MPM2D – Exam Review – Units 1 – 3

Unit 1 – Powers and Polynomials

1. For each polynomial below, state the degree and the type of polynomial.

Polynomial	Degree of Polynomial	Type of Polynomial
$5x^2 – 8x + 11$		
$X^2y^3 + 9x^3y^3 + 17xy^2 + 145$		
$22x^4y^4z$		
$86x – 78y^2$		

2. Identify the numerical and literal coefficient of each term.

Term	Numerical Coefficient	Literal Coefficient
$99x^2y$		
$–a^2b^3c^4$		
125		

3. Expand and simplify.

a. $(2y^2 – 2y + 1) + (4y^2 – y – 4)$

b. $(2x^2 – 3x – 5) – (2x^2 + 4x – 7)$

c. $4x(2x – 3) – x(3x – 1)$

d. $(x – 4)(x + 7)$

e. $(5a + 2b)(3a – 4b)$

f. $–5(x – 6)(2x + 7)$

g. $(x + 3)^2$

h. $–4(y – 2)^2$

i. $–3(x – 7)^2 + 11$

j. $y = \frac{1}{4}(x + 6)^2 – 20$

4. Simplify each of the expressions below. Write all final answers with positive exponents.

   a. $(3x^{-3})^{-2}$
   b. $(2a^4b^{-2}c^3)^5$
   c. $3x^2yz^{-4}(16x^{-3}yz^8)$
   d. $-\dfrac{44x^9y^8z^3}{11x^7y^{10}z^2}$
   e. $\dfrac{5a^{10}b^{12}c}{105a^{-3}b^9}$
   f. $\dfrac{(4ac^2)(5a^3b^{-4}c^{11})^2}{10a^7b^{-7}c^7}$

5. Simplify each expression below using the power laws. Evaluate if possible.

   a. $10x^0$
   b. -12^3
   b. $(2y^{-5})^3$
   d. $\left(\dfrac{8}{9}\right)^{-2}$
   e. $\left(\dfrac{3x^4}{y^6}\right)^4$
   f. $\left(-\dfrac{3}{4}\right)^{-5}$
   g. $2^{-2}+4^{-2}$
   h. $(11x^{-3})^{-2}$

6. In baseball, the second base bag is a square. Its side length can be represented by the expression 5x+3.
   a. Write and expand an expression to represent the area of the top of the bag.
   b. If x represents 7 cm, what is the area of the top of the bag?

Unit 2 – The Quadratic Relation

1. Find the vertex, equation of axis of symmetry, the direction of opening, and the maximum/minimum value of each parabola. Use this information to sketch the graph.

   a. $y = x^2 - 7$
   b. $y = (x - 3)^2$
   c. $y = -(x + 1)^2 + 10$
   d. $y = 3x^2 - 12$
   e. $y = -\frac{1}{2}(x + 2)^2 - 3$
   f. $y = -4(x - 1)^2 + 4$

2. Find the equation of a quadratic relation in vertex form that:

   a. has vertex (–6, 0) and passes through (–3, 27)
   b. has vertex (3, 7) and has a y-intercept of –8
   c. has vertex (4, –2), opens down and is congruent to $y=3x^2$

3. Determine the number of x-intercepts in each quadratic relation below.

a. $y = \frac{1}{2}(x-11)^2 + 12$

b. $y = -7(x-8)^2 + 13$

c. $y = 2(x-4)^2$

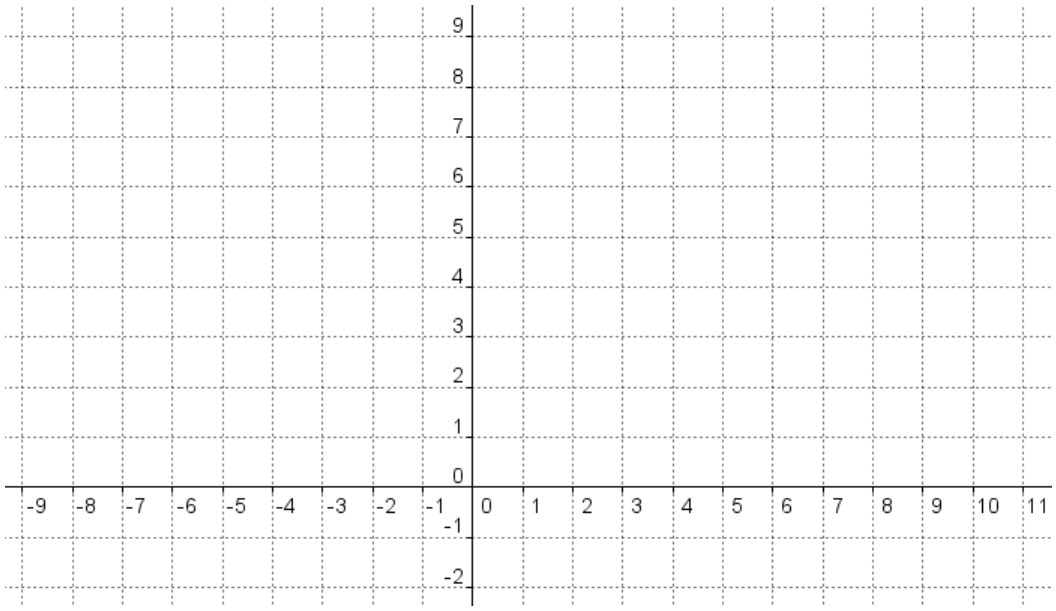
d. $y = 5x^2 - 6$

4. Graph each of the quadratic relations below on the grid provided.

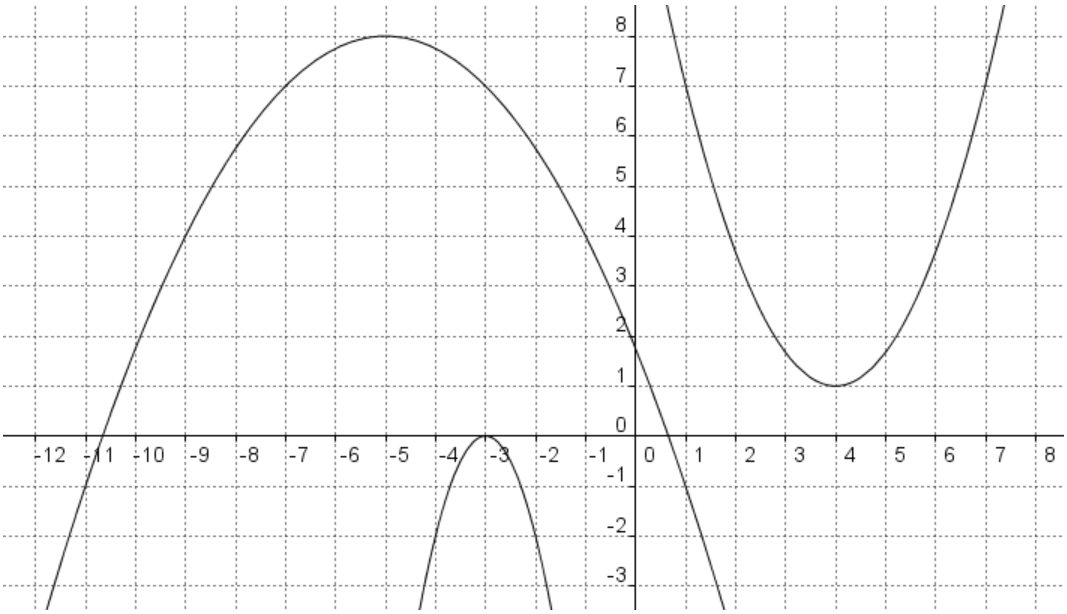
a. $y = -x^2 + 8$

b. $y = (x+6)^2$

c. $y = \frac{1}{2}(x-7)^2 - 2$



5. Determine the equation for each quadratic relation shown below.



Unit 3 – Factoring

1. Factory each expression below completely. If it is not factorable, prove that it cannot be factored.

a. $2ab - 6a^2b + 12ab^3$

b. $3(x + 4) - x(x + 4)$

c. $x^2 + 4x - 21$

d. $y^2 - 6y - 27$

e. $2x^2 + 10x + 12$

f. $2m^2 - 9m + 4$

g. $5y^2 - 11y + 2$

h. $36a^2 - 49$

i. $1 - 49x^2$

j. $121x^2 - 64b^2$

k. $y^2 - 6y + 9$

l. $4m^2 + 20m + 25$

m. $6x^2 + 3x - 8$

n. $12x^2 + 4x - 5$

Answer Key

Unit 1

1a) 2, trinomial
b) 6, polynomial
c) 9, monomial
d) 2, binomial

2a) 99, x^2y
b) –1, $a^2b^3c^4$
c) 125, none

3a) $6y^2–3y–3$
b) $–7x+2$
c) $5x^2–11x$
d) $x^2+3x–28$

e) $15a^2–14ab-8b^2$
f) $–10x^2+25x+210$
g) x^2+6x+9
h) $–4y^2+16y–16$

i) $-3x^2+42x-136$
j) $¼x^2+3x-11$

4a) $\frac{x^6}{9}$
b) $\frac{32a^{20}c^{15}}{b^{10}}$
c) $\frac{48y^2z^4}{x}$
d) $-\frac{4x^2z}{y^2}$

e) $\frac{a^{13}b^3c}{21}$
f) $\frac{10c^{17}}{b}$

5a) 10
b) –1728
c) $\frac{8}{y^{15}}$
d) $\frac{81}{64}$

e) $\frac{81x^{16}}{y^{24}}$
f) $-\frac{1024}{243}$
g) $\frac{5}{16}$
h) $\frac{x^6}{121}$

6a) $25x^2+30x+9$
b) 1 444 cm^2

Unit 2

	Vertex	Axis of Symmetry	Direction of Opening	Max/Min
a) $y = x^2 - 7$ $y = (x-0)^2 - 7$	(0, –7)	x = 0	Up	Min at y = –7
b) $y = (x-3)^2$	(3, 0)	x = 3	Up	Min at y = 0
c) $y = -(x+1)^2 + 10$	(–1, 10)	x= –1	Down	Max at y = 10
d) $y = 3x^2 - 12$ $y = 3(x-0)^2 - 12$	(0, –12)	x = 0	Up	Min at y = –12
e) $y = -\frac{1}{2}(x+2)^2 - 3$	(–2, –3)	x = –2	Down	Max at y = –3
f) $y = -4(x-1)^2 + 4$	(1, 4)	x = 1	Down	Max at y = 4

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

3a) none b) two c) one
d) two

4.a) V (0, 8), opens down b) V (-6, 0), opens up c) V (7, –2), vertical stretch by a factor of 0.5

5a) $y = -\frac{1}{4}(x+5)^2 + 8$ b) $y = -2(x+3)^2$ c) $y = \frac{2}{3}(x-4)^2 + 1$

Unit 3

1a) $2ab(1-3a+6b^2)$ b) (x+4)(3–x) c) (x+7)(x–3) d) (y–9)(y+3)
e) 2(x+2)(x+3) f) (2m–1)(m–4) g) (5y–1)(y-2) h) (6a–7)(6a+7)
i) (1–7x)(1+7x) or –(7x-1)(7x+1) j) (11x–8b)(11x+8b) k) $(y-3)^2$
l) $(2m+5)^2$ m) prime – see table below n) (6x+5)(2x–1)

P = –48	**S = 3**
(–1)(48)	47
(–2)(24)	22
(–3)(16)	13
(–4)(12)	8
(–6)(8)	2
(–8)(6)	–2
(–12)(4)	–8
(–16)(3)	–13
(–24) 2)	–22
(–48)(1)	–47