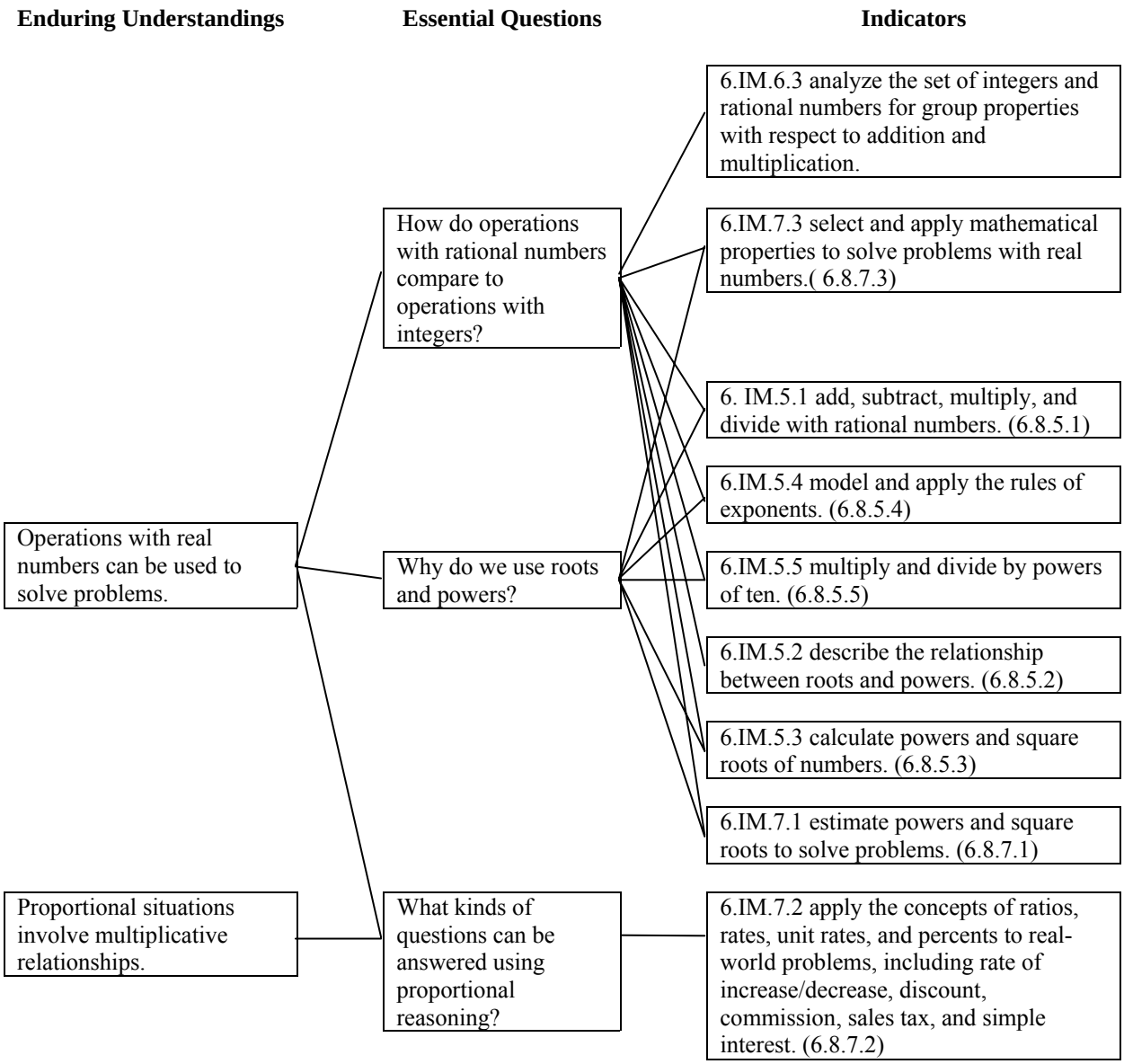
DRAFT – Investigations into Mathematics
Unit 1 – Statistical Applications and Set Theory — Content Map

Enduring Understandings	Essential Questions	Indicators
Graphical representations and statistical measures influence interpretations and predictions about data.	How can the results of a statistical investigation be used to support an argument?	4. IM.1.1 design, conduct, analyze, and communicate the results of a statistical experiment. (4.8.1.1)
		4. IM.5.1 evaluate arguments that are based on data analysis for accuracy and validity. (4.8.5.1)
		4. IM.3.1 analyze and interpret distribution of data by using statistical measures and displays. (4.8.2.1, 4.8.3.1, 4.8.4.1)
Relationships can be represented using set theory.	How does set theory help to identify relationships and solve problems?	6.IM.1.1 represent sets and set operations using rosters, number lines, and Venn diagrams.
		6.IM.6.1 identify and describe subsets, complements, unions, and intersections of sets.
		6.IM.1.2 solve problems using rosters, number lines, and Venn diagrams.
Real numbers are either rational or irrational.	What kinds of numbers make up the set of real numbers?	6.IM.6.2 categorize (classify) numbers according to the real number systems subsets.


Enduring Understandings
Essential Questions
Indicators
Operations with real numbers can be used to solve problems.
Proportional situations involve multiplicative relationships.
How do operations with rational numbers compare to operations with integers?
Why do we use roots and powers?
What kinds of questions can be answered using proportional reasoning?
6.IM.6.3 analyze the set of integers and rational numbers for group properties with respect to addition and multiplication.
6.IM.7.3 select and apply mathematical properties to solve problems with real numbers.(6.8.7.3)
6. IM.5.1 add, subtract, multiply, and divide with rational numbers. (6.8.5.1)
6.IM.5.4 model and apply the rules of exponents. (6.8.5.4)
6.IM.5.5 multiply and divide by powers of ten. (6.8.5.5)
6.IM.5.2 describe the relationship between roots and powers. (6.8.5.2)
6.IM.5.3 calculate powers and square roots of numbers. (6.8.5.3)
6.IM.7.1 estimate powers and square roots to solve problems. (6.8.7.1)
6.IM.7.2 apply the concepts of ratios, rates, unit rates, and percents to real-world problems, including rate of increase/decrease, discount, commission, sales tax, and simple interest. (6.8.7.2)

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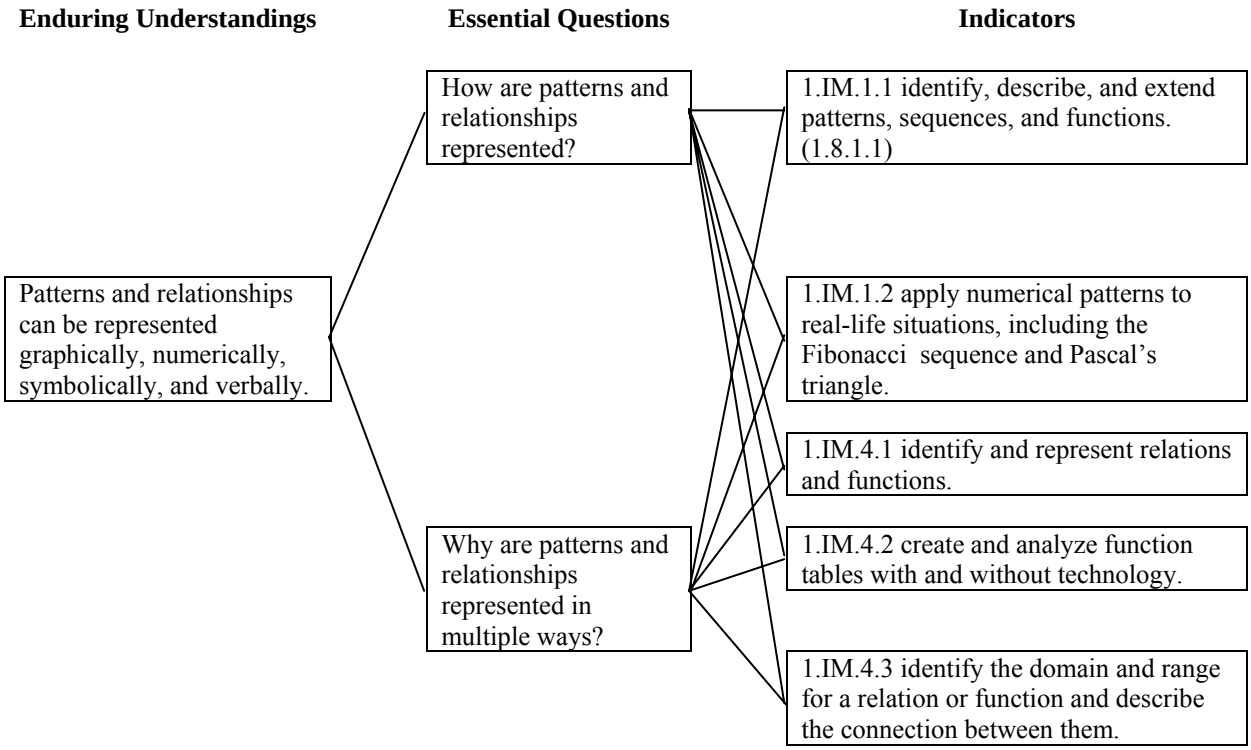
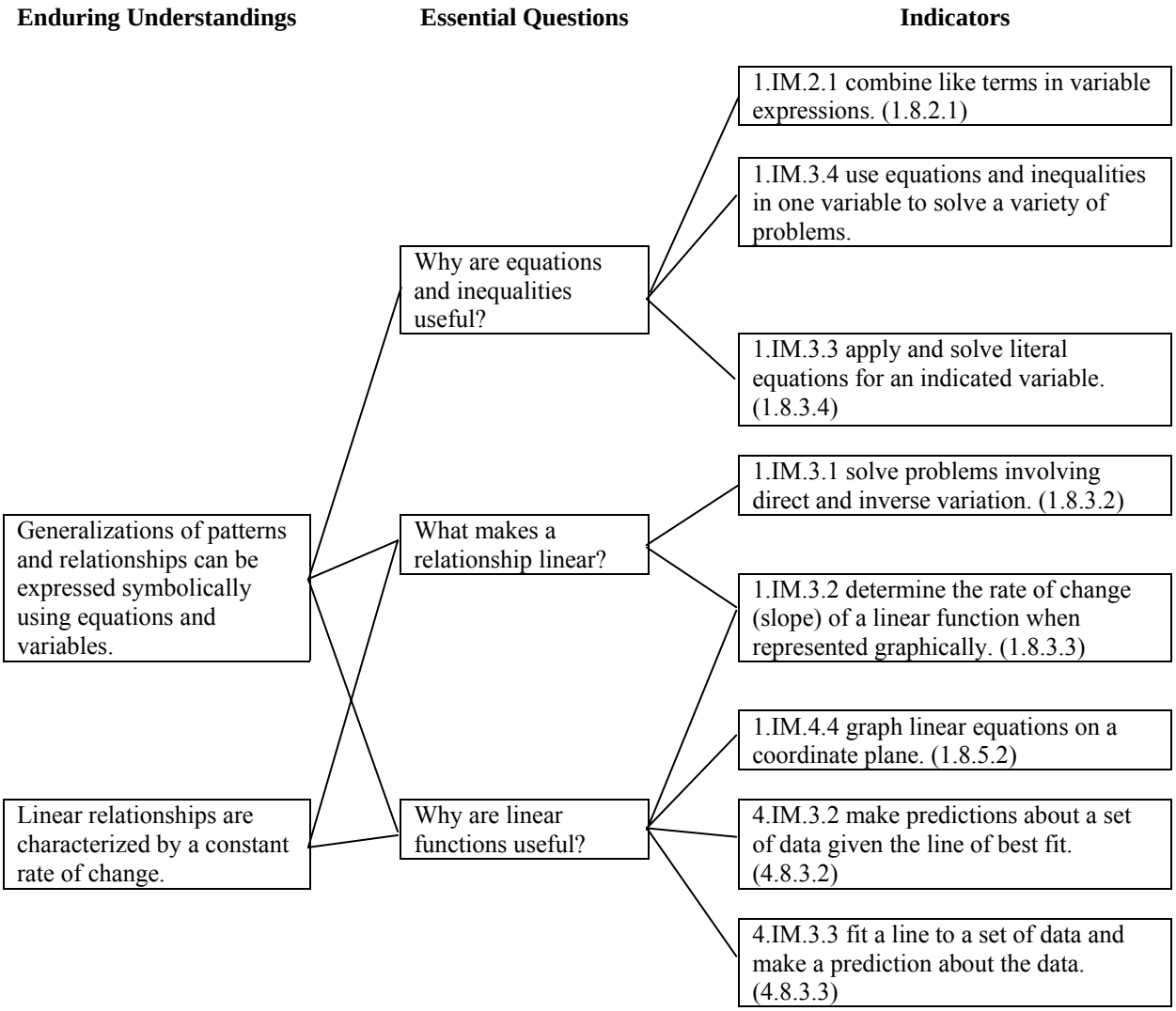
Geometric figures are constructed and transformed while maintaining proportional attributes.	How are geometric properties used to construct geometric figures?	2.IM.3.1 use a compass and straightedge to construct rectangles and triangles. (2.8.3.1)
	How is proportionality of geometric figures used to solve problems?	2.IM.4.1 graph plane figures that are similar to a given figure (dilations). (2.8.4.1)
		2.IM.5.1 apply properties of equality and proportionality to solve problems involving congruent and similar figures. (2.8.5.1)
Relationships exist among the angles, sides, lengths, perimeters, areas, and volumes of geometric figures.	How are the angles and sides of a polygon related?	2.IM.2.2 find measures of interior and exterior angles of a triangle. (2.8.2.2)
		2.IM.1.1 determine the sum of the measures of interior angles of polygons by partitioning into triangles. (2.8.1.1)
		2.IM.2.1 use the Pythagorean Theorem to solve problems by determining the length of the missing side of a right triangle. (2.8.2.1)
	How are one-, two-, and three-dimensional measures related?	2.IM.1.2 apply the properties of two- and three-dimensional figures to solve problems. (2.8.1.2)
		3.IM.3.1 determine relationships among length, area, and volume and describe how a change in one measure affects the others. (3.8.3.1)
		3.IM.2.1 estimate conversions between units of the same measurement system to solve problems. (3.8.2.1)
		3.IM.3.2 determine the surface area and volume of three-dimensional figures, including pyramids, spheres and cones.


Enduring Understandings
Essential Questions
Indicators
Patterns and relationships can be represented graphically, numerically, symbolically, and verbally.
How are patterns and relationships represented?
Why are patterns and relationships represented in multiple ways?
1.IM.1.1 identify, describe, and extend patterns, sequences, and functions. (1.8.1.1)
1.IM.1.2 apply numerical patterns to real-life situations, including the Fibonacci sequence and Pascal's triangle.
1.IM.4.1 identify and represent relations and functions.
1.IM.4.2 create and analyze function tables with and without technology.
1.IM.4.3 identify the domain and range for a relation or function and describe the connection between them.


Enduring Understandings
Essential Questions
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Generalizations of patterns and relationships can be expressed symbolically using equations and variables.
Linear relationships are characterized by a constant rate of change.
Why are equations and inequalities useful?
What makes a relationship linear?
Why are linear functions useful?
1.IM.2.1 combine like terms in variable expressions. (1.8.2.1)
1.IM.3.4 use equations and inequalities in one variable to solve a variety of problems.
1.IM.3.3 apply and solve literal equations for an indicated variable. (1.8.3.4)
1.IM.3.1 solve problems involving direct and inverse variation. (1.8.3.2)
1.IM.3.2 determine the rate of change (slope) of a linear function when represented graphically. (1.8.3.3)
1.IM.4.4 graph linear equations on a coordinate plane. (1.8.5.2)
4.IM.3.2 make predictions about a set of data given the line of best fit. (4.8.3.2)
4.IM.3.3 fit a line to a set of data and make a prediction about the data. (4.8.3.3)

Enduring Understandings	Essential Questions	Indicators
Other number bases and operational systems are useful.	How is modular arithmetic used?	6.IM.5.8 connect operations in modular arithmetic to operations in the real number system.
		6.IM.6.5 connect properties in modular arithmetic to properties in the real number system.
		6.IM.5.7 create addition and multiplication tables for various finite modular systems. ($2 \leq \text{mod} \leq 12$)
		6.IM.6.4 identify and justify properties for modular systems under addition and multiplication, including closure.
	How are place value concepts used to compute and convert between number systems with different bases made?	6.IM.5.6 compute in and convert between numbers systems with different bases, including the base two (binary) number system.
		6.IM.3.1 recognize and describe applications of number systems with different bases.
	Under what operations is a finite system a group?	6.IM.6.6 analyze modular systems for group properties with respect to addition and multiplication.
		6.IM.6.7 analyze modular systems for group properties with respect to subtraction and division.

Enduring Understandings	Essential Questions	Indicators
The interaction of events affects probability.	How do compound events affect probability?	5.IM.1.1 distinguish between permutations and combinations. (5.8.1.1)
		5.IM.1.2 apply the Fundamental Counting Principle to solve problems. (5.8.1.2)
		5.IM.2.1 find the probability of an event that does not have equally likely outcomes. (5.8.2.1)
		5.IM.2.2 find the probability of dependent and independent events using various methods, including constructing a sample space. (5.8.2.2)
		5.IM.3.1 predict the probability of compound events based on the outcomes of an actual event or a simulation. (5.8.3.1)
	How are complementary events related to odds of an event?	5.IM.2.3 calculate the probability of complementary events.
		5.IM.2.4 calculate the odds of a simple event and differentiate between odds and probability.