Proportional Relationships

Grade: 7 / Pre Algebra & Geometry	**Duration:** Week 26, 5 weeks

Summary:

Proportionality is a concept that connects rates, ratios and percents. Learning to reason proportionally will provide a basis for the study of algebra. During this unit, students will come to understand the terms ratio, rate, and unit rate, using their understanding to solve application problems in a wide variety of real life contexts. Proportions will be applied to solved problems relating to Scale and indirect measurement. Probability will also be introduced, students will come to understand that when all outcomes of an experiment are equally likely, the theoretical probability of an event is the fraction of outcomes in which the event occurs.

LEARNING FOCUS

COMPELLING QUESTION

Can we use proportional relationships to make a prediction or conclusion?

CONCEPT	LEARNING DISPOSITIONS
Identifying Proportional Relationships	**Resourcefulness: knowing which of the many approaches to use for solving.** **Relating: to each other as we investigate many real life situations as a group.**

ENDURING UNDERSTANDING

- The probability of an event can be used to predict the probability of future events.
- There are a variety of ways to calculate a probability, both theoretical and experimental.
- Mathematics can be a powerful tool for solving problems in the world around us.
- Numbers can be represented in multiple ways.
- Numbers tell how many or how much.
- The operations of addition, subtraction, multiplication, and division hold the same fundamental meanings no matter the domain to which they are applied.
- There are many algorithms for performing a given operation.
- Numbers or objects that repeat in predictable ways can be described or generalized.
- Change is relative

ESSENTIAL QUESTIONS

- How does my sample affect confidence in my prediction?
- What is fair?
- How can change be described mathematically?

STANDARDS & BENCHMARKS [Learning Goals]

NCTM: Curriculum Focal Points, NCTM: Grade 7, Focal Points
Number and Operations and Algebra and Geometry: Developing an understanding of and applying proportionality, including similarity

- Students extend their work with ratios to develop an understanding of proportionality that they apply to solve single and multistep problems in numerous contexts.
- They use ratio and proportionality to solve a wide variety of percent problems, including problems involving discounts, interest, taxes, tips, and percent increase or decrease.
- They also solve problems about similar objects (including figures) by using scale factors that relate corresponding lengths of the objects or by using the fact that relationships of lengths within an object are preserved in similar objects.
- Students graph proportional relationships and identify the unit rate as the slope of the related line.
- They distinguish proportional relationships ($y/x = k$, or $y = kx$) from other relationships, including inverse proportionality ($xy = k$, or $y = k/x$).

NCTM: Curriculum Focal Points, NCTM: Grade 7, Connections to the Focal Points

Measurement and Geometry:

- Students connect their work on proportionality with their work on area and volume by investigating similar objects.
- Students apply their work on proportionality to measurement in different contexts, including converting among different units of measurement to solve problems involving rates such as motion at a constant speed.

Data Analysis:
Students use proportions to make estimates relating to a population on the basis of a sample.

Probability:

- Students understand that when all outcomes of an experiment are equally likely, the theoretical probability of an event is the fraction of outcomes in which the event occurs.
- Students use theoretical probability and proportions to make approximate predictions.

KNOWLEDGE

Identifying that slope and unit rate are the same.
Students can understand that conversions can be made unit to unit.
See how proportional relationships can be justified mathematically and graphically.
Be able to predict.
Understand that a quantity can be described as a fraction, decimal, and percent.
Tracking a change and making sense of it through percents.

SKILLS

1. Graphing proportional relationships and identifying the slope as the unit rate of the related line.
2. Writing and simplifying ratios. Finding rates and unit rates, some of which involve unit conversions.
3. Connecting rates to proportional reasoning. Using proportions to make estimates relating to a population on the basis of a sample.
4. Similar figures and scale drawings.
5. When all outcomes of an event are equally likely, the theoretical probability of an event is the fraction of outcomes in which the event occurs.
6. Using theoretical probability and proportions to make approximate predictions.
7. Using the counting principle to find all of the possible outcomes for various situations involving chance.
8. Converting between decimal, fraction, and percent equivalents.

9. Using equations to solve percent word problems.
10. Percent change, markup, and discount.

LEARNING EVIDENCE

Summative and Formative
Practice Test
Formative: Unit Assessments
Common Assessment
Summative: Unit Assessments
Algebra Readiness Test
Pre-Assessment: Selected Response

LEARNING PLAN

1. Graphing proportional relationships and identifying the slope as the unit rate of the related line.
2. Writing and simplifying ratios. Finding rates and unit rates, some of which involve unit conversions.
3. Connecting rates to proportional reasoning. Using proportions to make estimates relating to a population on the basis of a sample.
4. Similar figures and scale drawings.
5. When all outcomes of an event are equally likely, the theoretical probability of an event is the fraction of outcomes in which the event occurs.
6. Using theoretical probability and proportions to make approximate predictions.
7. Using the counting principle to find all of the possible outcomes for various situations involving chance.
8. Converting between decimal, fraction, and percent equivalents.
9. Using equations to solve percent word problems.
10. Percent change, mark-up, and discount.

REFLECTION

Apr 2014
We need to work on the unit planner to update it
We did not get time to do the performance assessment.
We need to revisit the probability problems for Black. Check if the rigor on HW matches the rigor on test.
We provide more support for Blacks on transversal properties of parallel lines.
We did a better job explaining profit/loss concepts
We need to utilize the Basketball activity more. especially with slope.
should we include their mile times as their activity. ALso for unit conversion.

Feb 2015
We plan to take the percentages piece from this unit and create a new unit which will include unit 1: circle graphs.

We will begin the year with what is at present unit 2.
We will also do coordinate plane pictures as an aside at the beginning of the year.
FEB 2015 Worked on UBD, we have decided to use performance task as formative assessment this year.
Feb 23 2015
Discussion around use of Relating in the class activities. What language will we use, what will we encourage students to think about?

APRIL 2015- Summative
The percents part needs to be separated. The questions in PART 7 and 8 don't match up to the learning goal.
GREEN
The profit and loss question was a challenging concept for many. We have changed the language for clarity.
The super soaker question was a good question to differentiate higher order thinking.
The test gave students a variety of situations to set up their proportions and the students were consistent in doing it correctly.

BLUE
The rocket Q -BLUE too easy.
The shared ratio question was too straight forward.
Percent increase -decrease question is critical thinking question.
PART 5 blue 3 - order matters (changes made).
B

BLACK
Ratio- Blood question a good ine to test reading of complex problems

Black probability - fred and JAne (changes made)-
Probability question tests their deeper understanding of chances and dependant events

PROFIT and LOSS -is it part of the standards or focal points? do we need to keep it? Can do for blues and blacks. for green replace with Taxes and tips