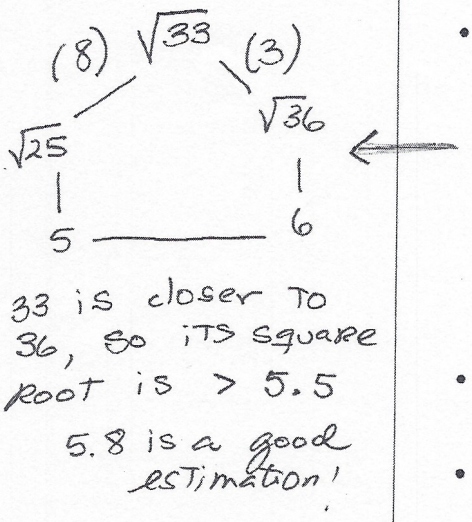
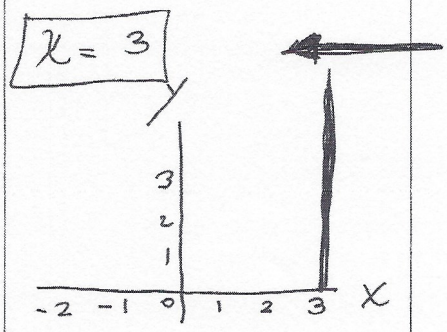
Grade 9 – Cumulative Exam Self-Check

Review Guide

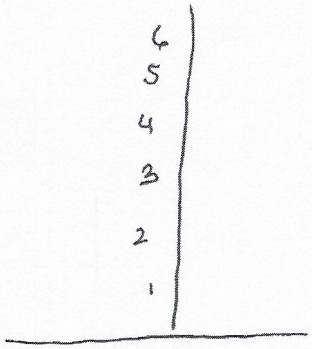
Question	Do I Know? Do I Understand?	Need to Review and Focus on
1. Square Roots and Surface Area • Perfect Squares • Square roots • Approximating Square Roots • Fractions and decimals as perfect squares  	• A **perfect square** is a number that is the square of a number, or the PRODUCT of am number multiplied by itself: 1 (1 x 1), 4 (2 x 2), 9 (3 X 3)... 16, 25, 36, 49, 64, 81, 100, 121, 144 ,169 • **To convert a decimal into a fraction:** Move the decimal place to the right until it is gone. The denominator will be a base of ten with AS MANY ZEROES AS THE SPACES YOU MOVED THE DECIMAL. 0.64 = 64/100 (moved the decimal 2 spaces) 0.989 = 989/1000 (moved the decimal 3 spaces) • **To approximate a square root:** 1. Determine the perfect squares that come before and after your number. 2. The square root of the number will be between the square roots of the perfect squares chosen above. 3. Estimate by determining the closer of the two perfect squares, and placing your number within a reasonable range from that closest perfect square's square root. • **A fraction is a perfect square if BOTH THE NUMERATOR AND THE DENOMINATOR are perfect squares.** • **To determine whether a decimal is a perfect square, rewrite it as a fraction and apply the rule above**	
2. Area of composite objects • Areas • Perimeters • Overlap • Area of composite objects	• The **area of a parallelogram** (square, rectangle) is: Base x Height • The **area of a triangle** is: (Base x Height)/ 2 • The **perimeter** is defined as the sum of all lengths that form the OUTSIDE of a shape. • To get the area of a 3-D object, calculate the area of all the faces, and add them together.	

	• A composite object is made of two or more shapes together. The faces that "touch" each other are said to be "overlapping." • **REMEMBER**: All overlaps MUST be multiplied by 2, since they involve 2 faces. • To get the area of a composite object, first get the area of each individual object by adding the areas of their individual faces. Then, add all areas together. Lastly, subtract the overlaps.	
3. Powers and Exponent Laws	• I can recognize the base and the exponent of a power • Another name for a power with an exponent of 2 is "square" • Another name for a power with an exponent of 3 is "cubed" • **If the base is negative (that is, the negative sign is INSIDE the bracket), and the exponent is even, the result is ALWAYS POSITIVE** • **If the base is negative (that is, the negative sign is INSIDE the bracket), and the exponent is odd, the result is ALWAYS NEGATIVE** • **A power with an exponent of 0 is always 1** • **A power with an exponent of 1 is itself** • **The order of operation to follow is always BEDMAS** •	
4. Powers and Exponent Laws	• To **multiply powers** with the same base, you keep the base and **ADD the exponents** • **To divide powers** with the same base: you keep the base and **SUBTRACT the exponents** • **For the power of a power, or a power inside a bracket with an exponent outside the bracket, you MULTIPLY the exponents** • **For a power of a division of fraction, you multiply the exponents for both the numerator and the denominator by the power outside the bracket**	

	• **For the power of a multiplication (which is inside a bracket), each of the individual numbers inside that bracket is multiplied by the power outside the bracket**	
5, 6. Rational Numbers • Rational numbers • Positive and negative signs combined in addition, subtraction, multiplication and division • Number lines • Ordering numbers in increasing or decreasing value • Adding and subtracting fractions • Multiplying and dividing fractions	• A **rational number** is any number that can be made into a fraction. • For negative numbers, the bigger numbers are the closest to 0. • For positive numbers, the bigger numbers are the ones away from 0 • **When combining numbers with the same sign, add them and keep the common sign** • **When combining numbers with different numbers, they subtract, and the number with the biggest value determines the sign of the answer** • **The order of operations for rational numbers is BEDMAS** • (+) x (+) = + (+) / (+) = + • (+) x (-) = - (+) / (-) = - • (-) x (-) = + (-) / (-) = - • (-) x (+) = - • **To multiply fractions, multiply the numerators with each other, and the denominators with each other** • **To divide fractions, cross multiply.**	
7, 8. Linear Relations • Extrapolation • Interpolation • Ordered pair • Linear relation • Be able to come up with the equation that represents the relation	• For a relation to be linear, both **the x and the y values have to increase or decreased in a constant pattern** (although they don't have to be the same pattern for both) • **A relation is linear if its graph is a straight line. Equations that have both the *–x and the –y* variables in it will produce OBLIQUE (INCLINED) LINES** • Always make a table of values • The points on the graph **ARE NOT JOINED** because there isn't enough data, or the data is finite • You can extrapolate (make longer) the graphed lined, or "interpolate to find any point along the graph • To find points along the graph, start at either the *x* or the *y* coordinate, draw a line towards the graphed line, and then draw a line towards the other axis. You	



The line Touches the x-axis at 3



are looking for the point in which the line intercepts the axis

- An ordered pair describes a point on the Cartesian plain. It is read *(X, Y)*
- When the equation HAS JUST ONE VARIABLE:
  ***x* = a number, it means *x* is constant, and therefore its graph is a VERTICAL line**
  ***y* = a number, it means that y is constant, and therefore its graph is a HORIZONTAL line**
- To come up with the equation that represents a relation, follow the following steps:

9, 10. Polynomials

- Term
- Like and unlike terms
- Degree of the polynomial
- Variable
- Exponent
- Numerical coefficient
- Constant
- Monomial
- Binomial
- Trinomial

- A **polynomial** is defined as one term or the sum of terms whose variables have whole-number exponents.
- A **term** is a number, a variable, or the product of numbers and variables.
- A **binomial** is a polynomial that has 2 terms
- A **trinomial** is a polynomial that has 3 terms

• Simplification = Combination of like terms • Subtract = ADD THE OPPOSITE	• **Using tiles, the big squares represent the x^2 terms, the rectangles represent the x terms, and the small squares represent the constant terms** • **"Like terms"** are terms that have THE SAME VARIABLE AND THE SAME EXPONENT • **To simplify polynomials, you combine the LIKE TERMS** (that is letters with letters with the same exponents, and numbers with numbers). BE CAREFUL: THE BASES HAVE TO MATCH UP!!!!! • **To ADD polynomials, you combine all "like terms".** Again, you can only combine terms that have the same base and exponent • **To SUBTRACT polynomials, you "ADD THE OPPOSITE":** That is, you change the subtraction sign to an add sign, and then YOU CHANGE THE SIGNS OF ALL THE TERMS • **To multiply a binomial or a trinomial by a constant, the constant (outside the bracket) MULTIPLIES EACH TERM INSIDE THE BRACKET** • **To divide a binomial or a trinomial by a constant, divide each term on the numerator (individually) by the numerator. If needed, combine like terms.** • **To divide a binomial or a trinomial by a monomial, divide the numbers with each other, and for the constant (letter), remember that to divide exponent you subtract them (bases have to match!)**	
11. Linear Equalities and Inequalities **EQUATION:** One quantity is EQUAL to another **INEQUALITY:** 1. One quantity is less than another 2. One quantity is greater than another 3. One quantity is greater or equal to another 4. One quantity is less or equal to another	• **To solve an equation:** **1. Isolate the variable** **2. Use INVERSE OPERATIONS** • If you want, you can use rectangles • **The first rectangle ALWAYS starts with the variable** • The arrows indicate the operations • On the lower row, you start backwards. THE LAST RECTANGLE starts with THE ANSWER. • Now follow back, and use inverse operations. **Inequalities:** • Remember that inequalities have MANY solutions, and you can use a number line to see the solutions • **IMPORTANT: You REVERSE the sign of the inequality when you MULTIPLY OR DIVIDE each side BY THE SAME NEGATIVE NUMBER**	

13, 14, 15, 16, 17. Similarities and Transformations Scale factor Enlargements Reductions Similar Polygons Similar Triangles Corresponding side Ratio Rotational Symmetry Order of rotation Angle of rotational symmetry Translations Rotations Reflection Ordered pair	• **SCALE FACTOR = New/old** • **For enlargements = SCALE FACTOR > 1** • **For reductions = SCALE FACTOR < 1** • **To get the NEW DIMENSIONS, multiply each length by the scale factor** • **Similar Polygons:** Have to have SAME ANGLES and SAME SCALE FACTOR (you have to get the scale factor **of each individual side**) • **Corresponding sides must be proportional. They are written in fractions form: AC/DB** • Make sure you ROTATE the polygons if you have to so that they "look the same" • **Similar Triangles: Similar triangles have EITHER the same angles OR the same scale factor** • **Remember to rotate (if you have to) the triangles so that they look the same.** • **TO SOLVE RATIOS: Cross-multiply!** • When given two triangles, and asked to find the length of one side, you MUST IDENTIFY THE EQUIVALENT SIDES, CALCULATE THE SCALE FACTOR WITH TWO EQUIVALENT, KNOWN DIMENSIONS, and use that scale factor to calculate the unknown length. • **LINE OF SYMMETRY = LINE OF REFLECTION:** Where you would "put" the mirror to reflect • **Lines of symmetry can be horizontal, vertical, and oblique (inclined)** • A shape has **ROTATIONAL SYMMETRY** when it is rotated, and it coincides with itself (before a full 360 degrees rotation) • If a figure is rotated and it does not coincide with itself, IT HAS NO ROTATIONAL SYMMETRY • The **order of rotation** is how many time a figure coincides with itself before a full rotation • **The angle of rotation symmetry is 360 divided by the order of rotation**	

	• **There are 3 types of transformations: Translations, Rotations and Reflections**	
18, 19, 20, 21, 22, 23. Circle Geometry Tangent Point of tangency Pythagorean Theorem Radius Diameter Chord Perpendicular bisector Minor arc Mayor arc Inscribed angle Central angle Semi-circle Subtended	• **A tangent to a circle is perpendicular to the radius. It is a line that touches the circle in one point (outside).** • This point where the tangent touches the circle is called the **POINT OF TANGENCY.** • **The angle at the point of tangency is always 90 degrees.** • A **radius** is any line that originates at the center of the circle and it ends in the circle itself • A **chord** is a line that goes from side to side in a circle but DOES NOT PASS THROUGH THE CENTER • A **diameter** is a line that goes through the middle of the circle, and it goes from one side to the other • **The longest chord in a circle is the diameter** • A **chord** is cut in two **IDENTICAL** parts by a line that comes from the centre of the circle and it goes to the center of the chord. This line is called the PERPENDICULAR BISECTOR • Remember: Perpendicular bisectors **COME FROM THE CENTRE OF THE CIRCLE**, and cut the chord in two IDENTICAL parts. • The angles created by the perpendicular bisectors are always 90 degrees. • Always try to complete triangles. That way you can use the Pythagorean Theorem. • **The total amount of degrees in ALL triangles is 180.** • **The total amount of degrees in all QUADRILATERALS is 360.** • **The total amount of degrees in all CIRCLEs is 360.** • The shortest distance between two points in the circumference of a circle is called the **MINOR ARC.** • The longest distance between two points in the circumference of a circle is called the **MAJOR ARC**	

	• **The angle that forms in the CENTRE of the circle, and it comes from the endpoints of an arc is called the CENTRAL ANGLE.** • **The angle formed ON THE CIRCLE, and it comes from the endpoints of an arc is called the INSCRIBED ANGLE.** • **CENTAL ANGLE = 2 x CENTRAL ANGLE** • **INSCRIBED ANGLE = (CENTRAL ANGLE)/2** • **Remember:** In order for you to utilize the above mathematical relation, **both the central and the inscribed angle HAVE to originate from the same two points.** • **All inscribed angles SUBTENDED (originating from) the same 2 points ARE EQUAL or EQUIVALENT (CONGRUENT)** • **In a circle, if a triangle has the diameter as its base, the vertex (where the other two sides meet) is always along the circle, and it will always be A RIGHT ANGLE.** • **OR: All inscribed angles subtended (originating from) a semi-circle are right angles.**	
24-29. Probability in Society Probability Theoretical probability Experimental probability Subjective judgement POTENTIAL PROBLEMS WITH DATA COLLECTION: • Bias • Use of language • Timing • Privacy • Ethics • Cultural Sensitivity • Cost • Time Population Census Sample Validity of conclusions Simple random sampling Systematic or Interval sampling Cluster sampling	• **Probability:** Defined as the possibility of an outcome happening. It can be expressed as a ratio (4:10), "4 out of 10," as a fraction (4/10), a decimal, or a percentage. • **Theoretical Probability:** The number of favourable outcomes written as a fraction of the total number of possible outcomes (based on a "theory") • **Experimental probability:** The probability of an event calculated from experimental results. • **Subjective judgement:** A decision made based on instinct, "gut feeling", superstition, etc. • A question is **BIASED** when the question influences responses in favour of, or against the topic of the data collection. • The **USE OF LANGUAGE** in a question could lead people to give a particular answer. • **Timing:** Refers to **WHEN** the data is collected, and it could potentially lead to particular results.	

Self-selected sampling Convenience sampling Stratified random sampling	• **Privacy:** If the topic of the data collection is personal, a person may not want to participate or may give an untrue answer on purpose. • **Cultural Sensitivity** means being aware of other cultures. The surveyor must avoid being offensive when asking questions that do not apply to that culture. • **Ethics:** The collected data must not be used for purposes other than those told to the participants. • **The COST** of collecting data must be taken into account. • The **TIME** needed for collecting the data must be considered. • **POPULATION:** The group about which information is being obtained. • **CENSUS:** Conducted when data are collected from EACH MEMBER of the population. Census can be time consuming, difficult or impossible to complete, and could be very expensive. • **SAMPLE:** A small part of the population used when a census is not feasible. • **REMEMBER: The sample has to be big enough to be a truer representation of the population. Also, if the sample is representative of the population, the data collection provides valid conclusions** • **Simple random sampling:** Each member of the population has an equal chance of being selected • **Systematic or Interval Sampling:** Every *nth* member of the population is selected. • **Cluster Sampling:** Every member of each randomly chosen group of the population is selected. • **Self-selected Sampling:** Only members of the population who are interested and volunteer will participate. • **Convenience Sampling:** Only members of the population who are convenient to include are selected • **Stratified Random Sampling:** Some members from each group of the population are randomly selected	