Math 10 Foundations Provincial Exam

Mrs. Epp's Study Notes with examples

- A **prime number** is a whole number which has exactly 2 factors. (2,3,5,7,11...)
- A **composite number** has more than two factors.
- The **GCF** of 8, 16, and 20 is 4.
- The **LCM** if 6 and 8 is 24.
- The **prime factorization** of 72 is $2\times2\times2\times3\times3$
- The prime factorization of a **perfect square** will involve factors which occur in pairs ($9=3\times3$)
- The prime factorization of a **perfect cube** will involve sets of factors which each occur three times or a multiple of 3 times ($125=5\times5\times5$)
- **Rational numbers** can be written as a fraction $\frac{m}{n}$ where m and n are integers and n is not zero.
- Decimal numbers which repeat or terminate are **rational**. (1.25, 0.1111...)
- Decimals numbers which are both non-repeating and non-terminating are called **irrational numbers.** (π)
- **Real numbers** are the combination of rational numbers and irrational numbers.
- **Radicals** are numbers like $\sqrt[4]{15}$. 4 is called the **index** and 15 is called the **radicand.**
- $\sqrt{a}\times\sqrt{b}=\sqrt{ab}$, $a\geq0, b>0$
- $\sqrt{\frac{a}{b}}=\frac{\sqrt{a}}{\sqrt{b}}$, $a\geq0, b>0$
- $\sqrt{108}=\sqrt{36\times3}=6\sqrt{3}$
- You can convert from an entire radical to a mixed radical and vice versa.

Perfect squares

1^2	$= 1$
2^2	$= 4$
3^2	$= 9$
4^2	$= 16$
5^2	$= 25$
6^2	$= 36$
7^2	$= 49$
8^2	$= 64$
9^2	$= 81$
10^2	$= 100$
11^2	$= 121$
12^2	$= 144$
13^2	$= 169$
14^2	$= 196$
15^2	$= 225$

Perfect Cubes

1^3	$= 1$
2^3	$= 8$
3^3	$= 27$
4^3	$= 64$
5^3	$= 125$
6^3	$= 216$
7^3	$= 343$
8^3	$= 512$
9^3	$= 729$
10^3	$= 1000$

☐ A power is a number written in exponential form, like a^n (a is the base and n is the exponent)

Law	Example
$x^1 = x$	$6^1 = 6$
$x^0 = 1$	$7^0 = 1$
$x^{-1} = 1/x$	$4^{-1} = 1/4$
$x^m x^n = x^{m+n}$	$x^2x^3 = x^{2+3} = x^5$
$x^m/x^n = x^{m-n}$	$x^6/x^2 = x^{6-2} = x^4$
$(x^m)^n = x^{mn}$	$(x^2)^3 = x^{2\times3} = x^6$
$(xy)^n = x^n y^n$	$(xy)^3 = x^3y^3$
$(x/y)^n = x^n/y^n$	$(x/y)^2 = x^2 / y^2$
$x^{-n} = 1/x^n$	$x^{-3} = 1/x^3$

And the law about Fractional Exponents:

$$x^{\frac{m}{n}} = \sqrt[n]{x^m} = (\sqrt[n]{x})^m \qquad x^{\frac{2}{3}} = \sqrt[3]{x^2} = (\sqrt[3]{x})^2$$

- ☐ ~~**Scientific notation** is a way to write numbers that are too large or too small to write in standard notation. $6150000000 = 6.15 \times 10^9$~~
- ☐ **Referents** are objects used as a point of reference in measurement (span, pace)
- ☒ A trundle wheel is useful for measuring long fields.
- ☒ A vernier caliper is good for very fine measurements of outside and inside dimensions or the depth of holes.
- ☒ A micrometer is useful for measuring the thickness of small objects precisely.
- ☐ We use the SI (Metric) system of measurement in Canada and most of the world. In the U.S. they use the imperial system. We can convert between the two.
- ☐ You can find the surface area and volume of prisms, cylinders, pyramids, cones and spheres using formulae provided.
- ☐ **Trigonometry** is a branch of math dealing with angles and triangles. SOH CAH TOA
- ☐ The **Pythagorean Theorem** can be used to find the 3rd side of a right triangle when the other 2 sides are given. $c^2 = a^2 + b^2$ (c is the hypotenuse)
- ☐ The angle of **elevation** is measured upwards from the horizontal, the angle of **depression** is measured downwards from the horizontal.
- ☐ A **bearing** is an angle measured clockwise from the North direction.
- ☐ A letter that represents a number is called a **variable**.
- ☐ A **monomial** is the product of numbers and variables. (eg. $2p^2q^4$)
- ☐ A **polynomial** is a monomial or the sum or difference of monomials (eg. $x^2 - 5x - 9$)
- ☐ A **binomial** is a polynomial with 2 terms and a **trinomial** is a polynomial with 3 terms.
- ☐ The **degree of a monomial** is the sum of the exponents of its variables. The **degree of a polynomial** is the degree if the term of highest degree.
- ☐ **Like terms** are terms with the same variable raised to the same exponent. (3a, a, 9.5a)
- ☐ **Algebra tiles** can help us work with polynomials
- ☐ **The distributive property** is $a(b+c) = ab + ac$
- ☐ **FOIL** helps to multiply two binomials $(x-2)(x+1) = x^2 + x - 2x - 2 = x^2 - x - 2$
- ☐ **Factoring** is a process in which a sum or difference of terms is expressed as a product ($20x - 6 = 2(10x - 3)$
- ☐ **The Difference of Squares** is $a^2 - b^2 = (a-b)(a+b)$
- ☐ You can factor trinomials by inspection, using tiles, or by decomposition
- ☐ When factoring always look for a common factor first.
- ☐ If you have 4 terms, try factoring by grouping.
- ☐ A **relation** is a connection between two quantities.
- ☐ In the **Cartesian coordinate system**, the x-axis and the y-axis intersect at the origin. There are 4 quadrants, numbered counterclockwise starting north-east.
- ☐ X is the independent variable, the input, the first coordinate of an ordered pair and is on the horizontal axis (Domain is all possible x-values)
- ☐ Y is the dependent variable, the output, the second coordinate of an ordered pair and is on the vertical axes. (Range is all possible y-values)

- ☐ To find the x-intercept, let y=0 and solve for x.
- ☐ To find the y-intercept, let x=0 and solve for y.
- ☐ In a **function**, each input has exactly one output. (use the vertical line test)
- ☐ F(x) means f is a function of x and it is the same thing as y
- ☐ The distance formula can help you find the distance between any two points

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

- ☐ The **midpoint**, M, of a line segment is $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$
- ☐ **Slope** is the measure of the steepness of a line. Slope = $\frac{rise}{run}$
- ☐ A line segment which goes up and right has a positive slope.
- ☐ A line segment which goes down and right has a negative slope.
- ☐ A horizontal line segment has a slope of zero.
- ☐ A vertical line segment has an infinite slope.
- ☐ The slopes of parallel lines are equal.
- ☐ The slopes of perpendicular lines have a product equal to -1 (negative reciprocals)
- ☐ $y = mx + b$ is the slope-intercept form of a linear equation; m is the slope, b is the y-intercept
- ☐ General Form: $Ax + By + C = 0$
- ☐ Slope-point form: $y - y_1 = m(x - x_1)$
- ☐ The slope represents the RATE OF CHANGE.
- ☐ Considering more than one equation at the same time is a **system** of equations.
- ☐ The solution of a system of equations is the points of intersection.
- ☐ You can use graphing, substitution, or elimination to solve a system.
- ☐ 2 Lines intersect at one point if their slopes are different. (ONE solution)
- ☐ There is no solution to a system of 2 equations with parallel lines (same slopes , different y-intercepts)
- ☐ The number of solutions of 2 coincident lines is infinite. (same slope, same y-intercept)