## Table of Contents

UNIT/MODULE/MISSION SYNOPSIS ..... 2
CONTENT STANDARDS ..... 6
ROADMAP ..... 7
UNPACKED STANDARDS ..... 19
VERTICAL STANDARDS ..... 20

## How to Use This Addenda

Make sure you're ready to teach by noting the **Necessary Materials and Pre-Lesson Prep** you will need to gather or complete prior to the lesson

Find high-leverage instructional moves in the **Lesson Look Fors**. This is what leaders should see when observing your instruction

Note how your lesson objective ties to your state **Standards**

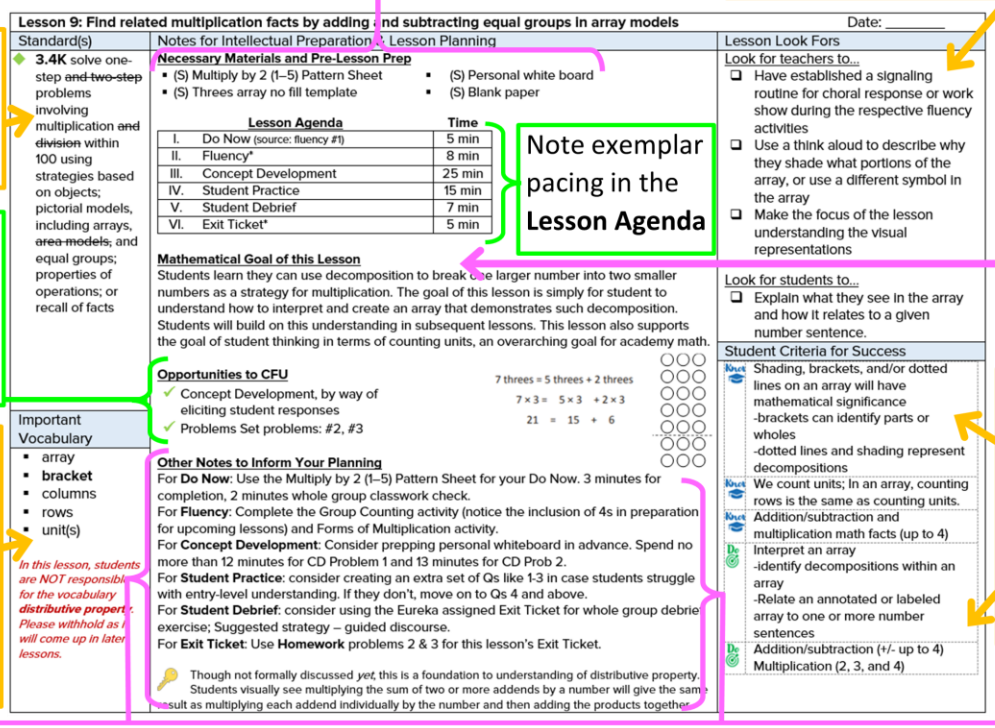
Note exemplar pacing in the **Lesson Agenda**

Use the **Mathematical Goal of the Lesson** to keep you focused on the appropriate student outcome

Plan purposeful questioning and responses using **Opportunities to CFU**

Plan to stress **Important Vocabulary** in the lesson. New vocab for the unit is indicated in bold

Plan instruction around what students need to Know & Do to be successful on the Exit Ticket using the identified **Student Criteria for Success**



**Lesson 9: Find related multiplication facts by adding and subtracting equal groups in array models** Date: _____

**Standard(s)**

**3.4K** solve one-step ~~and two-step~~ problems involving multiplication ~~and division~~ within 100 using strategies based on objects; pictorial models, including arrays, ~~area models~~, and equal groups; properties of operations; or recall of facts

**Important Vocabulary**

- array
- **bracket**
- columns
- rows
- unit(s)

*In this lesson, students are NOT responsible for the vocabulary **distributive property**. Please withhold as it will come up in later lessons.*

**Notes for Intellectual Preparation & Lesson Planning**

**Necessary Materials and Pre-Lesson Prep**

- (S) Multiply by 2 (1–5) Pattern Sheet
- (S) Threes array no fill template
- (S) Personal white board
- (S) Blank paper

| Lesson Agenda | | Time |
|---|---|---|
| I. | Do Now (source: fluency #1) | 5 min |
| II. | Fluency* | 8 min |
| III. | Concept Development | 25 min |
| IV. | Student Practice | 15 min |
| V. | Student Debrief | 7 min |
| VI. | Exit Ticket* | 5 min |

**Mathematical Goal of this Lesson**

Students learn they can use decomposition to break one larger number into two smaller numbers as a strategy for multiplication. The goal of this lesson is simply for student to understand how to interpret and create an array that demonstrates such decomposition. Students will build on this understanding in subsequent lessons. This lesson also supports the goal of student thinking in terms of counting units, an overarching goal for academy math.

**Opportunities to CFU**

- ✓ Concept Development, by way of eliciting student responses
- ✓ Problems Set problems: #2, #3

7 threes = 5 threes + 2 threes
7 × 3 = 5 × 3 + 2 × 3
21 = 15 + 6

**Other Notes to Inform Your Planning**

For **Do Now**: Use the Multiply by 2 (1–5) Pattern Sheet for your Do Now. 3 minutes for completion, 2 minutes whole group classwork check.
For **Fluency**: Complete the Group Counting activity (notice the inclusion of 4s in preparation for upcoming lessons) and Forms of Multiplication activity.
For **Concept Development**: Consider prepping personal whiteboard in advance. Spend no more than 12 minutes for CD Problem 1 and 13 minutes for CD Prob 2.
For **Student Practice**: consider creating an extra set of Qs like 1-3 in case students struggle with entry-level understanding. If they don't, move on to Qs 4 and above.
For **Student Debrief**: consider using the Eureka assigned Exit Ticket for whole group debrief exercise; Suggested strategy – guided discourse.
For **Exit Ticket**: Use **Homework** problems 2 & 3 for this lesson's Exit Ticket.

Though not formally discussed *yet*, this is a foundation to understanding of distributive property. Students visually see multiplying the sum of two or more addends by a number will give the same result as multiplying each addend individually by the number and then adding the products together.

**Lesson Look Fors**

Look for teachers to...

- ❑ Have established a signaling routine for choral response or work show during the respective fluency activities
- ❑ Use a think aloud to describe why they shade what portions of the array, or use a different symbol in the array
- ❑ Make the focus of the lesson understanding the visual representations

Look for students to...

- ❑ Explain what they see in the array and how it relates to a given number sentence.

**Student Criteria for Success**

Know: Shading, brackets, and/or dotted lines on an array will have mathematical significance
-brackets can identify parts or wholes
-dotted lines and shading represent decompositions

Know: We count units; In an array, counting rows is the same as counting units.

Know: Addition/subtraction and multiplication math facts (up to 4)

Do: Interpret an array
-identify decompositions within an array
-Relate an annotated or labeled array to one or more number sentences

Do: Addition/subtraction (+/- up to 4)
Multiplication (2, 3, and 4)

Find recommended lesson modifications, content knowledge boosters, and/or high-leverage instructional moves that may not be in your Teacher Edition located in **Other Notes to Inform Your Planning**

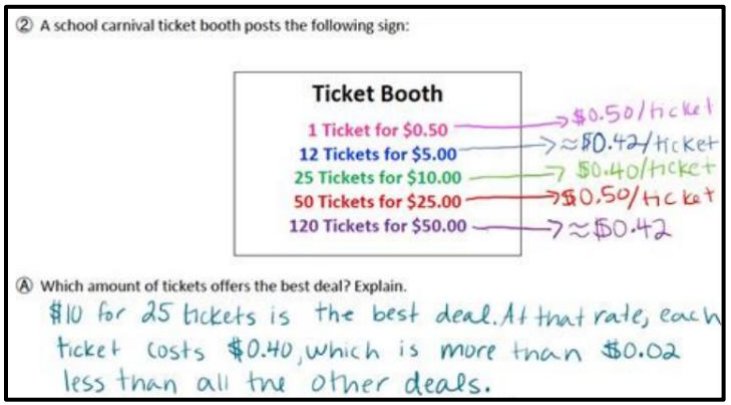
## UNIT SYNOPSIS

At the beginning of this unit, students review the concept of Unit Rate. They then extend their understanding of ratios and develop understanding of proportionality. They distinguish proportional relationships from other relationships and explore the multiple representations of proportional relationships, including tables, graphs, and equations. Students develop an understanding of unit rate as the constant of proportionality. Students calculate unit rates from a graph and table then move to recognizing and representing proportional relationships in equations and on graphs. Then, students extend their understanding to linear relationships that may or may not be proportional. Students learn to identify what it means for a relationship to be linear and then learn about the parts of a linear relationship: Slope (rate of change), y-intercept, and the independent and dependent variables. Students will explore linear equations that are written in slope-intercept form and will be able to go from an equation to a graph or table, or from a graph or table to the equation. This unit features 3 topics.

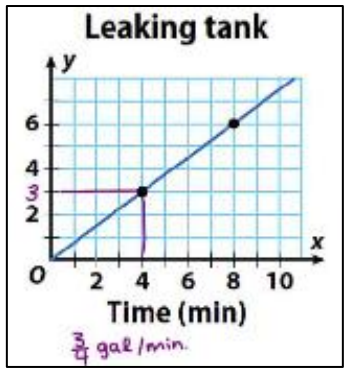
## Topic A Overview – *Unit Rate and Proportional Relationships*

In the first 2 lessons students will be calculating unit rates. Unit rates were introduced to students in 6th grade and will continue to be used throughout Pre-Algebra as students work with proportional relationships. Students should build an understanding that if they know the unit rate of a proportional relationship, they can calculate any quantity in that relationship easily. Students will then distinguish between proportional relationships sand non-proportional relationships through real-world situations. It is important that students understand what it means in the real-world for a relationship to be proportional, and they should be able to identify whether a situation is proportional or not by observing the rate at which it changes. The last lesson in this topic students determine and interpret the constant of proportionality then write an equation to represent a proportional relationship using the constant of proportionality .

### Introduction to Unit Rate




### Unit Rate from a Graph and Table

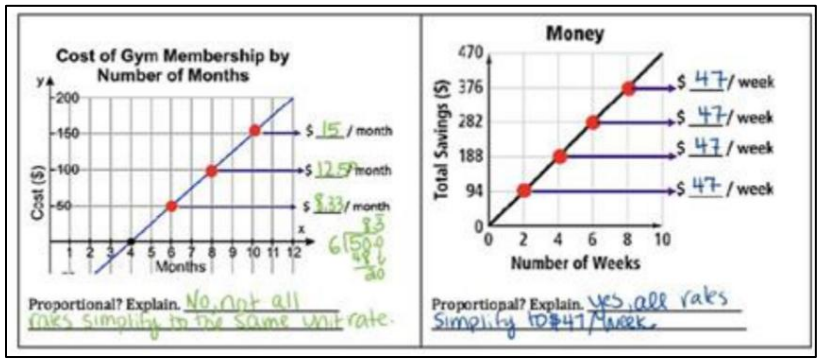



| # of Trees | # of Apples |
|---|---|
| 2 | 26 |
| 3 | 39 |
| 6 | 78 |
| 10 | 130 |
| 12 | 146 |

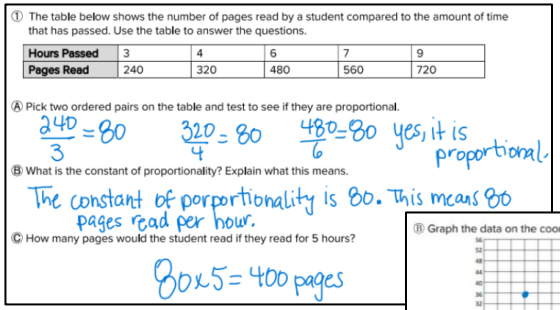
$\frac{26}{2} = 2\overline{)26}^{13}$

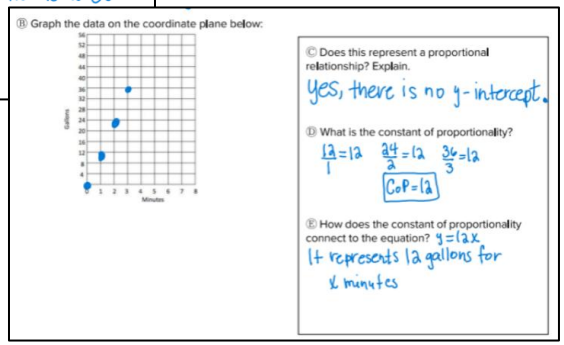
13 apples/tr

### Proportional Vs. Non-Proportional Relationships




### Constant of Proportionality and Equations to Represent Proportional Relationships

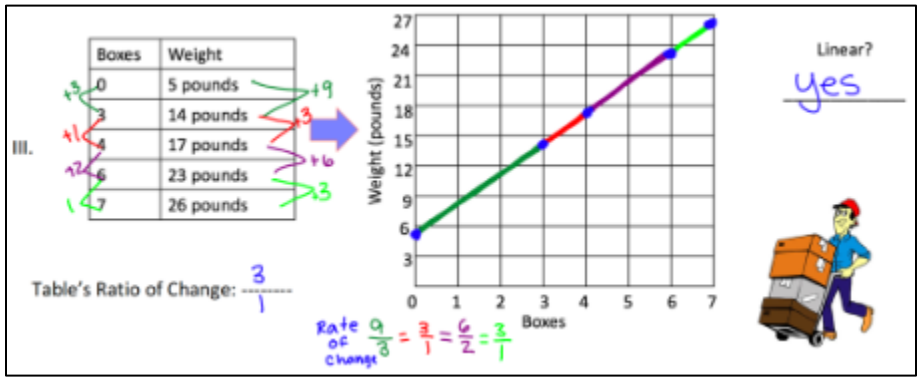


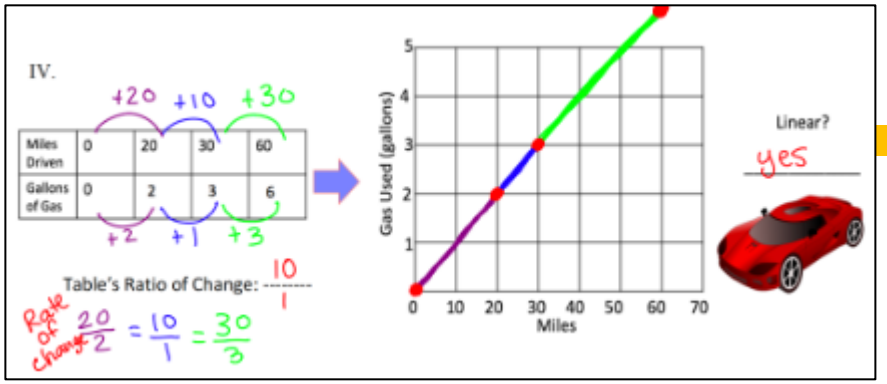



## Topic B Overview – *Linear Relationships, Slope and Y-Intercept*

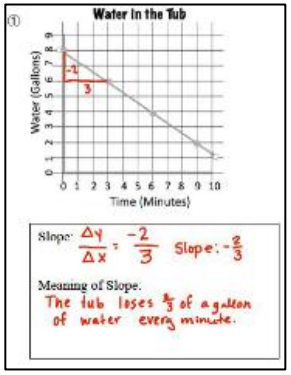
Topic B begins by having students explore linear vs. non-linear relationships from a table or graph. In Lesson 5, they explain whether a relationship is linear on non-linear given a graph or table. They also build an understanding that there is a constant change in the x and y values when a relationship is linear. They will discover that sometimes a data point may be left out of a table or graph but the ration of change from *x*=>*y* will always be equivalent in a linear relationship. In Lesson 6, students will calculate the slope from real-world situations and explain the meaning of slope in the context of a situation. In Lesson 7, students begin to identify the y-intercept from a table or graph and explain what it means in the context of a real-world situation.

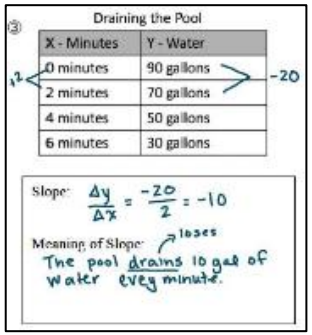
### Linear Vs Non-Linear Relationships



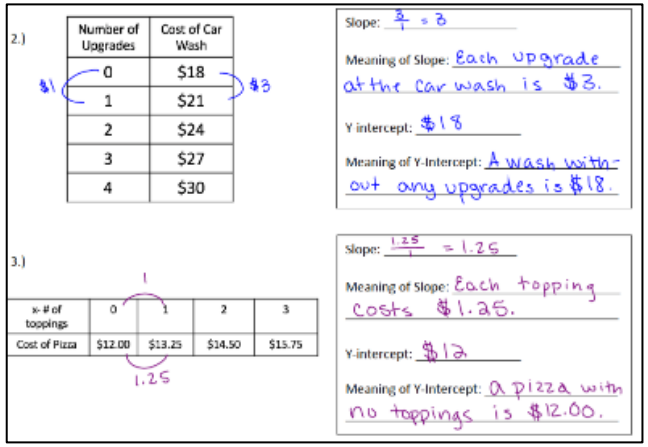




### Slope as Rate of Change




### The Y-Intercept



## Topic C Overview – *Equations of Linear Relationships and Graphing*

In Topic C students will write and graph linear equations. In Lesson 8, students identify slope and y-intercept in a linear relationship and then write an equation in slope-intercept form to represent the relationship. In Lesson 9, students take what they have been learning and practice graphing linear equations when given in slope-intercept form. In Lesson 10, students apply what they have learned about slope, y-intercept, independent and dependent variables to real-world situations.

### Equations of Linear Relationships

**Identify the slope and y-intercept in the table below, then write an equation to represent the linear relationship.**

**Money in Bank Account**

| x: Deposits | y: Account Balance |
|---|---|
| 0 | -$120 |
| 1 | -$80 |
| 2 | -$40 |
| 3 | $0 |
| 4 | $40 |
| 5 | $80 |

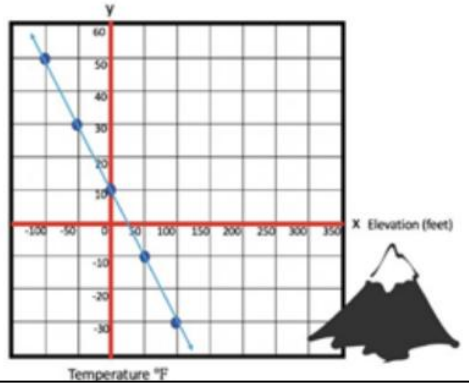
+1 → +40

Slope: 40 dollars/deposit

Y-Intercept: -$120

Equation: $y = 40x - 120$

**Identify the slope and y-intercept in the graph below, then write an equation to represent the linear relationship.**



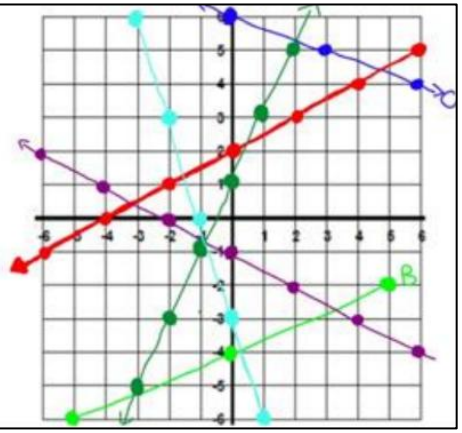

Slope: $\frac{-20}{50} = -\frac{2}{5}$ degrees/ft

Y-Intercept: 10 °F

Equation: $y = -\frac{2}{5}x + 10$

### Graphing Linear Equations

| Equation | Y-Intersect | Slope |
|---|---|---|
| a. $y = \frac{1}{2}x + 2$ | +2 | $\frac{\Delta y}{\Delta x} = \frac{1}{2}$ |
| b. $y = \frac{2}{5}x - 4$ | -4 | $\frac{\Delta y}{\Delta x} = \frac{2}{5}$ |
| c. $y = \frac{1}{3}x + 6$ | +6 | $\frac{\Delta y}{\Delta x} = \frac{-1}{3} = \frac{1}{-3}$ |
| d. $y = -\frac{1}{2}x - 1$ | -1 | $\frac{\Delta y}{\Delta x} = \frac{-1}{2} = \frac{1}{-2}$ |
| e. $y = 2x + 1$ | +1 | $\frac{\Delta y}{\Delta x} = \frac{2}{1}$ |
| f. $y = -3x - 3$ | -3 | $\frac{\Delta y}{\Delta x} = \frac{-3}{1} = \frac{3}{-1}$ |




### Linear Relationships Application

① The graph below shows the amount of money Chad has in his bank account each week.

ⓐ What is the equation of the line? $y = 3x + 9$

ⓑ Slope? 3 Y-intercept? 9

Dependent variable? Account balance (y)

Independent variable? Week (x)

ⓒ How much money will Chad have in his account in 19 weeks? (x)

$\frac{45 \div 15}{15 \div 15} = \frac{3}{1}$

$y = 3(19) + 9$

$y = 57 + 9$

$y = \$63$

## CONTENT STANDARDS

Below are the standards addressed in this unit.

| Readiness Standards | Supporting Standards |
|---|---|
| **7.4(A)** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including $d = rt$<br>**7.7(A)** represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form y = mx + b | **7.4(B)** calculate unit rates from rates in mathematical and real-world problems<br>**7.4(C)** determine the constant of proportionality (k = y/x) within mathematical and real-world problems |

| | |
|---|---|
| **Focus on Disciplinary Literacy** | Mathematical Process Standard **(F)** – analyze mathematical relationships to connect and communicate mathematical ideas |
| | Mathematical Process Standard **(G)** – display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication |

## ROADMAP

| AT A GLANCE: Unit 4 – Proportional and Linear Relationships | | | | |
|---|---|---|---|---|
| Topic | Day | Date | Lesson | Lesson Title |
| **Topic A** Unit Rate and Proportional Relationships | 1 | | 1 | Introduction to Unit Rate |
| | 2 | | 2 | Unit Rate from a Graph and Table |
| | 3 | | 3 | Proportional Vs. Non-Proportional Relationships |
| | 4 | | 4 | Constant of Proportionality and Equations to Represent Proportional Relationships |
| **Topic B** Linear Relationships, Slope and Y-Intercept | 5 | | | Reviewl Topic Quiz 4 |
| | 6 | | 5 | Linear Vs. Non-Linear Relationships |
| | 7 | | 6 | Slope as Rate of Change |
| | 8 | | 7 | The-Y-Intercept |
| **Topic C** Equations of Linear Relationships and Graphing | 9 | | 8 | Equations of Linear Relationships |
| | 10 | | 9 | Graphing Linear Equations |
| | 11 | | 10 | Linear Relationships Application |
| | 12 | | | Review |
| | 13 | | | Unit Exam |

Lesson 1: Introduction to Unit Rate | Date _____

## Standard(s)

◆ **7.4B** calculate unit rates from rates in mathematical and real-world problems

## Important Vocabulary

- Rate
- Unit Rate

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- 4.1 Student Workbook
- Document Camera
- Projector

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 8min |
| II. | INM | 30 min |
| III. | Student Practice | 15 min |
| IV. | Student Debrief | 3 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The primary goal of this lesson is for students to apply their understanding of unit rate to solve mathematical and real-world problems. This lesson serves as a review of the concept of unit rate, placing a lot of emphasis on building students' conceptual understanding of unit rate.

**Opportunities to CFU**

- ✓ INM #1a-b, #2a-b
- ✓ Student Practice #1-2

**Other Notes to Inform Your Planning**

For **Do Now**: Great opportunity to assess student understanding of Unit Rates in which they learned in 6th grade.

For **INM**: Students are building an understanding of unit rate through exploration. The term Unit Rate shouldn't be mentioned until the end of the INM. Students who struggle with division and multiplication facts will struggle with unit rate. Consider supporting them with graph paper, a multiplication chart, and a calculator for those that can use it; ensuring that they set up the problem on graph paper accurately and use the calculator for **computation only**. Students may have misconceptions around how to setup comparisons as a fraction (i.e., 12 tickets for $5.00 is $\frac{\$5.00}{12\ tickets}$). Consider supporting these students by modeling the setup using a tape diagram, something students are familiar with using.

**Focus on Disciplinary Literacy**

**INM:** #2a-b
**SP:** #1, 2

## Lesson Look Fors

Look for teachers to…

- ❑ Encourage productive struggle while students work to develop a strategy on their own to answer the exploration question in INM Q1,2.
- ❑ Use the term unit rate only after the INM where students develop a strategy to find unit rate.

Look for students to…

- ❑ Develop a strategy on their own to answer exploration questions in the INM in Q1, Q2.
- ❑ Accurately set up unit rate comparisons as a ratio then divide to find the unit rate.
- ❑ Explain and justify their thinking using words, diagrams, or models.

## Student Know/Do Chart

| | |
|---|---|
| Know | A unit rate is a specific ratio that describes how many units of the first quantity corresponds to **one unit** of the second quantity |
| Know | A rate is a ratio that compares two quantities |
| Do | From a word problem situation, accurately set up a ratio as a fraction then divide to find unit rate |
| Do | Use unit rate to compare different rates as most efficient vs. least efficient |

Lesson 2: Unit Rate from a Graph and Table Date _____

## Standard(s)

◆ **7.4B** calculate unit rates from rates in mathematical and real-world problems

## Important Vocabulary

- Rate
- Unit Rate
- Ordered Pair

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- Unit 4 Student Workbook
- Document Camera
- Projector

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 5 min |
| II. | INM | 35 min |
| III. | Student Practice | 20 min |
| IV. | Student Debrief | 5 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The primary goal of this lesson is for students to calculate the unit rate from a proportional graph or table. Students explored unit rates in 6th grade but will expand on the concept in 7th grade as the constant of proportionality and slope. This les is activating prior knowledge for students. This lesson will progress from easy graphs and table to more challenging problems that include fractions and decimals.

**Opportunities to CFU**

✓ INM Graphs Q3, 4, 6, 9, 10
✓ Student Practice Q3, 4, 7

**Other Notes to Inform Your Planning**

For **Do Now**: If students do not have a solid understanding of fractional parts, they may struggle. Consider having them label each value on the *x* and *y* axis.

For **INM**: Questions are scaffolded, starting out easier and then progressing to more difficult. **Graphs #1-4**; if students are struggling have them to fill in the missing numbers on the *x* and *y* axis. Support students in ensuring that numerators and denominators are in the correct place when setting up their ratio from a table or graph: Consider modeling for students the coordinates (i.e., (x, y)➔(5, 6)➔($\frac{y}{x}$)➔$\frac{6}{5}$ ), which yields a unit rate of $1\frac{1}{5}$. It may be even more helpful for students to label the x and y coordinates in the ordered pair/table and label/highlight the x and y axis on the graph .

**Focus on Disciplinary Literacy**

**INM:** Part I(Explain how you calculated the Unit Rate?).,#2a

## Lesson Look Fors

Look for teachers to…

- ❑ Encourage productive struggle as students find the unit rate of the graphs in the INM.
- ❑ **STAMP** that to find unit rate from a graph or table, identify the ordered pair (*x, y*)➔ $\frac{y}{x}$➔Unit Rate

Look for students to…

- ❑ Accurately set up a ratio from a table or graph
- ❑ Apply their understanding of unit rate to find the unit rate from a graph or table

## Student Know/Do Chart

Know — A unit rate on a graph or table will be the value of *x* when *y* is 1.

Know — A unit rate is a specific ratio that describes how many units of the first quantity corresponds to **one unit** of the second quantity

Do — From a table or graph, accurately set up a ratio then divide to find unit rate

Do — Accurately, calculate unit rate from a table or graph.

Lesson 3: Proportional Vs. Non-Proportional Relationships Date _____

## Standard(s)

◆ **7.4A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including $d = rt$

## Important Vocabulary

- Proportional Relationship
- Non-proportional Relationship
- Origin

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- Unit 4 Student Workbook
- Document Camera
- Projector

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 5 min |
| II. | INM | 43 min |
| III. | Student Practice | 15 min |
| IV. | Student Debrief | 3 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The primary goal of this lesson is for students to differentiate between proportional and non-proportional relationships represented by tables, graphs, and verbal descriptions. In this lesson, students differentiate between proportional and non-proportional relationships. They will utilize the concept of unit rate, developed in previous lessons, to determine if relationships are proportional or non-proportional.

**Opportunities to CFU**

- ✓ **INM:** 1st set of graphs a-b, #2, 3, 5
- ✓ **Student Practice:** #1a-d, #2a-c

**Other Notes to Inform Your Planning**

For **Do Now**: The Do Now activates prior knowledge of equivalent ratios or equivalent factions. Cross multiplying to test for equivalence is strongly discouraged as this **does not** promote a true understanding of the concept.

**Focus on Disciplinary Literacy**

**INM:** #1a-e
**SP**: #1d

For **INM/Student Practice**: Students that struggle with multiplication and division will struggle with finding the unit rate or constant of proportionality. Consider supporting them with graph paper to help them to organize numbers when dividing, a multiplication chart, and a calculator for those that can use it; ensuring that they set up the problem on graph paper and use the calculator for **computation only**. An anchor chart with Proportional Vs. Non-Proportional Representations (graphs, tables, verbal descriptions) may assist students as they begin the student practice and exit ticket.

## Lesson Look Fors

Look for teachers to…

- ❑ Build an understanding and stamp the idea that proportional relationships will have a constant ratio of $y:x$ and that ratio is the constant of proportionality or unit rate.
- ❑ **STAMP** that when a proportional relationship is graphed, it will always pass through the origin of the graph (0,0).

Look for students to…

- ❑ Find the unit rate or constant of proportionality given a table or graph
- ❑ Determine Proportional Vs. Non-Proportional Relationships from a situation, table, or graph

## Student Know/Do Chart

Know — Two quantities are proportional if they have a constant ratio or if the unit rate calculated from any two points is the same.

Know — The graph of a proportional relationship will pass through the origin and will always form a straight line.

Do — Determine proportionality given a table or graph.

Do — Justify whether a relationship is proportional or non-proportional using the ration $y:x$.

Lesson 4: Constant of Proportionality and Equations to Represent Proportional Relationships Date _____

## Standard(s)

◆ **7.4C** determine the constant of proportionality ($k = y/x$) within mathematical and real-world problems

## Important Vocabulary

- Constant of Proportionality

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- Unit 4 Student Workbook
- Document Camera
- Projector

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 5 min |
| II. | INM | 28 min |
| III. | Student Practice | 27 min |
| IV. | Student Debrief | 5 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The goal of this lesson is for students to determine and interpret the constant rate of proportionality in mathematical and real-world problems then write an equation to represent a proportional relationship using the constant of proportionality.

**Opportunities to CFU**

✓ INM: #2a-b, Part II #1a-b
✓ Student Practice: Part II #1, 2

**Other Notes to Inform Your Planning**

For **Do Now**: The Do Now is a great opportunity to assess and quickly address misconceptions prior to beginning the daily lesson. Misconceptions might be around #1 because of the decimals. Consider modeling the division for those that need extra support.

For **INM/Student Practice**: The purpose of the INM is to continue to build an understanding that constant of proportionality is a term used for unit rate. Model **Part I#1a-c** and **Part II #1a-b** under the document camera. Include student voice by prompting them to answer the questions in **a-c** as you record responses and correct misconceptions where necessary. This lesson includes fractions/decimals when finding the constant of proportionality. Prepare to support computational errors. You may decide to project an answer key as you monitor, checking that students are working through the process for finding the constant of proportionality accurately (**i.e.**, setting up the ratio in fraction form correctly ➔ $\frac{y}{x}$ )

**Focus on Disciplinary Literacy**

**INM: Part I**: 1A-B, 2A-B, **Part II:** 1C, E
**Student Practice**: Parts I and II

## Lesson Look Fors

Look for teachers to…

- ❑ Build an understanding of constant of proportionality using students' prior knowledge of unit rate
- ❑ Allow students to do the heavy lifting in discovering that the constant of proportionality in a proportional relationship is the coefficient

Look for students to…

- ❑ Identify the constant of proportionality for a proportional situation.
- ❑ Use the lesson vocabulary to explain Constant Of Proportionality represented in a graph, table, or verbal description.
- ❑ Determine that the constant of proportionality, ***k,*** in a proportional relationship is always the coefficient in the equation ($y$=***k***$x$)y

## Student Know/Do Chart

Know — The constant of proportionality is the same as the unit rate for a proportional relationship.

Know — The equation of a proportional relationship will be in the form of $y = kx$, where $k$ represents the constant of proportionality.

Do — Calculate the constant of proportionality from a graph and table given a real-world situation.

Do — Write an equation using the constant of proportionality to represent a table, verbal description, or graph

Lesson 5: Linear Vs. Non-linear Relationships Date _____

## Standard(s)

- **7.7A** represent linear relationships using verbal descriptions, tables, graphs ~~and equations that simplify to the form $y = mx + b$~~

## Important Vocabulary

- Linear Relationship
- Non-linear Relationship
- Ratio of Change
- Constant Rate of Change

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- Unit 4 Student Workbook
- Document Camera
- Projector

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 5 min |
| II. | INM | 35 min |
| III. | Student Practice | 20 min |
| IV. | Student Debrief | 5 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The primary goal of this lesson is for students to explain whether a relationship is linear or non-linear given a graph or table. They will build an understanding that there is a constant change in the *x* and *y* values when a relationship is linear. They will also see that sometimes a data point will be left out of a table or graph, so the *x* and *y* values will change at different rates, but the ration of change from *x* to *y* will always be equivalent in a linear relationship.

**Opportunities to CFU**

- ✓ INM: #1-2
- ✓ Student Practice: #3-4

**Other Notes to Inform Your Planning**

For **INM**: Ration or rate of change is going to be a very important concept as students move through math. This is the **first time** students are really introduced to the topic, but they will continue to see it expressed mostly as slope throughout math. In this section, you are stamping that the change in *y*-value always comes before the change in *x*-value. It is important to build students comfort level writing ratios of change in this way so that it becomes a habit. This lesson includes negative values in the change in *x* and *y* values; it will be important to highlight this for students. Consider creating an anchor chart for students to reference during the student practice and exit ticket.

**Focus on Disciplinary Literacy**

**INM**: #1-2
**Student Practice:** #1-4

## Lesson Look Fors

Look for teachers to…

- ❑ Stamp the understanding that **linear relationships** have equivalent rates of change and that some rat of change may look different but will simplify to the same ratio.
- ❑ Model $\frac{\Delta y}{\Delta x}$ under the document camera using color-coding to support student understanding

Look for students to…

- ❑ Show their thinking when calculating the rate of change from a table or graph
- ❑ Determine if a relationship is linear or non-linear and justify their reasoning

## Student Know/Do Chart

| | |
|---|---|
| Know | Linear Relationships form a straight line when graphed |
| Know | The ratio of change in *y*-values and *x*-values is always the same in linear relationships. |
| Do | Calculate the rate of change from a table or graph |
| Do | Determine whether a relationship in a table or graph represents a linear or non-linear relationship |

Lesson 6: Slope as Rate of Change Date _____

## Standard(s)

- **7.7A** represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form *y = mx + b*
- **7.4A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including *d = rt*

## Important Vocabulary

- Rate of Change
- Slope

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- Unit 4 Student Workbook
- Document Camera
- Projector

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 5 min |
| II. | INM | 40 min |
| III. | Student Practice | 18 min |
| IV. | Student Debrief | 2 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The primary goal of this lesson is to calculate the slope from real-world situations and explain the meaning of the slope in the context of the situation. This lesson builds a deep understanding of the concept of slope as the rate of change of a linear relationship or the measure of how fast or slow something is changing in a linear relationship.

**Opportunities to CFU**

- ✓ INM: Part I: #2, Part II: #3 Part III: #2, 4
- ✓ Student Practice: #1, 3, 6, 7

**Other Notes to Inform Your Planning**

For **INM**: Throughout the INM, stamp that slope is the ratio of the change in the y-value to the change in the x-value. You will also continue to stamp throughout the lesson that rate of change or slope is how fast or slow something changes, including the direction of the change. The INM offers several opportunities for students to participate in Turn and Talks. It will be important to model and encourage use of the lesson vocabulary during Turn and Talks. Use these as opportunities to listen for/address misconceptions. Watch for misconceptions around negative slopes. Students may omit the negative sign because they may not have a clear understanding of 'direction' (**i.e.**, if the $\Delta y = -3$; this means that the direction on a graph is downward and if the $\Delta x = 2$; this means that the direction on the graph is to the right.) Refer students to number line understandings and integer operation rules for dividing as students may make errors when simplifying such as:i.e., $\frac{-4}{2}$ → -2 **not**, 2. An anchor chart will support these understandings.

**Focus on Disciplinary Literacy**

**INM:**
Part I: #1-3
Part II: #1-3
Part III: #4,5
**Student Practice:**
#1-8

## Lesson Look Fors

Look for teachers to…

- ❑ Model and encourage use of the lesson vocabulary during Turn and Talks.
- ❑ Stamp that slope represents how fast or slow something is changing and the direction it is changing. (Increasing or decreasing)

Look for students to…

- ❑ Write slope as: $\frac{\Delta y}{\Delta x}$, using integers to simplify where necessary
- ❑ Explain the meaning of the slope represented by a table or graph

## Student Know/Do Chart

| | |
|---|---|
| Know | Slope is a ratio of the change in the *y*-value to the change in the *x*-value |
| Know | Slope is a measure of how fast or slow something changes and whether the values are increasing or decreasing |
| Do | Write slope as the ratio of change in the *y*-values to the change in the *x*-values from a table/graph and simplify if necessary |
| Do | Explain the meaning of the slope in the context of a graph or table |

Lesson 7: The Y-intercept Date _____

## Standard(s)

- **7.7A** represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form y = mx + b
- **7.4A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt

## Important Vocabulary

- Y-intercept
- **Initial value**

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- Unit 4 Student Workbook
- Projector
- Document Camera

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 5 min |
| II. | INM | 20 min |
| III. | Student Practice | 38 min |
| IV. | Student Debrief | 2 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The primary goal of this lesson is for students to identify the y-intercept from a graph/table and explain what it means in the context of a real-world situation. Students will build an understanding of what the y-intercept is, and its importance in a linear relationship. Students will need to think critically in each situation to figure out the meaning of the y-intercept in real-world situations.

**Opportunities to CFU**

- ✓ INM: #2,3 and graph and table
- ✓ Student Practice: #3-5, #7,8

**Other Notes to Inform Your Planning**

For **INM/Student Practice**: Students may be unfamiliar with a flat-fee or initial cost. Use other real-world examples to explain this concept to students. This is an essential idea for students to understand to master the concept of y-intercepts as many real-world examples involve flat fees.

**Focus on Disciplinary Literacy**

**INM:** Part I #1-3
**SP:** #1-2

**Ensure that students can answer the following essential questions prior to the exit ticket:**

What is the y-intercept?
Why is the y-intercept more important than any other coordinate in a linear relationship?
What does it mean if the y-intercept of a linear relationship is zero?

## Lesson Look Fors

Look for teachers to…

- ❑ Use real-world examples to build an understanding of the y-intercept as the initial quantity in a linear relationship.
- ❑ Explain/model how to interpret the meaning of the x-coordinate and y-coordinate in the context of real-world situations.

Look for students to…

- ❑ Describe the meaning of the y-intercept in different linear relationships using the context of real-world situations.
- ❑ Describe the meaning of the x-coordinate and y-coordinate in the context of real-world situations

## Student Know/Do Chart

| | |
|---|---|
| Know | The y-intercept is the **initial** value in a linear relationship representing a real-world situation |
| Know | The y-intercept represents where the line touches the y-axis |
| Do | Identify the slope and y-intercept from a graph and table |
| Do | Explain what the y-intercept and slope mean in the context of a real-world situation |

Lesson 8: Equations of Linear Relationships Date _____

## Standard(s)

- **7.7A** represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form y = mx + b
- **7.4A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt

## Important Vocabulary

- Y-intercept
- Rate of Change
- Slope
- Independent Variable
- Dependent Variable

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- Unit 4 Student Workbook
- Document Camera
- Projector

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 5 min |
| II. | INM | 30 min |
| III. | Student Practice | 25 min |
| IV. | Student Debrief | 5 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The primary goal of this lesson is for students to identify the slope and y-intercept in a linear relationship and write an equation in slope-intercept form (y=mx+b) to represent the relationship.

**Opportunities to CFU**

- ✓ INM: #2,3
- ✓ Student Practice: #1, 2

**Other Notes to Inform Your Planning**

In this lesson, you are pulling together the concepts of slope and y-intercept to show students how they can represent any linear relationship using an equation. Students primarily explore the meaning of the y-intercept, slope, independent and dependent variable in the context of situations, tables, and graphs in this lesson. Consider creating an anchor chart for students to reference the components of the equation y = mx + b (Slope, y-intercept, x coordinate as independent variable and y-coordinate as dependent variable) during student practice and exit ticket. Prepare to address misconceptions around integer operation rules as students find slope.

**Focus on Disciplinary Literacy**

**INM:** #1b-d
**Student Practice:** #1-3

## Lesson Look Fors

Look for teachers to…

- ❑ Review the meaning of independent and dependent variables and provide real-world examples
- ❑ Use guided questioning to build understanding of the role of the y-intercept and slope in a linear equation

Look for students to…

- ❑ Explain the relationship between the independent and dependent variable
- ❑ Write equations to represent linear relationships from a table or graph

## Student Know/Do Chart

| | |
|---|---|
| Know | The slope and y-intercept are constant in a linear relationship and are the two pieces of information needed to write a linear equation |
| Know | The independent and dependent variable in a linear relationship change. |
| | The dependent variable is reliant on the independent variable |
| Do | Identify the slope and y-intercept in a table or graph |
| Do | Write an equation from a table or graph to represent a linear relationship |

Lesson 9: Graphing Linear Equations Date _____

## Standard(s)

- **7.7A** represent linear relationships ~~using verbal descriptions, tables~~, graphs, and equations that simplify to the form y = mx + b
- **7.4A** represent constant rates of change in mathematical and ~~real-world problems given pictorial, tabular, verbal, numeric,~~ graphical, and algebraic representations, including d = rt

## Important Vocabulary

- Y-intercept
- Rate of Change
- Slope
- Horizontal Line
- Vertical Line

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- Unit 4 Student Workbook
- Document Camera
- Projector

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 5 min |
| II. | INM | 34 min |
| III. | Student Practice | 21 min |
| IV | Student Debrief | 5 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The primary goal of the lesson is for students to identify the slope and y-intercept in a linear equation and draw a graph to represent the relationship. They will practice graphing linear equations given in slope-intercept form on a coordinate plane.

**Opportunities to CFU**

- ✓ INM: Round 1 and 2
- ✓ Student Practice: #2,3,4

**Other Notes to Inform Your Planning**

The Do Now is a **must** as it reviews finding slope and y-intercept, which is necessary for the day's lesson. This is a great opportunity to note and address misconceptions prior to the lesson.

In this lesson students will have only one real-world connection to slope and y-intercept. The rest of the practice will focus on using linear equations to graph in all four quadrants. Since students have only graphed linear equations representing real-world situations; they have mostly used Quadrant I. In this lesson, it is most important for them to pay close attention to whether the slope is positive or negative. Prepare to address misconceptions around building the graph to the left of the y-axis. It would be worth it to continue to model this for students throughout the lesson.

**Focus on Disciplinary Literacy**

**INM:** #1a-b, #2, Rounds 1 and 2
**Student Practice:** #1-6

## Lesson Look Fors

Look for teachers to…

- ❑ Use student's conceptual understanding of the parts of a linear equation to build understanding of graphing algebraic equations that are not connected to a real-world situation.
- ❑ Model building the graph to the left of the y-intercept throughout the lesson.

Look for students to…

- ❑ When finding slope; show their thinking.
- ❑ Explain how to graph a line that is written in slope intercept form. (i.e., where to start the graph, and how do you know where to plot other points on the graph once the y-intercept is plotted)

## Student Know/Do Chart

| | |
|---|---|
| Know | The slope and y-intercept of a linear relationship is necessary to draw a graph on a coordinate plane to represent that relationship. |
| Know | To graph a linear relationship, it requires starting at (0, *y*)and using the slope to find other points on the line. |
| Do | Identify the slope and y-intercept from an algebraic equation written in slope intercept form |
| Do | Accurately use the slope and y-intercept to plot points on a graph. |

Lesson 10: Linear Relationship Application Date _____

## Standard(s)

- **7.7A** represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form y = mx + b
- **7.4A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt

## Important Vocabulary

- Y-intercept
- Rate of Change
- Slope
- Independent Variable
- Dependent Variable

## Notes for Intellectual Preparation & Lesson Planning

**Necessary Materials and Pre-Lesson Prep**

- Unit 4 Student Workbook
- Document Camera
- Projector

**Lesson Agenda**

| | | Time |
|---|---|---|
| I. | Do Now | 5 min |
| II. | INM | 25 min |
| III. | Student Practice | 30 min |
| IV | Student Debrief | 5 min |
| V. | Exit Ticket | 5 min |

**Mathematical Goal of this Lesson**

The primary goal of this lesson is for students to apply what they have learned about slope, the y-intercept, independent and dependent variables to real-world situations.

**Opportunities to CFU**

- ✓ INM: #2,4
- ✓ Student Practice: 2,3

**Other Notes to Inform Your Planning**

The Do Now is a **must** as it reviews writing linear equations from a graph. This provides a great opportunity to catch and address misconceptions prior to the day's lesson.

The format of this lesson will switch back and forth between teacher guided and student practice. The INM and Student Practice should be done together.

**Ensure that students can answer the following essential questions by the end of the lesson:**

- How do you graph a line that is written in slope-intercept form?
- Where do you start your graph?
- How do you know where to put the other points on the graph?

**Focus on Disciplinary Literacy**

**INM:** #1-4
**Student Practice:** #1-3

## Lesson Look Fors

Look for teachers to…

- ❑ Ask questions that require students to justify their solution and their solution pathway

Look for students to…

- ❑ Accurately compute the slope and y-intercept and show their thinking.
- ❑ Identify the dependent and independent variable from a table or graph and solve by substituting.
- ❑ Explain their solution pathway and what each part of the equation represents from a table, graph or verbal description.

## Student Know/Do Chart

**Know**

If the slope and y-intercept of a linear relationship are known, it is possible to draw a graph on a coordinate plane to represent that relationship; starting at the y-intercept, using the slope to find other points on your line.

**Do**

Identify the slope and the meaning of the slope from a situation and graph

**Do**

Identify y-intercept and the meaning of the y-intercept from a situation and graph

## Recommended Success Day Materials and Resources

**7.4A and 7.7A**
Practice with Constant Rate of Change
Practice with Representing Linear Relationships
Extra Practice Teacher Edition (TE)
Extra Practice Student Edition (SE)

Notes to Inform Your Planning
These resources are relatively brief and can be used for either small-group or whole-group reteach.

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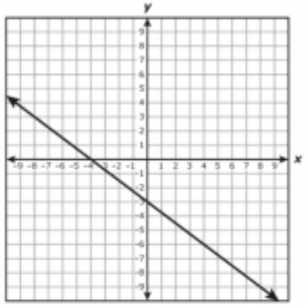
*If student data indicates a pause point is not necessary, you can opt to move forward and reserve a Success Day to use at a later date.*

Using exit ticket data can help you prioritize what to review. For example, if you remember that students did poorly on Lesson 6, pull problems from lesson 6 especially if they are problems students did not do before (for example, SP or INM problems you skipped during class). You can also take questions from the resources linked above.

All unit exams should be given online to prepare students for STAAR online.

# UNPACKED STANDARDS

Focus standards for this unit.

<table>
<tr><th colspan="3">Standard Breakdown</th></tr>
<tr><th>Standard</th><th>Specificity</th><th>STAAR Alignment</th></tr>
<tr>
<td>7.7(A) represent linear relationships using verbal descriptions, tables, graphs and equations that simplify to the form y = mx + b</td>
<td>
<u>Concepts:</u><br>
• Linear Relationships<br>
• Verbal Descriptions<br>
• Tables<br>
• Graphs<br>
• Equations (y = mx + b)<br>
<u>Skills:</u><br>
• Represent<br>
Clarifications including but Not Limited To:<br>
• Linear relationships should include tables, graphs, real-world descriptions, and equations<br>
• All parts and formats of linear equations should be introduced using real-world situations to build conceptual understanding. Once students have built conceptual understanding, linear equations can be explored as abstract mathematical concepts that are not tied to a real-world description.<br>
• Slopes and y-intercepts can be any rational number.<br>
• Students should understand slope as the rate of change and not rise over run (this is a trick).<br>
• When slope is introduced, fractions should be used to build an understanding of slope as a ratio. (Change in y-value to change in x-value)<br>
• Units should be used when connected to a real-world situation. (feet/second)<br>
Limitations:<br>
• Linear equations should be represented in slope-intercept form.<br>
Vertical Alignment:<br>
<u>Grade 6:</u><br>
• Proportional relationships and their representations<br>
• Unit rate<br>
• Independent and dependent variables<br>
<u>Algebra 1:</u><br>
• Linear Equations are now represented in slope-intercept form, point slope form and standard form<br>
• Graphing systems of equations and inequalities
</td>
<td>
<u>2019:</u><br>
Q17: Which equation best represents the relationship between x and y?<br>
 <br>
A $y = -\frac{3}{4}x - 3$<br>
B $y = -\frac{4}{3}x - 3$<br>
C $y = -\frac{3}{4}x - 4$<br>
D $y = -\frac{4}{3}x - 4$<br>
<br>
Q40: Nicholas is buying shirts for his baseball team. He will pay $9.50 for each shirt plus a one-time fee of $22.50 for the design.<br>
Which equation can be used to find y, the total cost to buy x shirts?<br>
<br>
A. y = 9.5x + 22.5<br>
B y = 22.5x + 9.5<br>
C. y = 9.5x – 22.5<br>
D. y = 22.5x – 9.5.<br>
<u>2017:</u><br>
Q16: The table shows the distance, y, a cheetah can travel in feet in x seconds.<br>
<table>
<tr><th>Time, x (seconds)</th><th>Distance, y (feet)</th></tr>
<tr><td>5</td><td>470</td></tr>
<tr><td>10</td><td>940</td></tr>
<tr><td>15</td><td>1,410</td></tr>
<tr><td>20</td><td>1,880</td></tr>
<tr><td>25</td><td>2,350</td></tr>
</table>
Based on the information in the table, which equation can be used to model the relationship between x and y?<br>
A. y = 5x<br>
B. y = x + 5<br>
C. y = x + 470<br>
D. y = 94x
</td>
</tr>
</table>

**7.4(A)** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical and algebraic representations, including d=rt.

**Concepts:**
- Constant Rates of Change
- Mathematical Problems
- Real-World Problems
- Pictorial Representations
- Verbal Representations
- Numeric Representations
- Graphical Representations
- Algebraic Representation

**Skills:**
- Represent

**Clarifications Including but Not Limited To:**
- Proportional relationships should be represented by graphs, tables, real-world descriptions, and equations.
- Units should be included when connected to a real-world situation. (ex: miles/hour)
- Proportional relationships represented by equations should be in the form of y=kx where k is the constant of proportionality.
- Proportional relationships can be graphed in any of the four quadrants, but most real-world situations will exist in quadrant 1.

**Limitations:**
- Limited to proportional relationships
-

**Vertical Alignment:**

**Grade 6:**
- Proportional relationships and their representations
- Unit rate
- Ratios and rates
- Independent and dependent variables

**Algebra 1:**
- Linear relationships
- Systems of equations

**2019 - Q4:** Pamela rode her bike at a constant rate of 0.1km per minute. Which table represents y, the number of kms Pamala rode her bike in x minutes?

F

Bike Ride

| Number of Minutes, $x$ | Number of Kilometers, $y$ |
|---|---|
| 5 | 0.1 |
| 10 | 0.1 |
| 15 | 0.1 |
| 20 | 0.1 |
| 25 | 0.1 |

H

Bike Ride

| Number of Minutes, $x$ | Number of Kilometers, $y$ |
|---|---|
| 5 | 0.1 |
| 10 | 0.2 |
| 15 | 0.3 |
| 20 | 0.4 |
| 25 | 0.5 |

G

Bike Ride

| Number of Minutes, $x$ | Number of Kilometers, $y$ |
|---|---|
| 5 | 0.5 |
| 10 | 1.0 |
| 15 | 1.5 |
| 20 | 2.0 |
| 25 | 2.5 |

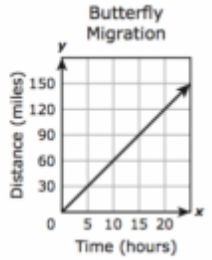
J

Bike Ride

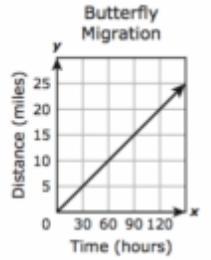
| Number of Minutes, $x$ | Number of Kilometers, $y$ |
|---|---|
| 5 | 5.1 |
| 10 | 10.1 |
| 15 | 15.1 |
| 20 | 20.1 |
| 25 | 25.1 |

**2016 – Q54** During migration, a butterfly can travel 30 miles in 1 hour. Which graph best represents y, the number of miles a butterfly can travel in x hours.

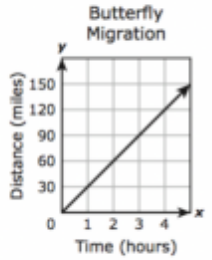
F




H




G

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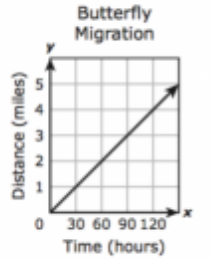

| Standard | Specificity | STAAR Alignment |
|---|---|---|
| **7.4B** calculate unit rates from rates in mathematical and real-world problems | **Concepts:**<br>• Unit Rates<br>• Mathematical Rates<br>• Real-World Rates<br>**Clarifications Including but Not Limited To:**<br>• Rates should include units<br>• Rates should be calculated from graphs, tables, and real-world descriptions<br>• Fractions should be used to represent rates initially to build understanding of rates as a ration of y to x.<br>• Rates include complex fractions. (1/2 mile in ¼ hours)<br>**Vertical Alignment:**<br>**Grade 6:**<br>• Proportional relationships and their representations<br>• Unit rate<br>• Ratios and rates<br>• Independent and dependent variables<br>**Algebra 1:**<br>• Linear relationships | **2019 – Q36:** A worker uses 450 inches of steel wire to make 300 springs of the same size. At this rate how many inches of steel wire are needed to make 1 spring?<br><br>A 1/3 in B 1/15 in C 2/3 in D 1½ in.<br><br>**2017 – Q12:** Jose paid $47.00 for 4 movie tickets. Each ticket cost the same amount. What was the cost of each movie ticket in dollars and cents?<br><br>**2016 – Q1:** Tareq pays $22.10 for 2.6 pounds of salmon. What is the price per pound of salmon?<br><br>A $57.46 B $8.50 C $19.50 D $24.70 |
| **7.4C** determine the constant of proportionality (k = y/x) within mathematical and real-world problems | **Concepts:**<br>• Constant of Proportionality<br>• Mathematical Problems<br>• Real-World Problems<br>**Clarifications Including but Not Limited To:**<br>**Limitations:**<br>**Vertical Alignment:**<br>**Grade 6:**<br>• Proportional relationships and their representations<br>• Unit rate<br>• Ratios and rates<br>• Independent and dependent variables<br>**Algebra 1:**<br>• Linear relationships<br>• Slope | **2019 – Q29:** At a school carnival, tickets can be purchased to participate in different activities. The table shows the total cost for different numbers of tickets.<br>School Carnival<br>Number of Tickets, $x$ / Total Cost, $y$ (dollars)<br>8 / 2.00<br>12 / 3.00<br>20 / 5.00<br>30 / 7.50<br>50 / 12.50<br>What is the constant of proportionality that relates y, the total cost in dollars, to , the number of tickets purchased?<br><br>**2018 – Q1** A recipe says to use 3 cups of flour to make 48 cookies. what is the constant of proportionality that relates the number of cookies made, y, to the number of cups of flour used x?<br><br>A 0.6 B 48 C 3 D 16 |

| | | |
|---|---|---|
| **7.4(E)** convert between measurement systems, including the use of proportions and the use of unit rates | **Concepts:**<br>• Measurement Systems<br>• Proportions<br>• Unit Rates<br>**Clarifications Including but Not Limited To:**<br>• Standard and metric units of measure included<br>• Conversions remain in the same measurement system | **2019 – Q8:** Chris bought 10.4 gallons of gasoline. there are approximately 3.8 liters in 1 gallon. Which measurement is closest to the number of liters of gasoline Chris bought?<br><br>A 11.44 L B 2.74 L C 39.52 L D 14.20 L<br><br>**2018 – Q19:** The distance between two towns is 120 Km. There are approximately 8 KM is 5 miles. Which measurement is closest to the number of miles between the two towns?<br>A 75 mi B 3 mi C 192 mi D 117 mi |

## VERTICAL STANDARDS

This section details the **progression** of key student expectations/standards** in the courses **before** and **after** this course. This will help you understand what **prior knowledge skills to build upon** and guide you in knowing what **skills you are preparing your students** for in the subsequent course.

| 5th Grade | 6th Grade | 8th Grade & Algebra 1 |
|---|---|---|
| 5.4(C) generate a numerical pattern when given a rule in the form y = ax or y = x + a and graph<br>5.8(C) graph in the first quadrant of the coordinate plane ordered pairs of numbers arising from mathematical and real-world problems, including those generated by number patterns or found in an input-output table<br>5.4(D) recognize the difference between additive and multiplicative numerical patterns given in a table or graph<br>5.8(A) describe the key attributes of the coordinate plane, including perpendicular number lines (axes) where the intersection (origin) of the two lines coincides with zero on each number line and the given point (0, 0); the x-coordinate, the first number in an ordered pair, indicates movement parallel to the x-axis starting at the origin; and the y-coordinate, the second number, indicates movement parallel to the y-axis starting at the origin<br>5.8(B) describe the process for graphing ordered pairs of numbers in the first quadrant of the coordinate plane | 6.6(C) represent a given situation using verbal descriptions, tables, graphs, and equations in the form $y = kx$ or $y = x + b$<br>6.4(A) compare two rules verbally, numerically, graphically, and symbolically in the form of $y = ax$ or $y = x + a$ in order to differentiate between additive and multiplicative relationships<br>6.5(A) represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions<br>6.6(A) identify independent and dependent quantities from tables and graphs<br>6.6(B) write an equation that represents the relationship between independent and dependent quantities from a table<br>6.4(H) convert units within a measurement system, including the use of proportions and unit rates<br>6.11(A) graph points in all four quadrants using ordered pairs of rational numbers | A.2(C) write linear equations in two variables given a table of values, a graph, and a verbal description<br>A.3(B) calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems<br>A.3(C) graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems<br>A.2(D) write and solve equations involving direct variation<br>A.2(E) write the equation of a line that contains a given point and is parallel to a given line<br>A.2(F) write the equation of a line that contains a given point and is perpendicular to a given line<br>A.3(A) determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including $y = mx + b$, $Ax + By = C$, and $y - y_1 = m(x - x_1)$ |