xy$

6. Factor.

 a) $\frac{1}{2}x^{2}-2x-6$ b) $\frac{1}{4}c^{2}+\frac{1}{2}c-6$ c) $\frac{3}{2}x^{2}-5x+\frac{7}{2}$

 d) $\frac{1}{7}m^{2}+\frac{11}{14}m$+1 e) $\frac{1}{64}a^{2}-\frac{1}{36}b^{2}$ f) $\frac{1}{25}d^{2}-\frac{1}{100}f^{2}$

7. Factor.

 a) $0.1a^{2}-0.1a-3$ b) $0.5x^{2}-5.4x+4$ c) $0.5m^{2}-1.3m-0.6$

 d) $0.81x^{2}-0.25y^{2}$ e) $1.21k^{2}-0.25n^{2}$ f) $0.001c^{2}+0.008c+0.012$

8. Factor.

 a) $16m^{4}-1$ b) $4x^{4}-17x^{2}+4$ c) $\left(x^{2}+4x\right)^{2}-\left(x^{2}+4x\right)-20$

***Solutions***

1. a) $\left(x+4\right)\left(x-4\right)$ b) $\left(5m+1\right)\left(5m-1\right)$ c) $\left(3+n\right)\left(3-n\right)$

d) $\left(8x^{2}-9y\right)\left(8x^{2}+9y\right)$ e) $\left(x-6\right)\left(x-2\right)$ f) $\left(m+7\right)\left(m-2\right)$

g) $\left(d+8\right)\left(d+2\right)$ h) $\left(a-2\right)^{2}$ i) $\left(2x+5\right)\left(x+1\right)$

j) $(4m-5)^{2}$ k) $\left(n+3\right)\left(5n-1\right)$ l) $\left(2x^{2}-7\right)\left(2x^{2}+1\right)$

m) $2\left(c^{2}+1\right)\left(3c^{2}+2\right)$ n) $3\left(a-2\right)\left(5a-3\right)$ o) $3\left(x+2\right)\left(2x-1\right)$

2. a) $\left(x+4y\right)\left(x-3y\right)$ b) $\left(m-9n\right)\left(m-3n\right)$ c) $-4\left(a-4b\right)\left(a+b\right)$

 d) $-x\left(x-3y\right)$ e) $-5\left(x+6y\right)\left(x-6y\right)$ f) $-\left(u^{2}+6v^{2}\right)\left(u^{2}-v^{2}\right)$

3. a) $\left(5m+4n\right)\left(5m-4n\right)$ b) $-7\left(x-2\right)\left(17x+6\right)$ c) $\left(a+2\right)\left(a+1\right)$

 d) $x\left(x+1\right)$ e) $\left(c+4\right)\left(2c+1\right)$ f) $\left(x+1\right)\left(2x-5\right)$

4. a) $2a\left(6a+7\right)$ b) $3\left(3x-2\right)\left(5x-1\right)$ c) $-4\left(4m+3\right)\left(2m-3\right)$

 d) $\left(10y^{3}+x\right)\left(10y^{3}-x\right)$

5. a) $3\left(2a+3b\right)\left(2a-3b\right)$ b) $\left(5m^{2}n+6q\right)\left(5m^{2}n-6q\right)$ c) $xy\left(x+5\right)\left(2x-3\right)$

6. a) $\frac{1}{2}\left(x-6\right)\left(x+2\right)$ b) $\frac{1}{4}\left(c+6\right)\left(c-4\right)$ c) $\frac{1}{2}\left(3x-7\right)\left(x-1\right)$

 d) $\frac{1}{14}\left(2m+7\right)\left(m+2\right)$ e) $\frac{1}{4}\left(\frac{1}{4}a+\frac{1}{3}b\right)\left(\frac{1}{4}a-\frac{1}{3}b\right)$

 f) $\frac{1}{25}\left(d+\frac{1}{2}f\right)\left(d-\frac{1}{2}f\right) or \frac{1}{100}\left(2d+f\right)\left(2d-f\right) $

7. a) $0.1\left(a-6\right)\left(a+5\right)$ b) $0.1\left(5x-4\right)\left(x-10\right)$ c) $0.1\left(m-3\right)\left(5m+2\right)$

 d) $0.01\left(9x+5y\right)\left(9x-5y\right)$ e) $0.01\left(11k+5n\right)\left(11k-5n\right)$ f) $0.001\left(c+6\right)\left(c+2\right)$

8. a) $\left(4m^{2}+1\right)\left(2m+1\right)\left(2m-1\right)$ b) $\left(2x+1\right)\left(2x-1\right)\left(x+2\right)\left(x-2\right)$

 c) $\left(x+5\right)\left(x-1\right)\left(x+2\right)^{2}$