Name: _____ Date: _____

Chapter 3 Review

For each type of question, the achievement level is indicated. Showing work is an important strategy in communicating your knowledge and ideas so please be thorough.

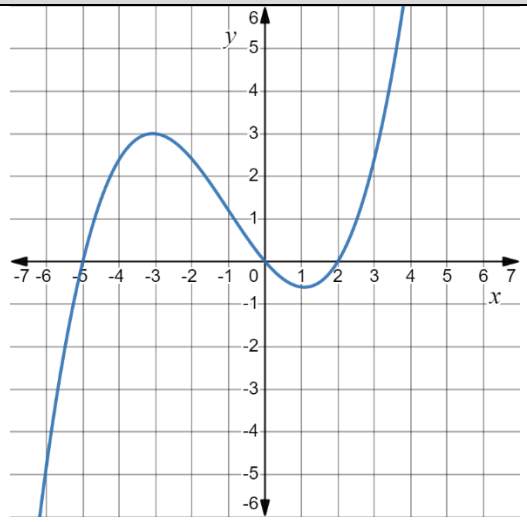
Learning Goal 3.1	Graphing and the characteristics of a graph (ex. Degree, extrema, zeros, end – behaviour)

1. Use the partial graph of the polynomial to determine the following information.

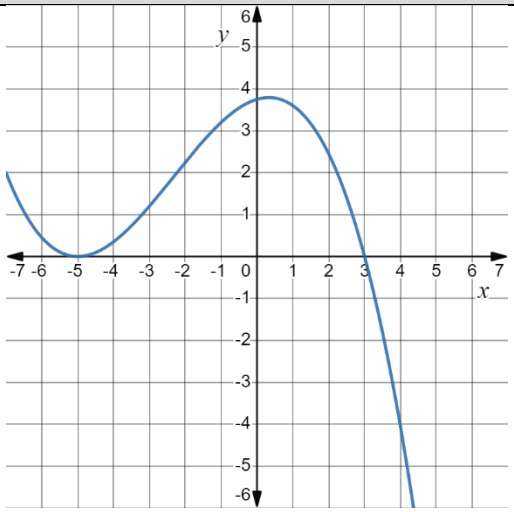
- Polynomial Type
- Number of $x-$ intercepts
- End Behaviour
- Value(s) of $x-$ intercepts
- Domain
- $y-$ intercept
- Range
- Max/Min values

Developing

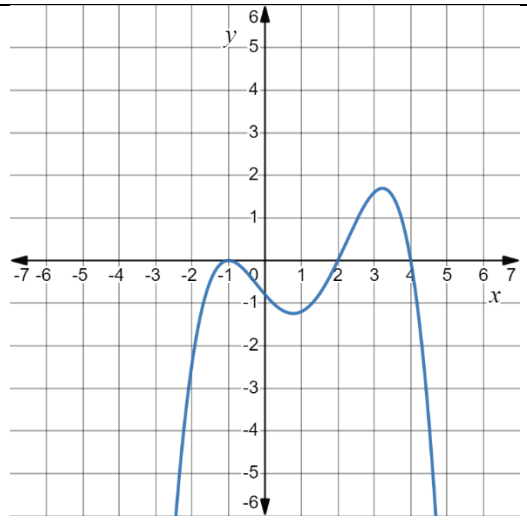
a.



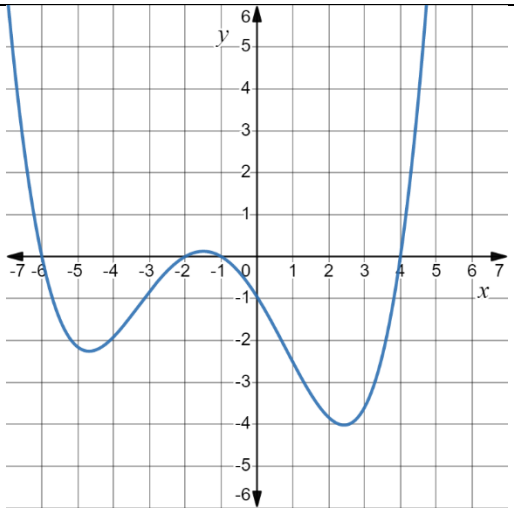
b.



c.

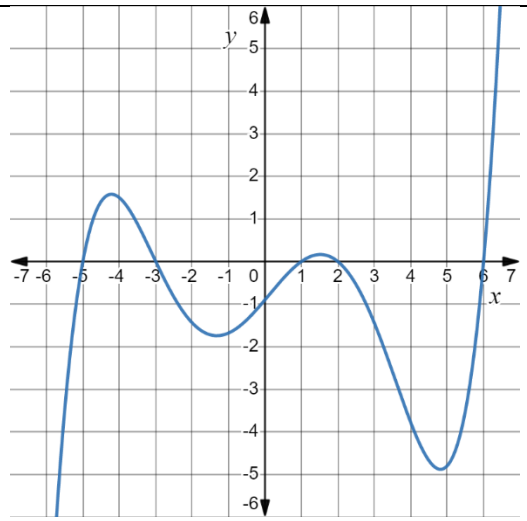
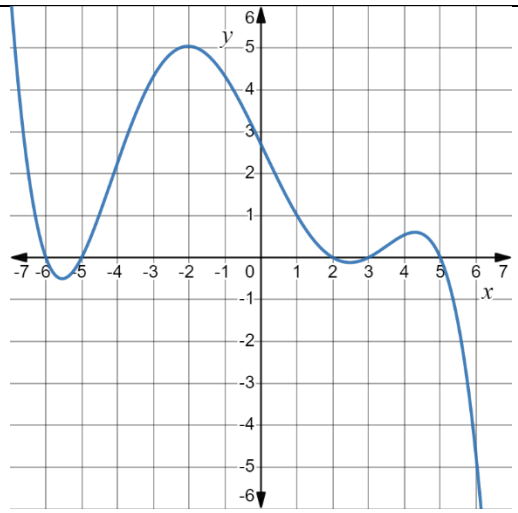


d.



Name: _____ Date: _____

Chapter 3 Review

e. 	f. 

2. Using the equation of the polynomial, determine the following information.

- Polynomial Type
- End Behaviour
- $y-$ intercept
- Domain
- Number of $x-$ intercepts

Proficient	
a. $P(x) = x^2 - 6x - 8$	b. $P(x) = -3x + x^2 + 5$
c. $P(x) = -x^3 + 2x^2 - 10x$	d. $P(x) = 2x + 5x^3 - 7 + 12x$
Extending	
e. $P(x) = 6x^4 - 3x^3 - 2x^2 + 12x - 1$	f. $P(x) = x^3 - 4x^2 - 5x^4 + 12 - 2x$
g. $P(x) = 6x^5 - 7x^3 - x - 9$	h. $P(x) = x^3 - x^4 - x^5$

3. On a grid, sketch a polynomial function with the following characteristics.

Extending	
a. A polynomial function with degree 3, a positive leading coefficient and 2 $x-$ intercepts.	b. A polynomial function with degree 4, a negative leading coefficient, and 4 $x-$ intercepts.
c. A polynomial function with degree 5, a negative leading coefficient and 3 $x-$ intercepts.	d. A polynomial function with degree 4, a positive leading coefficient, and 2 $x-$ intercepts.

Name: _____ Date: _____

Chapter 3 Review

Extending
4. A skateboard manufacturer determines that it's profit P, in dollars, can be modelled by the function $P(x) = 1000x + 1.25x^4 - 3200$, where x represents the number, in hundreds, of skateboards sold. a. What is the degree of the function $P(x)$? b. What are the leading coefficient and the constant of this function? What does the constant represent in this context? c. Describe the end behaviour of the graph of this function. d. What are the restrictions on the domain of this function? Explain how you determined those restrictions. e. What do the $x-$ intercept(s) of the graph represent in this context? f. What is the profit from the sale of 1200 skateboards?
5. By analyzing the effect of growing economic conditions, the predicted population P of a town in t years from now can be modelled by the function $P(t) = 6t^4 - 6t^3 + 200t + 1\,200$. Assume this model can be used for the next 15 years. a. What are the key features of the graph of the function? b. What is the current population of this town? c. What will be the population 10 years from now? d. When will the population of the town be approximately $175\,000$?

Name: _____ Date: _____

Chapter 3 Review

For each type of question, the achievement level is indicated. Showing work is an important strategy in communicating your knowledge and ideas so please be thorough.

Learning Goal 3.2	Factoring, including the factor theorem and the remainder theorem.

1. Use long division or synthetic division to find a division statement for the following problems. Verify the remainder using the remainder theorem. Identify any restrictions on the variable.

Developing	
a. $x^4 + 3x^3 - x^2 - 2x + 1$ by $x + 2$	b. $P(x) = 2x + 5x^3 - 7 + 12x^2$ by $x + 1$
c. $2x^3 - 3x^2 + 9x - 12$ by $x - 4$	d. $3x^4 - 2x^3 + 5x^2 - 7x + 10$ by $x - 5$
e. $2x^3 + x^2 - 27x - 36$ by $x - 1$	f. $3x^4 - 2x^3 + 5x^2 - 7x + 10$ by $x + 2$
g. $2x^3 + x^2 - 27x - 36$ by $x + 1$	h. $4x^4 - 10x^3 + 13x^2 - 2x + 15$ by $x + 2$
Proficient	
i. $P(x) = -x^3 + 2x^2 - 10x$ by $x - 3$	j. $9x + 4x^3 - 12$ by $x - 2$
k. $P(x) = -x^4 + 2x^2 - 10x$ by $x - 3$	l. $x^3 - x^4 + x^2 - x + 1$ by $x - 1$
m. $3x^4 - x^3 - 5$ by $x - 3$	n. $x^3 - x - 10$ by $x + 4$

2. For each dividend, determine the value of k if the remainder is -2.

Developing	
a. $(2x^3 - 5x^2 - 4x + k) \div (x + 1)$	b. $(x^3 - 4x^2 + kx + 10) \div (x - 3)$
c. $(3x^3 + kx^2 - 13x + 4) \div (x + 2)$	d. $(kx^3 - 4x^2 - 5x + 8) \div (x - 2)$

Proficient
3. For what value of m will the polynomial $P(x) = x^3 + 6x^2 + mx - 4$ have the same remainder when it is divided by $x - 1$ and $x + 2$?
4. Given that $x + 3$ is a factor of the polynomial $P(x) = x^4 + 3x^3 + cx^2 - 7x + 6$, determine the value of c.
5. Determine the value of k so that $x + 3$ is a factor of $x^3 + 4x^2 - 2kx + 3$
6. For what value of b will the polynomial $P(x) = 4x^3 - 3x^2 + bx + 6$ have the same remainder when it is divided by both $x - 1$ and $x + 3$?

Name: _____ Date: _____

Chapter 3 Review

7. State all possible integer factors of the following polynomials, then factor fully.

Proficient	
a. $x^3 - 4x^2 + x + 6$	b. $-4x^3 - 4x^2 + 16x + 16$
c. $x^3 + 4x^2 + 5x + 2$	d. $x^3 - 13x^2 + 12$
e. $-x^3 + 6x^2 - 9x$	f. $x^3 - 3x^2 + x + 5$
g. $x^3 + 3x^2 - 10x - 24$	h. $x^3 - 21x + 20$
i. $x^3 - 7x - 6$	j. $x^3 - x^2 - 4x + 4$
k. $x^3 - 2x^2 - 4x + 8$	l. $x^3 + 3x^2 + 3x + 1$
m. $x^3 + 2x^2 - 9x - 18$	n. $4x^3 - 8x^2 + x + 3$
o. $6x^3 + x^2 - 31x + 10$	p. $3x^3 - 5x^2 - 26x - 8$
Extending	
q. $x^4 - 4x^3 - x^2 + 16x - 12$	r. $x^5 - 3x^4 - 5x^3 + 27x^2 - 32x + 12$
s. $-x^4 + 8x^2 - 16$	t. $x^4 + 2x^3 - x - 2$
u. $x^4 + x^3 - 13x^2 - 25x - 12$	v. $5x^4 + 12x^3 - 101x^2 + 48x + 36$
w. $2x^4 + 5x^3 - 8x^2 - 20x$	x. $x^5 + 2x^4 - 11x^3 - 40x^2 - 44x - 16$

Name: _____ Date: _____

Chapter 3 Review

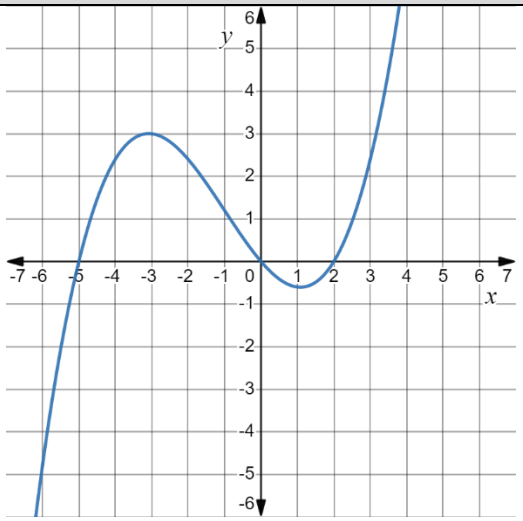
For each type of question, the achievement level is indicated. Showing work is an important strategy in communicating your knowledge and ideas so please be thorough.

Learning Goal 3.3	Solving equations algebraically and graphically.

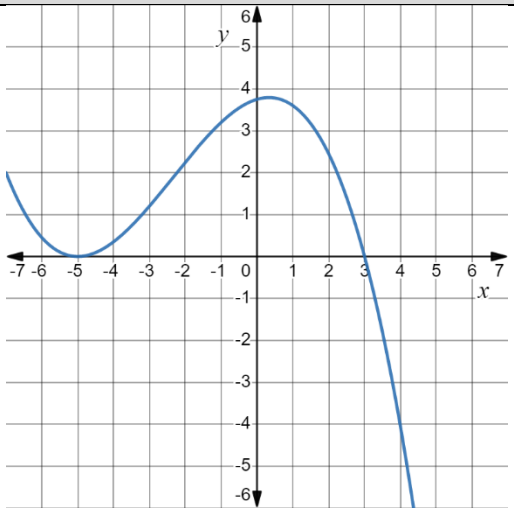
1. For each graph, state the $x-$ intercepts, the interval(s) where the function is positive and negative and the multiplicity of each zero.

Developing

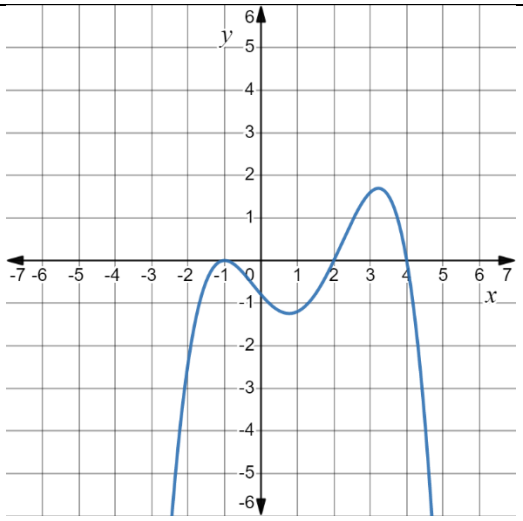
a.



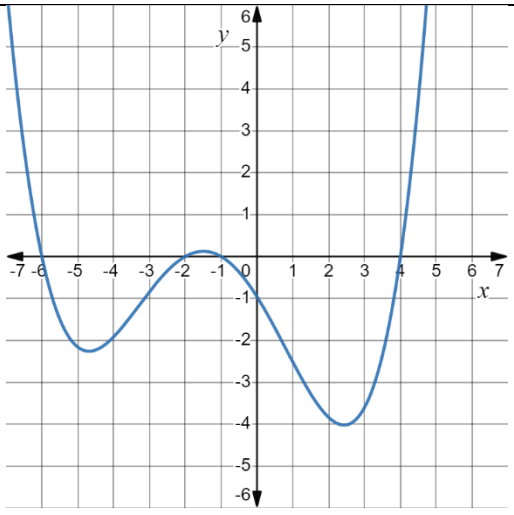
b.



c.



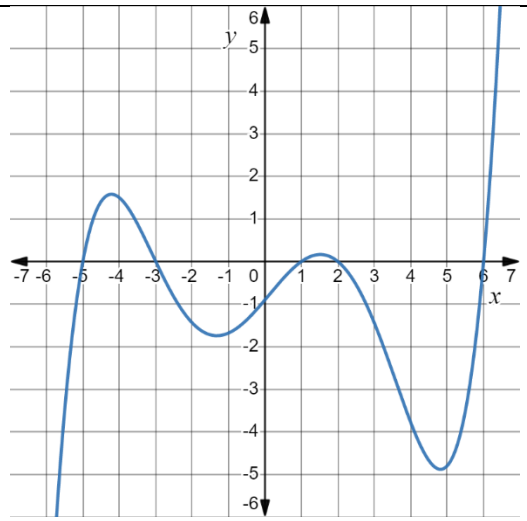
d.



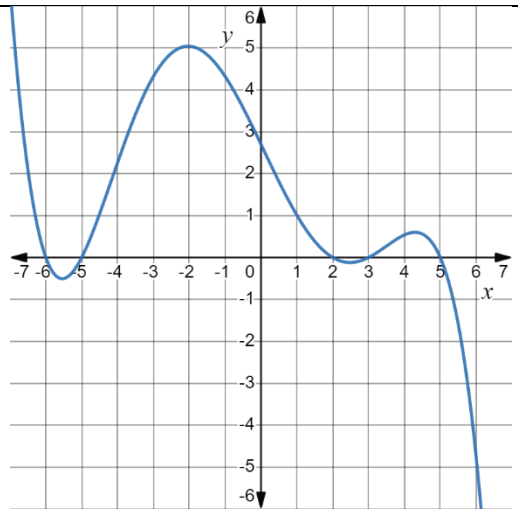
Name: _____ Date: _____

Chapter 3 Review

e.



f.



2. For each equation, state the $x-$ intercepts, the interval(s) where the function is positive and negative and the multiplicity of each zero. Sketch a graph.

Proficient	
a. $x^3 - 4x^2 + x + 6$	b. $-4x^3 - 4x^2 + 16x + 16$
c. $x^3 + 4x^2 + 5x + 2$	d. $x^3 - 13x^2 + 12$
e. $-x^3 + 6x^2 - 9x$	f. $x^3 - 3x^2 + x + 5$
g. $x^3 + 3x^2 - 10x - 24$	h. $x^3 - 21x + 20$
i. $x^3 - 7x - 6$	j. $x^3 - x^2 - 4x + 4$
k. $x^3 - 2x^2 - 4x + 8$	l. $x^3 + 3x^2 + 3x + 1$
m. $x^3 + 2x^2 - 9x - 18$	n. $4x^3 - 8x^2 + x + 3$
o. $6x^3 + x^2 - 31x + 10$	p. $3x^3 - 5x^2 - 26x - 8$
Extending	
q. $x^4 - 4x^3 - x^2 + 16x - 12$	r. $x^5 - 3x^4 - 5x^3 + 27x^2 - 32x + 12$
s. $-x^4 + 8x^2 - 16$	t. $x^4 + 2x^3 - x - 2$
u. $x^4 + x^3 - 13x^2 - 25x - 12$	v. $5x^4 + 12x^3 - 101x^2 + 48x + 36$
w. $2x^4 + 5x^3 - 8x^2 - 20x$	x. $x^5 + 2x^4 - 11x^3 - 40x^2 - 44x - 16$

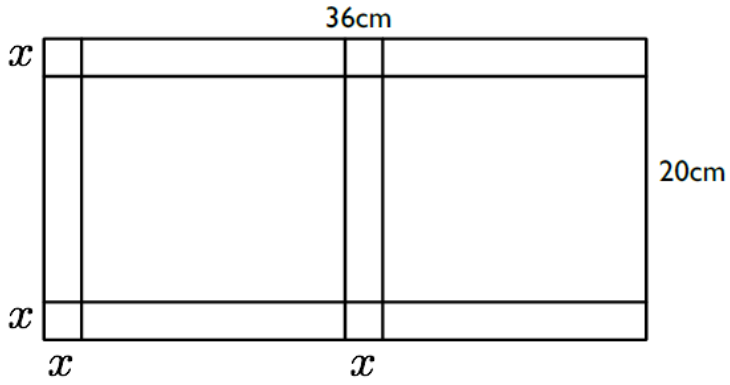
Extending

3. The specifications for a cardboard box state that the width must be 5 cm less that the length, and the height must be double the length of the box.
   a. Write an equation for the volume of the box.
   b. What is the degree of the polynomial?
   c. What are the leading coefficient and the constant of this function?
   d. Describe the end behaviour of the graph of this function.
   e. What are the restrictions on the domain of this function? Explain how you determined those restrictions.
   f. What do the $x-$ intercept(s) of the graph represent in this context?
   g. What are the dimensions of a box with a volume of $384\ \text{cm}^3$?

Name: _____ Date: _____

Chapter 3 Review

4. Boxes for candies are to be constructed from cardboard measures 36 cm by 20 cm. Each box is formed by folding a sheet along the dotted lines as shown.



   a. Write an equation for the volume of the box.
   b. What is the degree of the polynomial?
   c. What are the leading coefficient and the constant of this function?
   d. Describe the end behaviour of the graph of this function/ What are the restrictions on the doamin of this funciton? Explain how you determined the restrictions.

What the possible whole number dimensions of the box if the volume is 512 cubic centimetres?

5. The length of a pool is 4 feet more than twice the width. The depth of the pool is two thirds the width.
   a. Write an equation for the volume.
   b. The volume of the pool is $1188\ \text{ft}^3$. What are the dimensions?
   c. If we wanted to increase all dimensions by the same amount, but the maximum volume at $2700\ \text{ft}^3$, what is the maximum size of the pool?