

# Pull it Together

## Cycle 1

### What did you Learn ?

Cycle 1

| Date | Day | Section | Lesson   | Assigned Work  |
|------|-----|---------|--|--|
|      | 1   | 2.1     | Adding and Subtracting Polynomials                   | Handout  |
|      |     | 2.2     | Multiplying Polynomials                              |  |
|      | 2   | 2.3     | Factoring Polynomials                                | Handout  |
|      | 3   | 1.1     | CBR Relations and Functions                          | Pg 10 # 1ac, 2, 4, 6, 7, 9                           |
|      | 4   | 3.1     | Properties of Quadratic Functions                    | Pg 145 # 1-4, 6a, 7, 9a, 11, 13                      |
|      | 5   | 1.3     | Properties of Parent Functions                       | Handout  |
|      | 6   | 6.2     | Investigating the Properties of Sinusoidal Functions | Pg 263 # 5, 6, 8                                     |
|      |     | 4.5     | Properties of Exponential Functions                  |  |
|      | 7   | 1.2     | Function Notation                                    | Pg 22 # 1, 2, 10, 11ab<br>Pg 88 # 9, 17a<br>Handout  |
|      | 8   | 1.4     | Domain and Range                                     | Pg. 12 # 13, 15<br>Pg. 35 # 2, 5, 10, 15             |
|      | 9   | 5.1     | Trig ratios of acute angles                          | Pg 281 # 7, 8, 10, 11, 17                            |
|      | 10  | 5.6     | Sine Law   | Pg 318 # 4a, 5ad, 7, 8, 12, 13<br>Pg 326 # 4ab, 6, 7 |
|      |     | 5.7     | Cosine Law   |  |
|      | 11  | 4.2     | Working with Integer Exponents                       | Pg 222 # 1-8ace, 10, 11ad, 13ace, 15, 16ace, 18ace   |
|      | 12  |         | Pull It Together                                     |  |
|      | 13  |         | <b>Test</b>  |  |

## 3U - C1 - day 12 -Pull it Together (1).notebook

### How did you do?

*MCR3U – Quiz Tracking Sheet*

| Expectations                       | Achievement |  |  |  |  |  |  |  |  |  |
|------------------------------------|-------------|--|--|--|--|--|--|--|--|--|
| <b>Functions</b>                   |             |  |  |  |  |  |  |  |  |  |
| Operations with polynomials        |             |  |  |  |  |  |  |  |  |  |
| Function Notation                  |             |  |  |  |  |  |  |  |  |  |
| Properties of functions            |             |  |  |  |  |  |  |  |  |  |
| Domain and range                   |             |  |  |  |  |  |  |  |  |  |
| Transformations                    |             |  |  |  |  |  |  |  |  |  |
|                                    |             |  |  |  |  |  |  |  |  |  |
|                                    |             |  |  |  |  |  |  |  |  |  |
| <b>Quadratics</b>                  |             |  |  |  |  |  |  |  |  |  |
| Identifying parts                  |             |  |  |  |  |  |  |  |  |  |
| Finding equations                  |             |  |  |  |  |  |  |  |  |  |
| Factoring                          |             |  |  |  |  |  |  |  |  |  |
| Solving by factoring               |             |  |  |  |  |  |  |  |  |  |
| Solving by quadratic f.            |             |  |  |  |  |  |  |  |  |  |
| Complete the square                |             |  |  |  |  |  |  |  |  |  |
|                                    |             |  |  |  |  |  |  |  |  |  |
|                                    |             |  |  |  |  |  |  |  |  |  |
| <b>Rational Expressions</b>        |             |  |  |  |  |  |  |  |  |  |
| Simplifying rational f.            |             |  |  |  |  |  |  |  |  |  |
| +/- rational expressions           |             |  |  |  |  |  |  |  |  |  |
| $\times/\div$ rational expressions |             |  |  |  |  |  |  |  |  |  |
| Asymptotes and holes               |             |  |  |  |  |  |  |  |  |  |
|                                    |             |  |  |  |  |  |  |  |  |  |
|                                    |             |  |  |  |  |  |  |  |  |  |
| <b>Exponential</b>                 |             |  |  |  |  |  |  |  |  |  |
| Rational Exponents                 |             |  |  |  |  |  |  |  |  |  |
| Simplifying exponential exp.       |             |  |  |  |  |  |  |  |  |  |
| Application                        |             |  |  |  |  |  |  |  |  |  |
|                                    |             |  |  |  |  |  |  |  |  |  |
|                                    |             |  |  |  |  |  |  |  |  |  |

### How did you do?

|                                      |  |  |  |  |  |  |  |  |  |  |
|--------------------------------------|--|--|--|--|--|--|--|--|--|--|
| <b>Trigonometry</b>                  |  |  |  |  |  |  |  |  |  |  |
| Similar triangles                    |  |  |  |  |  |  |  |  |  |  |
| SohCahToa                            |  |  |  |  |  |  |  |  |  |  |
| Sine law                             |  |  |  |  |  |  |  |  |  |  |
| Cosine Law                           |  |  |  |  |  |  |  |  |  |  |
| Identities                           |  |  |  |  |  |  |  |  |  |  |
| 3D                                   |  |  |  |  |  |  |  |  |  |  |
| Solving using Sinusoidal f.          |  |  |  |  |  |  |  |  |  |  |
|                                      |  |  |  |  |  |  |  |  |  |  |
|                                      |  |  |  |  |  |  |  |  |  |  |
| <b>Discrete</b>                      |  |  |  |  |  |  |  |  |  |  |
| Pascal's triangle                    |  |  |  |  |  |  |  |  |  |  |
| Arithmetic Sequence                  |  |  |  |  |  |  |  |  |  |  |
| Geometric Sequence                   |  |  |  |  |  |  |  |  |  |  |
| Series                               |  |  |  |  |  |  |  |  |  |  |
| Applications of sequences and series |  |  |  |  |  |  |  |  |  |  |
|                                      |  |  |  |  |  |  |  |  |  |  |
|                                      |  |  |  |  |  |  |  |  |  |  |
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|                                      |  |  |  |  |  |  |  |  |  |  |
|                                      |  |  |  |  |  |  |  |  |  |  |
|                                      |  |  |  |  |  |  |  |  |  |  |
|                                      |  |  |  |  |  |  |  |  |  |  |
|                                      |  |  |  |  |  |  |  |  |  |  |

01/16/2019  
3 Aug 15

Unit 2: Polynomial Functions

**2.1 AROC**  
 ↳ secant line through 2 pts  $\frac{f(x_2) - f(x_1)}{x_2 - x_1}$   
 ↳  $x$  is over an interval  
 ↳ AROC =  $\frac{f(x_2) - f(x_1)}{x_2 - x_1}$

**2.2/2.3 IROC & DG**  
 ↳ tangent line through 1 pt  $\frac{f'(x)}{1}$   
 ↳  $x$  is at a specific value  
 ↳ DG =  $\frac{f'(a+h) - f'(a)}{h}$   
 ↳ IROC =  $\frac{f'(x_2) - f'(x_1)}{x_2 - x_1}$

**2.4/2.5 Max & Min**  
 ↳  $m_f(x) = f'$  ↳  $m_{max} \circlearrowright$  ↳  $m_{min} \circlearrowleft$   
 ↳  $m_f(x) = f'$  ↳  $m_{min} \circlearrowleft$  ↳  $m_{max} \circlearrowright$

**3.1 Polynomial functions**  
 ↳ exponents are whole #'s,  $b \in \mathbb{R}$   
 ↳ order in descending order  
 ↳ leading coeff. of  $f(x)$

**3.2 Characteristics of polynomial functions**  
 ↳ E.B. odd  $\rightarrow x \rightarrow \infty, y \rightarrow \infty$   
 ↳ even  $\rightarrow x \rightarrow \infty, y \rightarrow \infty$   
 ↳ odd  $\rightarrow x \rightarrow -\infty, y \rightarrow -\infty$   
 ↳ even  $\rightarrow x \rightarrow -\infty, y \rightarrow -\infty$   
 ↳ increasing  $f'$ :  $x \uparrow, y \uparrow$   
 ↳ decreasing  $f'$ :  $x \uparrow, y \downarrow$

**3.3 Characteristics in factored form**  
 ↳ family of polynomial  $f(x)$  have the same zeros  
 ↳ degree 1 or 3  $\rightarrow$  goes through  $\infty$   
 ↳ other degree  $\rightarrow$  touches  $\infty$

**3.4 Transformations**  
 $(\frac{x}{k} + d, a(y + c))$

**3.5 Dividing polynomials**  
 ↳ long division  $f(x) = d(x) \cdot q(x) + r(x)$   
 ↳ steps: dividend's highest monomial by divisor's highest monomial  
 ↳ synthetic division

**3.6 factoring polynomials**  
 ↳ remainder theorem  
 ↳ finding R:  $\frac{f(x)}{(x-a)} \rightarrow R = f(a)$   
 ↳ use R to find k  
 ↳ sub R in

**3.7 factoring sum/difference of cubes**  
 ↳ sum  $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$   
 ↳ difference  $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

**Factor Theorem**  
 Steps:  
 1) find values for a whole  $R=0$   
 2) synthetic division  
 3) repeat step 1 & 2 to get in form  $(x^2 + x + 1)$   
 4) factor fully

UNIT 1: Summary

**1.1:**  
 ↳ Function notation  $f(x), g(x), h(x)$   
 ↳ Set notation  $\{(1,2), (3,4)\}$   
 ↳ Domain  
 ↳ Range

**1.2:**  
 ↳ Interval notation  $x \in [1, \infty)$   
 ↳ Absolute value  $|x| \geq 2$   
 ↳ Solving  $-2|3-1| - 1 = -10$

**1.3:**  
 ↳ End behavior  
 ↳ Even, Odd, Neither  
 ↳ Parent Function  
 ↳ Interval of increase/decrease

**1.4:**  
 ↳ Transformations  
 ↳ Solving  $\rightarrow$  The point  $(-10, 6)$  is on the graph of  $f(x)$ . Find the corresponding coordinates of this point on the graph of  $y = -f(2x+4) - 3$ .

**1.5:**  
 ↳ Inverse  
 ↳ Piecewise function = multiple functions  
 ↳ Combining functions

# Six Overall Expectations

## Six Colours

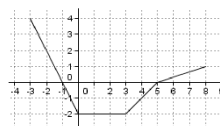
## Six MeaningFull Notes

### Worksheet #7

*MCR3U – Extra Practice – Function Notation and Domain & Range*

1. If  $f(x) = 2x + 3$ , find
- a)  $f(6)$                       b)  $f(-5)$                       c)  $f(6 - 5)$                       d)  $2f(2)$

2. Given the graph to the right, find
- a)  $f(2)$   
b)  $f(-3)$   
c)  $x$  if  $f(x) = 2$   
d)  $x$  if  $f(x) = 0$

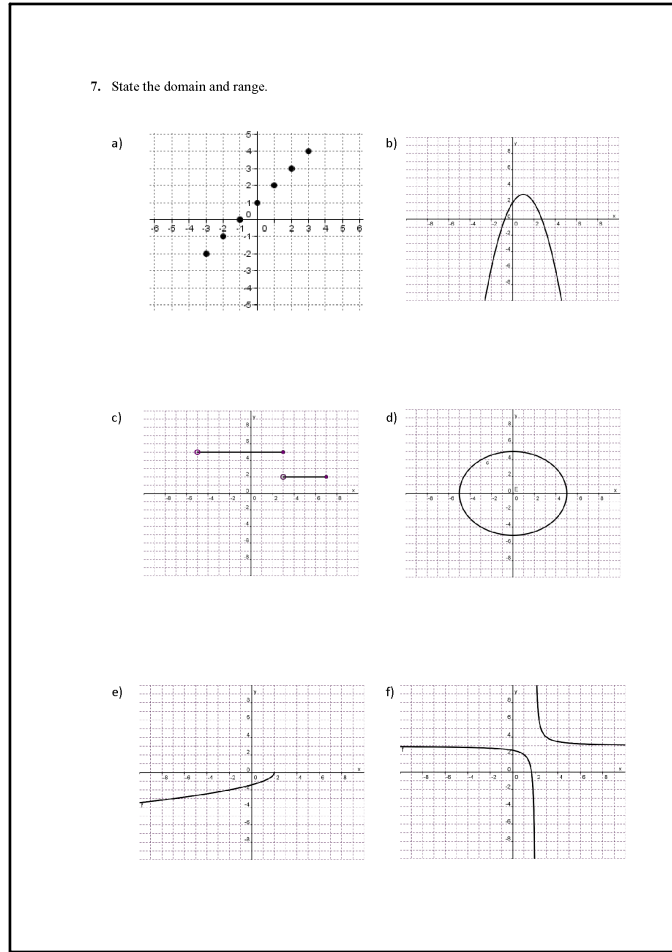


3. A company rents cars for \$50 per day plus \$0.15/km.
- a) Express the daily rental cost,  $C$  as a function of the number of kilometres,  $d$  travelled.  
b) Determine the rental cost if you drive 472 km in one day.  
c) Determine how far you can drive in a day for \$80.  
d) Is  $C(d)$  a function? Justify your answer.

4. If  $f(x) = -3x + 7$ , find in simplest form:
- a)  $f(-a)$                       b)  $f(a + 3)$                       c)  $x$  if  $f(x) = 16$

5. If  $f(x) = 2x^2 + 3x - 1$ , find in simplest form:
- a)  $f(-1)$                       b)  $f(x - 1)$                       c)  $x$  if  $f(x) = -2$





Corrected Solutions

Function Notation and Domain & Range

1. If  $f(x) = 2x + 3$ , find

a)  $f(6)$   
 $f(6) = 2(6) + 3$   
 $= 12 + 3$   
 $= 15$

b)  $f(-5)$   
 $f(-5) = 2(-5) + 3$   
 $= -10 + 3$   
 $= -7$

c)  $f(x+1)$   
 $f(x+1) = 2(x+1) + 3$   
 $= 2x + 2 + 3$   
 $= 2x + 5$

d)  $f(2x)$   
 $f(2x) = 2(2x) + 3$   
 $= 4x + 3$

2. Given the graph to the right, find

a)  $f(2) = -2$

b)  $f(-3) = 4$

c)  $x$  if  $f(x) = 2$   $x = -2$

d)  $x$  if  $f(x) = 0$   $x = -1$  and  $5$

3. A company rents cars for \$50 per day plus \$0.15/km.

a) Express the daily rental cost,  $C$  as a function of the number of kilometres,  $d$  travelled.

b) Determine the rental cost if you drive 472 km in one day.  $c(472) = 0.15d + 50$

c) Determine how far you can drive in a day for \$80.  $c(472) = 0.15(472) + 50 = 120.8$  or 492 km driven

d) Is  $C(d)$  a function? Justify your answer.  $c(d) = 0.15d + 50$   
 $80 = 0.15d + 50$   
 $30 = 0.15d$   
 $200 = d$   
 Yes because there can be two cars for the same # of km driven ( $d$ ).

4. If  $f(x) = 3x^2 - 7x + 2$

a) Find  $f(-4)$   
 $f(-4) = 3(-4)^2 - 7(-4) + 2$   
 $= 48 + 28 + 2$   
 $= 78$

b) Find  $f(a^2 - 1)$   
 $f(a^2 - 1) = 3(a^2 - 1)^2 - 7(a^2 - 1) + 2$   
 $= 3(a^4 - 2a^2 + 1) - 7a^2 + 7 + 2$   
 $= 3a^4 - 6a^2 + 3 - 7a^2 + 9$   
 $= 3a^4 - 13a^2 + 12$

5. If  $f(x) = 7 - 3x$ , find in simplest form:

a)  $f(-a)$   
 $f(-a) = 7 - 3(-a)$   
 $= 7 + 3a$

b)  $f(a+3)$   
 $f(a+3) = 7 - 3(a+3)$   
 $= 7 - 3a - 9$   
 $= -3a - 2$

c)  $f(x+2)$   
 $f(x+2) = 7 - 3(x+2)$   
 $= 7 - 3x - 6$   
 $= 1 - 3x$

6. If  $f(x) = 2x^2 + 3x - 1$ , find in simplest form:

a)  $f(2-x)$   
 $f(2-x) = 2(2-x)^2 + 3(2-x) - 1$   
 $= 2(4 - 4x + x^2) + 6 - 3x - 1$   
 $= 8 - 8x + 2x^2 + 6 - 3x - 1$   
 $= 2x^2 - 11x + 13$

b)  $f(x^2)$   
 $f(x^2) = 2(x^2)^2 + 3(x^2) - 1$   
 $= 2x^4 + 3x^2 - 1$

c)  $x$  if  $f(x) = -2$   
 $f(x) = 2x^2 + 3x - 1$   
 $-2 = 2x^2 + 3x - 1$   
 $-1 = 2x^2 + 3x$   
 $0 = 2x^2 + 3x + 1$   
 $0 = (2x+1)(x+1)$   
 $2x+1 = 0$   $x = -\frac{1}{2}$   
 $x+1 = 0$   $x = -1$

3U - C1 - day 12 -Pull it Together (1).notebook

7. State the domain and range.

a)   
 $D = \{x \in \mathbb{Z} \mid -2 \leq x \leq 2\}$  ✓   
 $R = \{y \in \mathbb{Z} \mid -1 \leq y \leq 4\}$  ✓

b)   
 $D = \{x \in \mathbb{R}\}$  ✓   
 $R = \{y \in \mathbb{R} \mid y \leq 3\}$  ✓   
 ~~$R = \{y \in \mathbb{R} \mid y \leq 3\}$~~    
 ~~$\{y \in \mathbb{R} \mid y \leq 3\}$~~

c)   
 $D = \{x \in \mathbb{R} \mid x > -5\}$  X   
 $R = \{2, 1, 0\}$  ✓   
 $D = \{x \in \mathbb{R} \mid -5 \leq x \leq 5\}$  ✓

d)   
 $D = \{x \in \mathbb{R} \mid -5 \leq x \leq 5\}$  ✓   
 $R = \{y \in \mathbb{R} \mid -5 \leq y \leq 5\}$  ✓

e)   
 $D = \{x \in \mathbb{R} \mid x < 2\}$  ✓   
 $R = \{y \in \mathbb{R} \mid y \leq 0\}$  ✓

f)   
 $D = \{x \in \mathbb{R} \mid x \neq 2\}$  ✓   
 $R = \{y \in \mathbb{R} \mid y \neq 3\}$  ✓

