Vocabulary Review Sheet

Lesson – Linear Relationships and Transportation Access

How to Use

- Review each word and example before your quiz.
- Connect **math definitions** to **real-world fairness issues** in transportation.
- Keep this sheet in your *Equity in Numbers Student Journal*.
- Remember: *Math helps us measure time, distance, and equity in everyday life*.

Linear Relationship

- **Definition:** A constant rate of change between two variables, forming a straight line on a graph.
- **Math Example:** $T(d) = 6d + 4$ (time increases by 6 minutes per mile).
- **Real-Life Example:** The farther someone lives from work, the longer their commute.
- **Fairness Example:** Linear models show how distance and time can reveal transportation inequities between neighborhoods.

Slope (m)

- **Definition:** The rate of change; tells how much y changes for every 1-unit change in x.
- **Math Formula:** $m = \dfrac{y_2 - y_1}{x_2 - x_1}$
- **Math Example:** From (1, 10) to (4, 28): $m = \dfrac{28 - 10}{4 - 1} = 6 \text{min/mi}$.
- **Real-Life Example:** Slope = minutes per mile → how fast the trip is.
- **Fairness Example:** A smaller slope means quicker travel — some neighborhoods have slower routes, showing unequal access.

Y-Intercept (b)

- **Definition:** The starting value of y when x = 0; where the line crosses the y-axis.
- **Math Example:** If (T = 6d + 4), then b = 4 minutes (wait time before moving).
- **Real-Life Example:** Represents time spent waiting for the bus before travel begins.
- **Fairness Example:** A larger intercept means longer wait times — a sign some riders face more delays.

Linear Equation Model

- **Definition:** An equation showing how two variables are connected by a straight-line pattern.
- **Math Example:** (T(d) = m d + b).
- **Real-Life Example:** Predicting total travel time (T) from distance (d).
- **Fairness Example:** Modeling helps identify where public transit is slower or less reliable for certain communities.

Rise and Run

- **Definition:** The vertical and horizontal changes between two points on a line.
- **Math Formula:** Slope = Rise ÷ Run = (\dfrac{\text{Change in y}}{\text{Change in x}}).
- **Real-Life Example:** Rise = minutes of travel time added; Run = miles traveled.
- **Fairness Example:** Comparing “rise per run” shows who spends more time for the same distance.

Graph of a Line

- **Definition:** A visual representation of a linear relationship on the coordinate plane.
- **Math Example:** Plotting points (1, 9) and (5, 35) for Neighborhood A creates a line showing time vs distance.
- **Real-Life Example:** Graphing travel time helps planners compare neighborhoods.
- **Fairness Example:** The steepness of each line tells a story of access — flatter lines = faster, fairer transit.

Prediction

- **Definition:** Using a model to estimate an unknown value.
- **Math Example:** If (T(d) = 6d + 4), then (T(7) = 46 \text{min}).
- **Real-Life Example:** Estimating how long it will take to reach school 7 miles away.
- **Fairness Example:** Predictions help identify who faces the longest commutes and why.

Equity Gap (in Time)

- **Definition:** The difference between the longest and shortest travel times for the same distance.
- **Math Example:** 54 min − 38 min = 16 min gap.
- **Real-Life Example:** Some riders spend much more time commuting than others.
- **Fairness Example:** The gap shows which areas need better transit routes or schedules.

Interpretation

- **Definition:** Explaining what a number or pattern means in real-world terms.
- **Math Example:** "Slope = 6 means 6 minutes per mile."
- **Real-Life Example:** Turning data into meaning — how math describes travel experience.
- **Fairness Example:** Interpretation connects math results to people's daily challenges and opportunities.

Modeling with Data

- **Definition:** Creating an equation or graph that represents real-world information.
- **Math Example:** Building (T(d) = 8d + 5) from two data points.

- **Real-Life Example:** Students use distance-time data to analyze commute fairness.
- **Fairness Example:** Data modeling gives a voice to communities often overlooked in planning.

Representation (in Transportation Data)

- **Definition:** Showing information about all neighborhoods and groups accurately.
- **Math Example:** Graph includes data for A, B, C, and D neighborhoods.
- **Real-Life Example:** Comparing routes from different sides of the city.
- **Fairness Example:** Representation ensures every community's experience is visible in the data.

Summary of Math + Fairness Connections

Concept	Math Focus	Fairness Connection
Slope (m)	Rate of change (minutes per mile)	Reveals travel speed differences
Intercept (b)	Starting delay (wait time)	Shows which areas have more delays
Linear Model	Predicts time from distance	Makes inequities measurable
Graph of Line	Visual comparison of routes	Highlights unequal access
Equity Gap	Highest – Lowest time	Identifies where fairness needs attention