Essential Outcome	Lesson/Video	Practice Questions
Construct a linear equation given a table of values	Method 1: https://www.youtube.com/watch?v=9wixvKtebbE Method 2: (Slope-Intercept Form) https://www.youtube.com/watch?v=o09bdHA5ZBA	Worksheet #1: Constructing a Linear Equation from a Table of Values
Construct linear equations from context. Identify a pattern in a problem and use it to interpolate and extrapolate data.	Notes to Accompany Video 1 are below in this document. Video 1: https://youtu.be/7JU8nbqtt9A Video 2: https://youtu.be/hBpl9lfmMKg	Worksheet #2: Word Problems

Worksheet #1: Constructing a Linear Equation from a Table of Values

Write the equation represented by each table of values.

1.

x	y
-2	2
-1	3
0	4
1	5
2	6

2.

x	y
-5	6
-4	4
-3	2
-2	0
-1	-2

3.

x	y
-6	-6
-5	-3
-4	0
-3	3
-2	6

4.

x	y
0	8
1	6
2	4
3	2
4	0

5.

x	y
0	8
2	6
4	4
6	2
8	0

6.

x	y
0	0
1	-4
2	-8
3	-12
4	-16

Answers:

1. $y = x + 4$
2. $y = -2x - 4$
3. $y = 3x + 12$
4. $y = -2x + 8$
5. $y = -x + 8$
6. $y = -4x$

Notes: How to construct linear equations from context, identify a pattern in a problem, and extrapolate data.

Example to Accompany Instructional Video:

Apolline is mowing lawns for a summer job. For every mowing job, she charges an initial fee of $7 plus a constant fee for each hour of work. Her fee for a 5-hour job, for instance, is $42. Her fee for a 3-hour job is $28.

Let y represent Apolline's fee (in dollars) for a single job that took x hours for her to complete.

A. **Complete the equation for the relationship between the fee and number of hours worked using the steps below.**

- **Create a table of values**

x (hours)	y (fee)
3	$28
5	$42

- **Find slope** $\left(\frac{Change\ in\ y}{Change\ in\ x}\right)$

+2 | x (hours) | y (fee) | +14
|-----------|---------|
| 3 | $28 |
| 5 | $42 |

$$slope\ (m) = \left(\frac{Change\ in\ y}{Change\ in\ x}\right)$$

$$slope\ (m) = \left(\frac{14}{2}\right)$$

$$slope\ (m) = 7$$

- **Find y-intercept (What is the value of y when x=0 on the table)**

x (hours)	y (fee)
0	$7 initial fee
3	$28
5	$42

OR, you can substitute any known point and the slope into the slope-intercept equation and solve for b to find the intercept. I chose the point (3,28)

$y = mx + b$

$28 = 7(3) + b$ (substitute y=28, m=7, and x=3)

$28 = 21 + b$

$28 - 21 = 21 - 21 + b$

$7 = b$

- **Plug in the values for slope and the y-intercept into slope-intercept form of an equation. (y=mx+b, where m = slope and b = y-intercept)**

$$y = mx + b$$
$$y = 7x + 7$$

B. **How many hours would she have worked if she made $63?**

$y = 7x + 7$

$63 = 7x + 7$ — Substitute y = 63 into the equation and solve for x

$63 - 7 = 7x + 7 - 7$

$56 = 7x$

$\frac{56}{7} = \frac{7x}{7}$

$8 = x$ — She would have worked 8 hours if she made $63.

C. **How much money would she make for working 6 hours?**

$y = 7x + 7$

$y = 7(6) + 7$ — Substitute x = 6 into the equation and solve for y

$y = 42 + 7$

$y = 49$

She would make $49 if she worked 6 hours.

Worksheet #2: Word Problems

Problem #1:

A lake near the Arctic Circle is covered by a 2-meter-thick sheet of ice during the cold winter months. When spring arrives, the warm air gradually melts the ice, causing its thickness to decrease at a constant rate. After 3 weeks, the sheet is only 1.25 meters thick.

Let y represent the ice sheet's thickness (in meters) after x weeks.

- **A. Complete the equation for the relationship between the thickness and number of weeks using the steps below.**
  - **Create a table of values**
  - **Find slope $\left(\frac{Change\ in\ y}{Change\ in\ x}\right)$**
  - **Find y-intercept (What is the value of y when x=0 on the table)**
  - **Plug in the values for slope and the y-intercept into slope-intercept form of an equation. (y=mx+b, where m=slope and b= y-intercept)**
- **B. How much ice will be left after 6 weeks?**
- **C. How long will it take for the ice to disappear?**

Problem #2:

Mr. Mole left his burrow that lies 7 meters below the ground and started digging his way deeper into the ground, descending at a constant rate. After 6 minutes, he was 16 meters below the ground.

Let y represent Mr. Mole's altitude (in meters) relative to the ground after x minutes.

- **A. Complete the equation for the relationship between the altitude and number of minutes using the steps below.**
  - **Create a table of values**
  - **Find slope $\left(\frac{Change\ in\ y}{Change\ in\ x}\right)$**
  - **Find y-intercept (What is the value of y when x=0 on the table)**
  - **Plug in the values for slope and the y-intercept into slope-intercept form of an equation. (y=mx+b, where m=slope and b= y-intercept)**
- **B. How long will it take Mr. Mole to dig 20 meters $(y = -20)$?**
- **C. What would Mr. Mole's altitude be after 12 minutes of digging?**

Problem #3:

A young sumo wrestler decided to go on a special high-protein diet to gain weight rapidly. He started at 90 kilograms and gained weight at a constant rate. After 8 months, he weighed 138 kilograms.

Let y represent the sumo wrestler's weight (in kilograms) after x months.

- **A. Complete the equation for the relationship between the weight and number of months using the steps below.**
  - **Create a table of values**
  - **Find slope $\left(\frac{Change\ in\ y}{Change\ in\ x}\right)$**
  - **Find y-intercept (What is the value of y when x=0 on the table)**
  - **Plug in the values for slope and the y-intercept into slope-intercept form of an equation. (y=mx+b, where m=slope and b= y-intercept)**
- **B. How much did he weigh 4 months into his high protein diet?**
- **C. How many months will it take him to reach 150kg?**

Problem #4:

Kayden is a stunt driver. One time, during a gig where she escaped from a building about to explode, she drove at a constant speed to get to the safe zone that was 160 meters away. After 3 seconds of driving, she was 85 meters away from the safe zone.

Let y represent the distance (in meters) from the safe zone after x seconds.

- **A. Complete the equation for the relationship between the distance and number of seconds using the steps below.**
  - **Create a table of values**
  - **Find slope $\left(\frac{Change\ in\ y}{Change\ in\ x}\right)$**
  - **Find y-intercept (What is the value of y when x=0 on the table)**
  - **Plug in the values for slope and the y-intercept into slope-intercept form of an equation. (y=mx+b, where m=slope and b= y-intercept)**

B. How long did it take her to reach the safe zone?

C. How far past the safe zone would she be after 9 seconds of driving?

Problem #5: (More challenging)

Noa drove from the Dead Sea up to Jerusalem, and her altitude increased at a constant rate of 740 meters per hour. When she arrived in Jerusalem after 1.5 hours of driving, her altitude was 710 meters above sea level.

Let y represent Noa's altitude (in meters) relative to sea level after x hours.

A. **Complete the equation for the relationship between the altitude and number of hours using the steps below.**
   - **Create a table of values [hint: Use the rate of her increase in altitude (the slope) to add more values to your table besides the one given]**
   - **Extrapolate to find the y-intercept (What is the value of y when x=0 on the table). In other words, what was her altitude when she began driving?**
   - **Plug in the values for slope and the y-intercept into slope-intercept form of an equation. (y=mx+b, where m=slope and b= y-intercept)**

Worksheet #2: Answers

Problem #1:	Problem #2:	Problem #3:	Problem #4:	Problem #5:
A. $y = -0.25x + 2$ B. 0.5 m C. 8 weeks	A. $y = -\frac{3}{2}x - 7$ B. 8.7 minutes C. -25m (25 m underground)	A. $y = 6x + 90$ B. 114kg C. 10 months	A. $y = -25x + 160$ B. 6.4s C. 65 meters past the safe zone (or -65m)	A. $y = 740x - 400$