

MCR3U

Rich Summative Task

Five Overall Expectations

Five Meaningful Notes

What did you Learn ?

Write a summary (1 page max/expectation) of each of the different overall expectations.

- important ideas
- important formulas
- some examples

1. Functions
2. Quadratics
3. Rational Expressions
4. Exponential Functions
5. Trigonometry and Sinusoidal Functions

Cycle 1			
Feb 5	1	2.1	Adding and Subtracting Polynomials
		2.2	Multiplying Polynomials
Feb 6 Feb 7	2	2.3	Factoring Polynomials
Feb 10	3	1.1	CBR Relations and Functions
Feb 11	4	3.1	Properties of Quadratic Functions
Feb 12	5	1.3	Properties of Parent Functions
Feb 13	6	6.2	Investigating the Properties of Sinusoidal Functions
Feb 13		4.5	Properties of Exponential Functions The Note has been updated with Homework Solutions
Feb 17	7	4.2	Working with Integer Exponents
Feb 18	8	1.4	Domain and Range
Feb 19	9	5.1	Trig ratios of acute angles
Feb 20	10	5.6	Sine Law
		5.7	Cosine Law
	11	4.2	Working with Integer Exponents

Cycle 2

Date	Day	Section	Lesson
Mon Mar 2	1		Factoring I <i>Diff. of squares, perfect sq, grouping</i>
Tues Mar 3	2	2.3	Factoring Polynomials <i>decomposition</i>
Wed Mar 4	3	4.3	Working with Rational Exponents
Fri Mar 5	4	3.4	Operations with Radicals <i>simplify and add/subtract</i>
Mon Mar 9	5	7.7	Pascal's Triangle
Tues Mar 10	6		Recursive Formula
Wed Mar 11	7	3.2	Determining Max/Min of Quadratic Functions
Thurs Mar 12	8	3.2	Determining Max/Min of Quadratic Functions Work Period for Assignment
Fri Mar 13			Quiz #4 solution posted as the note

Cycle 2B - OnLine

Mar 25	9	5.2	Trig ratios for special angles and the unit circle
Mar 27	10	5.2	Trig ratios for special angles and the unit circle
Mar 30	11		Vertical Transformations I (a, c)
Mar 31	12		Vertical Transformations II Function Notation (a,c)
April 1	13		Check Your Learning
April 2			Check Your Learning Hints
April 3			Check Your Learning Solutions Version 2 with corrections

Cycle 3 - OnLine

Starting		Section	
April 6	1	2.3	Factoring II
April 6	2	4.4	Simplifying Algebraic Expressions
April 6	3	3.4	Radicals – Multiplication/Division
April 13	4	3.5	Solving Quadratic Equations
April 13	5	3.6	Zeros of Quadratic Functions
Apr 20	6	5.3 / 5.4	Trig Ratios - All Angles - Related Acute Angle
Apr 20	7	5.3 / 5.4	Trig Ratios - All Angles - The CAST Rule
Apr 20	8	6.1	Periodic Behaviour
Apr 27	9	6.3	Interpreting Sinusoidal Functions
Apr 27	10		Horizontal Transformations (k,d)
Apr 27	11		Four Transformations using Points
May 4	12		Transformations - Pull it Together

Cycle 4 - Online

May 4	1	2.4	Simplifying Rational Functions
May 11	2	2.6	Multiplying and Dividing Rational Expressions
May 11	3	3.7	Families of Quadratic Functions
May 18	4	3.8	Linear Quadratic Systems
May 18	5	1.5 3.3	Inverse Functions
May 25	6	5.4	Trigonometric Ratios using Co-ordinates
May 25	7	6.6	Sinusoidal Equations from Graphs
	8		Adding and Subtracting Rational Expressions
	9		Graphs of Rational Functions

How did you do?

Review Check Your Learning Feedback

What will you need to review before MHF4U?

How did you do?

Functions																				
Operations with polynomials																				
Function Notation																				
Properties of functions																				
Domain and range																				
Transformations																				
Quadratics																				
Identifying parts																				
Finding equations																				
Factoring																				
Solving by factoring																				
Solving by quadratic f.																				
Complete the square																				
Rational Expressions																				
Simplifying rational f.																				
+/- rational expressions																				
×/÷ rational expressions																				
Asymptotes and holes																				
Exponential																				
Rational Exponents																				
Simplifying exponential exp.																				
Application																				

Check this out in section 4.7

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

Check this out in section 5.8

This part was omitted in the online learning - check out chapter 7 and 8 in the textbook if you are interested.

Some examples from MHF4U

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 Max & Min
 ↳ $m_f(x) = f'$ ↳ $m_{\max} \circlearrowright \rightarrow \max$ ↳ $m_{\min} \circlearrowleft \rightarrow \min$
 ↳ $m_f(x) = -f'$ ↳ $m_{\min} \circlearrowleft \rightarrow \min$ ↳ $m_{\max} \circlearrowright \rightarrow \max$

2.2/2.5 IROC & DQ
 ↳ tangent line through 1 pt $\frac{f'(x)}{1}$
 ↳ x is at a specific value
 ↳ DQ = $\frac{f(a+h) - f(a)}{h}$
 ↳ IROC = $\frac{f(x_2) - f(x_1)}{x_2 - x_1}$

3.1 Polynomial functions
 ↳ exponents are whole #'s, $b \in \mathbb{R}$
 ↳ $3x^4 - 2x^3 + 7x^2 - 9x + 11$
 ↳ leading coeff. of $f(x)$ is 3
 ↳ degree of $f(x)$ is 4

3.2 Characteristics of polynomial functions
 ↳ E.B. odd \rightarrow $y \rightarrow \infty$ as $x \rightarrow \infty$, $y \rightarrow -\infty$ as $x \rightarrow -\infty$
 ↳ even \rightarrow $y \rightarrow \infty$ as $x \rightarrow \infty$ and $x \rightarrow -\infty$
 ↳ odd \rightarrow $y \rightarrow -\infty$ as $x \rightarrow \infty$ and $y \rightarrow \infty$ as $x \rightarrow -\infty$
 ↳ even \rightarrow $y \rightarrow \infty$ as $x \rightarrow \infty$ and $y \rightarrow \infty$ as $x \rightarrow -\infty$
 ↳ odd \rightarrow $y \rightarrow -\infty$ as $x \rightarrow \infty$ and $y \rightarrow -\infty$ as $x \rightarrow -\infty$
 ↳ Tpt: local max/min
 ↳ even/odd: max tp: $n-1$, min tp: 1
 ↳ odd: min tp: 0
 ↳ zeros: even/odd: max zero: n , min zero: 0
 ↳ odd: min zero: 1

3.3 Characteristics in factored form
 ↳ family of polynomial $f(x)$ have the same zeros
 ↳ degree 1 or 3 \rightarrow goes through ∞
 ↳ other degree \rightarrow touches ∞
 ↳ factor theorem: $2x^2 + 3x - 17x - 30$
 ↳ steps: 1) find values for a whole $R=0$ by looking @ factors of last #
 2) synthetic division
 3) repeat step 1) & 2) to get in form $(x^2 + x + \#)$
 4) factor fully

3.4 Transformations
 $(\frac{x}{k} + d, a(y + C))$
 $y = 1, y = x^2, y = x^3$
 $y = 7, y = x^2, y = x^3$
 $y = 2, y = x^2, y = x^3$

3.5 Dividing polynomials
 ↳ long division: $f(x) = d(x) \cdot q(x) + r(x)$
 ↳ steps: 1) dividend's highest monomial by divisor's highest monomial
 ↳ keep going until there is a remainder
 ↳ synthetic division: if answer not in form $(x-a)(x^2 + x + \#)$, redo synthetic division
 ↳ remainder & factor

3.6 Factoring polynomials
 ↳ remainder theorem: finding $R: f(x) \rightarrow R = f(a)$
 ↳ use R to find k
 ↳ $f(x) = x^2 + 3x^2 - 17x - 30$
 $f(1) = -42 \rightarrow$ remainder
 $f(-2) = 0 \rightarrow$ no remainder, -2 is a factor
 ↳ use R to find k
 $f(x) = 2x^2 - 3x^2 + kx - 1$, \div by $f(x)$ given
 $(x-1) \cdot R = 2$, find k
 $2 = 2(1)^2 - 3(1) + k(1) - 1$
 $2 = k$

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

Unit 2: Summary

2.1: AROC = $\frac{f(x_2) - f(x_1)}{x_2 - x_1}$
 ↳ large interval
 ↳ IROC = $\frac{f(x_2) - f(x_1)}{x_2 - x_1}$
 ↳ small interval

2.2/2.3: Difference Quotient
 ↳ Another way to solve IROC
 ↳ DQ = $\frac{f(a+h) - f(a)}{h}$
 ↳ Example: IROC $f(x) = x^2$ @ $x=3 \rightarrow a=3$
 $DQ = \frac{f(a+h) - f(a)}{h} = \frac{f(3+h) - f(3)}{h} = \frac{(3+h)^2 - 3^2}{h} = \frac{h^2 + 6h + 9 - 9}{h} = \frac{h^2 + 6h}{h} = h + 6$
 $h \rightarrow 0, m \rightarrow 6$
 IROC $\rightarrow 6$

3.3: $f(x) = a(x-h)(x-k)$
 ↳ tells us the end behaviour

3.4: Factor theorem
 ↳ Ex $f(x) = x^2 + 7x^2 + 11x^2 - 7x - 12$
 ① $f(1) = 0$
 $\begin{array}{r|rrrr} 1 & 1 & 7 & 11 & -7 & -12 \\ & & 8 & 18 & 12 & 0 \end{array}$
 $f(x) = (x-1)(x^2 + 8x^2 + 19x + 12)$
 $g(x)$

3.5: Long division
 $2x^2 - 4x^2 - 3x + 5$ by $x-3$
 $\begin{array}{r} 2x^2 - 6x + 9 \\ - (2x^2 - 6x + 9) \\ \hline 3x + 5 \end{array}$
 $F(x) = (x+3)(2x^2 + 2x + 3) + 14$

3.6: Synthetic division
 ↳ only works for linear
 ↳ Ex. $2x^2 - 4x^2 - 3x + 5$ by $x-3$
 $\begin{array}{r|rrrr} 3 & 2 & -4 & -3 & 5 \\ & 6 & 6 & 9 & \\ \hline & 8 & 2 & 6 & 14 \end{array}$
 $g(x) = (x+1)(x^2 + 7x + 12)$
 $g(x) = (x+1)(x-1)(x+3)(x+4)$

3.7: Sum of cubes
 $A^3 + B^3 = (A+B)(A^2 - AB + B^2)$
 Difference of cubes
 $A^3 - B^3 = (A-B)(A^2 + AB + B^2)$
 ↳ SOAP (same, opposite, always positive)

2.4/2.5: IROC = 0 at max and min

3.1: Polynomial functions $\rightarrow y = x, y = (x-2)^2 + 4$
 ↳ Not polynomial functions $\rightarrow y = \sqrt{x}, y = 3x - x, y = \sin x$
 ↳ All polynomial functions have $D = \{x \in \mathbb{R}\}$

3.2: Characteristics even/odd functions
 ↳ even: same end behaviours, may have no zeros
 ↳ odd: opposite end behaviours, at least 1 zero
 ↳ Turning points $\rightarrow n-1$

