MTH 1W: Infinity, Limits and Density

LESSON OVERVIEW:

Scope and Sequence – Main Lesson Topics	Prior Knowledge	Vocabulary
Infinity, Limits and Density • infinite sets and subsets • patterns and number relationships to explain density, infinity and limits	• Number systems •	• Density • Infinity • Limits

Learning Objectives	Curriculum Expectations
I can • Describe how subset so of number systems are defined • Describe similiarites and differences between subsets of number systems • Use patterns and number relationships to explain density • Use patterns and number relationships to explain infinity • Use patterns and number relationships to explain limits	• **B1.2** describe how various subsets of a number system are defined, and describe similarities and differences between these subsets • **B1.3** use patterns and number relationships to explain density, infinity, and limit as they relate to number sets

1 Lesson Introduction & Problem String *(see below)* 40 minutes

Introduction:

- Begin by introducing the real number system and the sets of numbers within each.
- Have a quick discussion about the concept of a limit (use a real world example).
- Talk about how the concpet of a limit can be applied to a set of numbers.

2 Consolidation 10 minutes

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3 Meaningful Notes 10 minutes

- **Density** – between any two given numbers, there will always be another real number. There are infinetly many real numbers between two numbers.
- **Infinity** – the state of haivng no end or limit. For example the set of even numbers or the set of retional numbers cannot me counted. A pattern or expresssion is said to approach infinity if the value can always be made larger than any given value.
- **Limit** – long term behaviour of a pattern or function, or the result as the number of terms increases.

4 Check Your Understanding 15 minutes

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LESSON BACKGROUND:

- Talk about density property – there is always a rational number between any two rational numbers
- Introduce concept of limit (example with closer to infinity? Examples with closer to 0?)

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PROBLEM	HINTS	EXTENSIONS
Write ten numbers between 2 and 3.	• Try drawing a number line • What number fits between 2 and 3? • What type of numbers are we looking for?	• How many rational numbers exist between 2 and 3? What do you notice? • Could you write ALL of the numbers between 2 and 3? Why or why not?
Given the set {6, 7, 8, 9…} What is the limit?	• What happens to the numbers as we continue to write this sequence? •	• Write a sequence of numbers that has a limit of negative infinity. • Why does this set approach infinity?
Given the set $\left\{\frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right\}$ What is the limit?	• What happens to the value of the fractions as we continue to write this sequence?	Why do the fractions get smaller as we continue the sequence? Why is the limit ___?
Write the limit given the set: {8.1, 8.01, 8.001, 8.0001}	• Are the numbers getting larger or smaller? How do you know? • What number are we getting closest to?	• Write the limit given the set: o 0.3, 0.33, 0.333, 0.3333… o 1.6, 1.66, 1.666, 1.6666… • If you were to write a note to your "future forgetful self" about sets, infinity and limits, what information would you include? Discuss in your group what you think the most important ideas are
Given 3n What happens when n gets larger and larger?	• What operation is present in the expression? • How does that help your understanding?	• What if n got smaller and smaller? • What if the values of n were smaller and smaller fractions? How would that change the limit? • If you were to write a note to your "future forgetful self" about sets, infinity and limits, what information would you include? Discuss in your group what you think the most important ideas are • What is some new learning that you have? What are some questions that you still have?
$\frac{1}{2}$n What happens when n approaches infinity?	• What operation is present in the expression? • How does that help your understanding?	• What if n got smaller and smaller? • What if the values of n were smaller and smaller fractions? How would that change the limit? • If you were to write a note to your "future forgetful self" about sets, infinity and limits, what information would you include? Discuss in your group what you think the most important ideas are

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Teacher Observations/To Go Back to During Gallery Walk:

