U1A L6 Writing & Solving Equations and Inequalities	Name: _____ HR: _____

Target Skill(s): Translate a real situation into an expression, equation, or inequality; solve it; and interpret the answer in context.

BIG IDEA: Algebra describes a situation BEFORE it solves it.

A MODELING ROUTINE

1. Define the variable and its units.

2. Build an expression for the quantity.

3. Choose the relationship: exact, maximum, or minimum.

4. Solve using the same equation/inequality skills you already know.

5. Interpret the answer in the situation.

Linear Models have something that changes at a constant RATE. Look for two key words:

Per or Each

Fixed amount + (rate)(number of units)

$3.00 + .50 • z (z = # of ounces; variable # of ounces)

At the ice cream bar an empty bowl cost $3.00 and then $0.50 per ounce for the ice cream and toppings you put in the bowl. Write an expression that calculates the cost of your dessert.

$.50 per ounce

$.50 / 1 ounce

3 + .5z

1. Build the expression first

Example: A streaming service charges a $15 start-up fee plus $8 each month.

Let m = # of month (Number)

Total cost expression: 15 + 8m

$15 Fixed

$8 / 1 month • # months

Determine total cost for the given number of months of service: 15 + 8m

6 months: 15 + 8(6) = 15 + 48 = $63

11 months: 15 + 8(11)

15 + 88 = $103

2. SAME situation - different relationships

EXACT amount *one target*	**MAXIMUM amount** *55 or less* (< OR >)	**MINIMUM amount** *55 or more*
The bill was exactly $55.	**You can spend no more than $55.**	**You must spend at least $55.**
15 + 8m = 55 −15 −15 8m = 40 8 8 m = 5	15 + 8m ≤ 55 −15 −15 8m ≤ 40 m ≤ 5	15 + 8m ≥ 55 m ≥ 5
Meaning of the answer: 5 month to spend $55	Meaning of the answer: Keep service for 5 or few months, Spend $55 or less	Meaning of the answer: keep service 5 or more months, cost $55 or more

3. Translate the comparison words by meaning

exactly / is	less/fewer than	at most / no more than	More/greater than	at least / no less than
=	<	≤	>	≥
= one value	does NOT include limit	includes the limit	Does NOT include limit	includes the limit

U1A L6 Guided Notes - Modeling with Equations & Inequalities	Name: _____

4. Solve AND interpret: the algebra answer may not be the final answer

Key question: Does the situation describe one exact value, values up to a limit, or values starting at a minimum?

Example: Concert tickets cost $12 each plus a $5 service fee. You have at most $75 to spend.

Let t = # of tickets

Fixed + rate · # items

$12 / ticket

$5 Flat fee

Model: $5 + 12t \leq 75$

Solve: $-5 \quad -5$

$\frac{12t}{12} \leq \frac{70}{12}$

$t \leq 5.83$ tickets

Interpret: You can buy at most 5 whole tickets.

WHY CONTEXT MATTERS

A calculator might give a decimal. But some quantities must be whole numbers:

- tickets
- people
- text messages
- games played

The situation decides what answers make sense.

5. Guided Practice - MODEL first, then solve

1. I DO: A carnival charges $4 to enter and $3 for each game. Jordan spent exactly $22. How many games did Jordan play?

Define: g = # of games played

Fix: $4

$3/game

Model: $4 + 3g = 22$

Solve: $\frac{3g}{3} = \frac{18}{3}$

$g = 6$

Interpret: Played 6 games

2. WE DO: A carnival charges $4 to enter and $3 for each game. You have no more than $22. How many games can you play?

Define:

Model: $4 + 3g \leq 22$

Solve: $3g \leq 18$

$g \leq 6$

Interpret: play 6 or fewer games to spend $22 or less

3. YOU DO: A fundraiser already has $18 and earns $6 for each item sold. The goal is at least $60. How many items must be sold?

Define: I = # of Items

Fixed: 18

rate: $6/item

Model: $18 + 6I \geq 60$

Solve: $-18 \quad -18$

$6I \geq 42$

$I \geq 7$

Interpret: Sell 7 or more Items

4. YOU DO: A phone plan costs $25 per month plus $0.10 per text. One bill was exactly $32. How many texts were sent?

Define: T = # of text

Fixed: $25

$.10/text

Model: $25 + .10T = 32$

Solve: $-25 \quad -25$

$\frac{.10T}{.10} = \frac{7}{.10}$

$T = 700$ texts

Interpret: Sent exactly 700 texts

Some examples of rates of change:

$17 per hour — $\frac{\$17}{hr}$

55 miles per hour — $\frac{55 \text{ miles}}{1 \text{ hr}}$

50 words per minute — $\frac{50 \text{ words}}{1 \text{ min}}$

$12 per pound — $\frac{\$12}{2 \text{ lb}}$

Summary

Fixed Rate

Change Rate: (per)(each)