Workplace & Apprenticeship 30 Math Rubrics

WP 30.1 Analyze puzzles and games that involve logical reasoning using problem-solving strategies.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
Outcome integrated throughout the course by using puzzles and games such as Chess, Sudoku, Mastermind, Nim, Reversi.			

WP30.2 Demonstrate concretely, pictorially and symbolically an understanding of limitations of measuring instruments, including: precision, accuracy, uncertainly and tolerance.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	I can explain why a certain degree of precision and/or accuracy is required for the given context. I can compare the degree of accuracy for two or more given instruments used to measure the same attribute. I can relate the degree (margin) of accuracy to the uncertainty of a given measure. I can calculate the maximum and minimum values, given the nominal value and the tolerance,	I can state and justify the degree of precision required by the measuring device, given a situational question, I can calculate the nominal value and the tolerance, given the maximum and minimum values,	I can compare and describe, using examples, the limitations of measuring instruments used in a specific trade or industry, eg, tape measure versus Vernier caliper. I can explain using concrete models and pictorial representations the difference between precision and accuracy. I can explain using specific examples, the importance of applying tolerance in various situations (eg) Machining, Carpentry, Manufacturing.

WP30.3 Solve problems that involve the Sine Law and Cosine Law, excluding the ambiguous case.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	Given all the necessary information, I can apply the Laws of Sine and Cosine to a situational question.	I can solve situational questions using the Laws of Sine and Cosine that require multiple step calculations (with or without diagrams.)	I can identify and describe the use of the Sine and Cosine Laws in construction, industrial, commercial and artistic applications.

WP30.4 Extend and apply understanding of the properties of triangles, quadrilaterals and regular polygons to solve problems.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	I can analyze, generalize, and explain properties of polygons using illustrations, including: triangles, quadrilaterals, and regular polygons.	I can explain, using examples, why a given property does (not) apply to certain polygons. I can solve situational questions that involve the application of the properties of polygons.	I can solve higher level situational questions that involve the application of the properties of polygons. I can identify and explain applications of the properties of polygons in construction, industry, commerce, domestic, and artistic contexts.

WP30.5 Extend and apply understanding of transformations on 2-D shapes and 3-D objects, including: translations, rotations, reflections, dilations.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	I can draw the image of 2-D shapes given a single transformation: translations, rotations, dilation or a reflection and state the new coordination. Given two similar images I can calculate the scale factor used to create the	I can explain how and why the concept of similarity can be used to determine if an image is a dilation of a given shape, and provide examples. I can determine whether or not given images are dilations of given shapes and explain	I can solve higher level contextual problems that involve transformations and explain the reasoning. I can analyze and describe designs that involve translations, rotations, and reflections in all four quadrants of a coordinate grid, and explain the

	scale diagram. I can calculate the dilation, given an original diagram and scale factor.	the reasoning. I can solve contextual problems that involve transformations.	reasoning. I can create designs using translations, rotations and reflections in all four quadrants of a coordinate grid.

WP30.6 Demonstrate understanding of options for acquiring a vehicle including: purchasing without credit, purchasing with credit, leasing and leasing to purchase.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	I can calculate the total purchase price of a vehicle including tax. I can determine the principal of a loan given the purchase price and the amount of the down payment. Given the conditions of the lease, I can calculate the cost of lease to pick up the vehicle and the total cost at the end of the lease. When given a lease option, I can calculate the penalty for extra km driven. I can calculate the total lease to purchase price including the residual value.	I can solve, with or without technology, situational questions that involve the purchase of a vehicle and the cost of a lease	I can solve, with or without technology, situational questions that involve a lease to purchase of a vehicle. I can justify a decision related to buying, leasing, or leasing to buy a vehicle, based on factors such as personal finances, intended use, maintenance, warranties, mileage, and insurance.

WP30.7 Explore and critique the viability of small business options with respect to: expenses, sales, profit or loss.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	I can analyze a small business to generate options that might improve its profitability including start up and operating costs. I can identify variable & fixed income and expenses.	I can determine the break-even point for small businesses and explain the reasoning. Using the compound interest formula, I can calculate start up loans with various interest rates and terms to determine the total cost of the loan and monthly payments.	I can analyze small businesses such as a hot dog stand to identify and describe expenses, and explain factors, such as seasonal variations and hours of operations that might impact their profitability. I can justify my choice of loan options.

WP30.8 Extend and apply understanding of linear relations including: patterns and trends, graphs, tables of values, equations, interpolation and extrapolation, and problem solving.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	I can determine the characteristics of a linear relation using various forms (using equations, table of values or graphs). I can analyze graphs (scatterplots) describing and naming the type of trends represented (linear, nonlinear or no trend). I can explain the linear relation in a given context and match it with its corresponding graph. I can create a graph to represent a data set, including scatterplots. Given data, I can calculate slope.	I can relate slope and rate of change to linear relations. I can solve situational questions and write an equation of a line given a table of values or a graph. I can explain why the points on a graph should or should not be connected.	I can solve situational questions that may require interpolation or extrapolation of information. Given situational questions I must create my own table of values, equation of a line and graph to solve. I can critique statements such as, “Trends allow us to predict exactly what will happen in the near future?”

WP30.9 Extend and apply understanding of measures of central tendency to solve problems including: mean, median, mode, weighted mean, trimmed mean.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)

I need more help with becoming consistent with the criteria.	I can determine the mean, median and mode for sets of data and explain the reasoning. I can analyze calculations of measures of central tendency to identify and correct errors if necessary.	I can calculate the trimmed mean for sets of data, and justify the removal of the outliers. I can calculate the mean of a set of numbers after allowing the data to have different weightings (weighted mean) and explain the reasoning. I can manipulate the mean formula to calculate an unknown data entry for a given mean.	I can identify the outlier(s) in a set of data, explain why they are outliers and explain their effect on the mean, median, and mode of that data set. I can explain, using examples from print and other media, how and why measures of central tendency and outliers are used to provide different interpretations of data.

WP30.10 Demonstrate understanding of percentiles.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	I can calculate the percentile rank in situational questions given the data.	I can solve situational questions that involve percentiles and percentile charts.	I can explain, using examples, percentile ranks in a context. I can compare, using examples, percent and percentile rank. I can explain how and why decisions can be made based on a percentile rank. I can compare, using examples, percent & percentile rank.

WP30.11 Extend and apply understanding of probability.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	I can calculate the probability of an event based on a data set. I can express given probabilities as fractions, decimals, percentages, and words. I can calculate the probability of an event occurring given a data set (eg) number of defective light bulbs. I can calculate the odds in favour or against a particular outcome.	I can analyze, generalize, and compare odds and probability including part-whole and part-part relationships. I can determine the probability of an event, given the odds for and against. I can solve situational questions that involve probability.	I can explain, using examples, how decisions may be based on a combination of theoretical probability calculations, results of experimental probability, and subjective judgments. I can critique statements such as, "It is not possible to express odds as fractions." I can solve higher level situational questions that involve probability.