Grade 8
Family Resource Bundle

Grade 8

ANSWER KEY Text #1 "The Keys to Happiness: Partly Genetic, But You Control the Rest"

by ABC News May 10, 2012

1. RI.KID.2

PART A: Which of the following identifies the main claim of the text?

A. Genetics do not have any detectable impact on a person's individual happiness, as scientists previously believed.
B. By actively attempting to be happier more often, people can improve their set point of happiness.
C. While genetics may determine a person's range of happiness, individual choices have a significant impact on happiness levels.
D. Individual choices can influence a person's happiness levels, but the effects they have on overall happiness are insignificant in comparison to the effects of genetics.

2. RI.KID.1

PART B: Which detail from the text best supports the answer to Part A?

A. "For several decades psychologists have wrestled with that question, and in recent years many, if not most, have embraced the idea that we are born with a tendency to be happy, or sour" (Paragraph 2)
B. "But some participants were able to maintain that elevated level of happiness by keeping the memory alive and appreciating what they already had." (Paragraph 16)
C. "'And if you look at studies of various superficial circumstances, like income, where you live, how many cars you have, those are pretty small'" (Paragraph 23)
D. "'So that left 40 percent that we conclude, although not everybody would agree with this conclusion, is the percent that is affected by what you do.'" (Paragraph 24)

3. RI.CS.5

How does the detail about the study of twins contribute to the text (Paragraph 22)?

A. It proves that environment has a significant impact on a person's happiness, as twins do not the same level of happiness after being separated.
B. It shows that happiness is greatly determined by genetics, so even separated twins are likely to have the same level of happiness.
C. It shows how twins' happiness levels are affected when separated at birth.
D. It proves that there is no accurate way to determine what impacts a person's level of happiness.

4. RI.CS.4

What does the phrase "level of happiness" reveal about how researchers consider happiness to work (Paragraph 15)?

1. **Answers will vary; students should explain how the phrase "level of happiness" reveals that researchers view happiness as something that can change and vary in degeree. Different people experience different degrees of happiness, and their happiness can vary somewhat over time. This is supported by the research discussed in the text, as a study revealed that "'set point' is really a range, and we can move up and down on the happiness scale within that range" (Paragraph 3).**

5. RI.KID.3

How does the author's claim regarding happiness compare to previous understandings of happiness?

1. **Answers will vary; students should describe how the author's claim suggests that people have more control over their personal happiness than previously believed. For instance, the author references previous understandings of happiness, in which "we are born with a tendency to be happy, or sour, and it doesn't have much to do with our surroundings or lifestyle" (Paragraph 2). This perspective on a person's happiness doesn't allow them much agency to improve their mood or achieve happiness. However, the author shows that new studies suggest that people have some control over their happiness. Rather than a "set point," happiness is viewed as a range, (Paragraph 3) allowing an individual to be happier.**

ANSWER KEY Text #2 "From Blossoms"

by Li-Young Lee 1986

1. RL.KID.2

PART A: Which of the following best identifies the theme of the poem?

A. People can find boundless joy in unexpectedly simple moments.
B. People should appreciate every moment because some opportunities may never come again.
C. Living in the moment can help drive away fears of the future.
D. Even the simplest actions can be meaningful with friends and family.

2. RL.KID.1

PART B: Which quote from the poem best supports the answer to Part A?

A. "From blossoms comes / this brown paper bag of peaches / we bought from the boy" (Lines 1-3)
B. "From laden boughs, from hands, / from sweet fellowship in the bins, / comes nectar at the roadside" (Lines 6-8)

C. "peaches we devour, dusty skin and all, / comes the familiar dust of summer, dust we eat." (Lines 9-10)
D. "to hold / the fruit in our hands, adore it, then bite into / the round jubilance of peach." (Lines 14-16)

3. RL.CS.4

PART A: What do peaches represent for the speaker?

A. a way to remember those who are gone
B. gratitude for all life
C. time together with family
D. the unavoidability of death

4. RL.KID.1

PART B: Which quote from the text best supports the answer to Part A?

A. "peaches / we bought from the boy / at the bend in the road where we turned toward / signs painted Peaches" (Lines 2-5)
B. "From laden boughs, from hands, / from sweet fellowship in the bins, / comes nectar at the roadside" (Lines 6-8)
C. "O, to take what we love inside, / to carry within us an orchard" (Lines 11-12)
D. "There are days we live / as if death were nowhere" (Lines 17-18)

5. RL.CS.5

How does the final stanza contribute to the development of the poem's theme?

1. **Answers will vary; students should discuss how the final stanza is the only indication the reader receives that death, or thoughts of death, are present in the speaker's life. In the previous stanzas, the speaker has only discussed the perfection of the peaches purchased. Line 17 is where the poem takes a dramatic turn, when the speaker says, "There are days we live / as if death were nowhere / in the background" (Lines 17-19). However, it is clear that even with the presence or thoughts of death in the speaker's life, they are able to find moments of complete happiness. The speaker brings us back to the beginnings of the peach: "from blossom to blossom to / impossible blossom, to sweet impossible blossom" (Lines 21-22). By doing this, the speaker emphasizes the importance of appreciating the fullness of life and its experiences, rather than just anticipating the end of life. The joy of the moment, juxtaposed against thoughts of death, shows that moments of pure and untainted joy are possible in life.**

Related Media Links and Descriptions

Related Media #1: "Is Happiness in Your Genes? "
Show students this video to further explore the effects genetics can have on a person's emotions. What additional information does the video provide about happiness? Do students agree with the findings discussed in the video? Why or why not? (3:16)

Related Media #2: "The Gratitude Experiment "
Show students this video to explore the role that gratitude plays in happiness. What are the benefits and disadvantages of the Hedonic Treadmill? How does the speaker in the poem express gratitude? Ask students to consider what they are grateful for and ways they can express this gratitude more often. (4:43)

Grab and Go Writing Checklists

Grades 6-9 Short Response

Informational /Explanatory	❑ Has a topic sentence that addresses the main question ❑ Includes ideas that support the topic sentence ❑ Cites at least two pieces of evidence from the text that most strongly support the ideas ❑ Elaborates and explains how the text evidence supports the topic and ideas ❑ Ends with concluding sentences or statement
Entire Response	❑ Has few errors in sentence formatting, capitalization, punctuation, and spelling.

Argument	❑ Has a claim that responds to the main question ❑ Includes ideas that support the claim ❑ Cites at least two pieces of evidence from the text that most strongly support the claim ❑ Elaborates and explains how the text evidence supports the ideas and the claim ❑ Ends with concluding sentences or statement
Entire Response	❑ Has few errors in sentence formatting, capitalization, punctuation, and spelling.

Find the positive value of x.

1) $x^3 = 8$

$\sqrt[3]{x^3} = \sqrt[3]{8}$

$x = \sqrt[3]{8}$

2) $x^3 = 27$

$\sqrt[3]{x^3} = \sqrt[3]{27}$

$x = \sqrt[3]{27}$

3) $x^3 = 64$

$\sqrt[3]{x^3} = \sqrt[3]{64}$

$x = \sqrt[3]{64}$

4) $x^3 = 125$

$\sqrt[3]{x^3} = \sqrt[3]{125}$

$x = \sqrt[3]{125}$

5) $x^3 = 216$

$\sqrt[3]{x^3} = \sqrt[3]{216}$

$x = \sqrt[3]{216}$

6) $x^3 = 343$

$\sqrt[3]{x^3} = \sqrt[3]{343}$

$x = \sqrt[3]{343}$

7) $x^3 = 512$

$\sqrt[3]{x^3} = \sqrt[3]{512}$

$x = \sqrt[3]{512}$

8) $x^3 = 729$

$\sqrt[3]{x^3} = \sqrt[3]{729}$

$x = \sqrt[3]{729}$

9) $x^3 = 1{,}000$

$\sqrt[3]{x^3} = \sqrt[3]{1{,}000}$

$x = \sqrt[3]{1{,}000}$

10) $x^2 = 1$

$\sqrt{x^2} = \sqrt{1}$

$x = \sqrt{1}$

11) $x^2 = 4$

$\sqrt{x^2} = \sqrt{4}$

$x = \sqrt{4}$

12) $x^2 = 9$

$\sqrt{x^2} = \sqrt{9}$

$x = \sqrt{9}$

13) $x^2 = 16$

$\sqrt{x^2} = \sqrt{16}$

$x = \sqrt{16}$

14) $x^2 = 25$

$\sqrt{x^2} = \sqrt{25}$

$x = \sqrt{25}$

15) $x^2 = 36$

$\sqrt{x^2} = \sqrt{36}$

$x = \sqrt{36}$

16) $x^2 = 49$

$\sqrt{x^2} = \sqrt{49}$

$x = \sqrt{49}$

17) $x^2 = 64$

$\sqrt{x^2} = \sqrt{64}$

$x = \sqrt{64}$

18) $x^2 = 81$

$\sqrt{x^2} = \sqrt{81}$

$x = \sqrt{81}$

19) $x^2 = 100$

$\sqrt{x^2} = \sqrt{100}$

$x = \sqrt{100}$

20) $x^2 = 121$

$\sqrt{x^2} = \sqrt{121}$

$x = \sqrt{121}$

Answers

1. **2**
2. **3**
3. **4**
4. **5**
5. **6**
6. **7**
7. **8**
8. **9**
9. **10**
10. **1**
11. **2**
12. **3**
13. **4**
14. **5**
15. **6**
16. **7**
17. **8**
18. **9**
19. **10**
20. **11**

1-10	95	90	85	80	75	70	65	60	55	50
11-20	45	40	35	30	25	20	15	10	5	0

Problem Set Sample Solutions

1. A food bank distributes cans of vegetables every Saturday. The following table shows the total number of cans they have distributed since the beginning of the year. Assume that this total is a linear function of the number of weeks that have passed.

Number of weeks (x)	1	12	20	45
Number of cans of vegetables distributed (y)	180	2,160	3,600	8,100

a. Describe the function being considered in words.

The total number of cans handed out is a function of the number of weeks that pass.

b. Write the linear equation that describes the total number of cans handed out, y, in terms of the number of weeks, x, that have passed.

$$y = \frac{180}{1}x$$
$$y = 180x$$

c. Assume that the food bank wants to distribute $20,000$ cans of vegetables. How long will it take them to meet that goal?

$$20\,000 = 180x$$
$$\frac{20\,000}{180} = x$$
$$111.1111\ldots = x$$
$$111 \approx x$$

It will take about 111 weeks to distribute $20,000$ cans of vegetables, or about 2 years.

d. The manager had forgotten to record that they had distributed $35,000$ cans on January 1. Write an adjusted linear equation to reflect this forgotten information.

$$y = 180x + 35\,000$$

e. Using your function in part (d), determine how long in years it will take the food bank to hand out $80,000$ cans of vegetables.

$$80\,000 = 180x + 35\,000$$
$$45\,000 = 180x$$
$$\frac{45\,000}{180} = x$$
$$250 = x$$

To determine the number of years:

$$\frac{250}{52} = 4.8076\ldots \approx 4.8$$

It will take about 4.8 years to distribute $80,000$ cans of vegetables.

2. A linear function has the table of values below. It gives the number of miles a plane travels over a given number of hours while flying at a constant speed.

Number of hours traveled (x)	2.5	4	4.2
Distance in miles (y)	$1,062.5$	$1,700$	$1,785$

a. Describe in words the function given in this problem.

The total distance traveled is a function of the number of hours spent flying.

b. Write the equation that gives the distance traveled, y, in miles, as a linear function of the number of hours, x, spent flying.

$$y = \frac{1062.5}{2.5}x$$
$$y = 425x$$

c. Assume that the airplane is making a trip from New York to Los Angeles, which is a journey of approximately $2,475$ miles. How long will it take the airplane to get to Los Angeles?

$$2475 = 425x$$
$$\frac{2475}{425} = x$$
$$5.82352\ldots = x$$
$$5.8 \approx x$$

It will take about 5.8 hours for the airplane to fly $2,475$ miles.

d. If the airplane flies for 8 hours, how many miles will it cover?

$$y = 425(8)$$
$$y = 3400$$

The airplane would travel $3,400$ miles in 8 hours.

3. A linear function has the table of values below. It gives the number of miles a car travels over a given number of hours.

Number of hours traveled (x)	3.5	3.75	4	4.25
Distance in miles (y)	203	217.5	232	246.5

a. Describe in words the function given.

The total distance traveled is a function of the number of hours spent traveling.

b. Write the equation that gives the distance traveled, in miles, as a linear function of the number of hours spent driving.

$$y = \frac{203}{3.5}x$$
$$y = 58x$$

c. Assume that the person driving the car is going on a road trip to reach a location 500 miles from her starting point. How long will it take the person to get to the destination?

$$500 = 58x$$
$$\frac{500}{58} = x$$
$$8.6206\ldots = x$$
$$8.6 \approx x$$

It will take about 8.6 hours to travel 500 miles.

4. A particular linear function has the table of values below.

Input (x)	2	3	8	11	15	20	23
Output (y)	7	10	25	34	46	61	70

a. What is the equation that describes the function?

$$y = 3x + 1$$

b. Complete the table using the rule.

5. A particular linear function has the table of values below.

Input (x)	0	5	8	13	15	18	21
Output (y)	6	11	14	19	21	24	27

a. What is the rule that describes the function?

$$y = x + 6$$

b. Complete the table using the rule.

2. $y = 20x + 50$

Activity Synthesis

The purpose of this discussion is to have students explain strategies for writing equations for real-world scenarios. Ask students to share what they discussed with their partners by asking:

- "What did each of the variables mean in the situations?" (Since we want a price based on the number of pounds of fruit, b and g represent the amount of bananas and grapes purchased. For the savings account, the x was the number of weeks, and the y was number of dollars.)
- "Was the slope for each of these equations positive or negative? Why does that make sense with the scenario?" (For the fruit, the slope was negative, which makes sense because if you buy more of one fruit, you have to buy less of the other. For the savings account, the slope is positive, which makes sense because the more weeks go by, the more money will be in the account.)

14.2 Five Savings Accounts

: 25 minutes

Given a graph with five lines representing changes in bank account balance over time, students write equations and interpret how points represent solutions. The activity also connects to and contextualizes students' prior understanding of slope and intercepts, and lays the foundation for the coming unit on systems of equations by considering what points of intersection of lines and non-intersecting lines represent.

Addressing

- 8.EE.B.6

Instructional Routines

- MLR8: Discussion Supports

Launch

Display the image from the lesson for all to see and ask the students to consider line a. Invite 2–3 students to describe in words what line a shows. If no students bring it up, tell students that they saw this line before in the warm-up, and they wrote an equation for it. Instruct students that for #1, they should not choose line a.

Arrange students in groups of 3–4. Groups work for about 10 minutes, followed by a whole-class discussion.

Support for Students with Disabilities

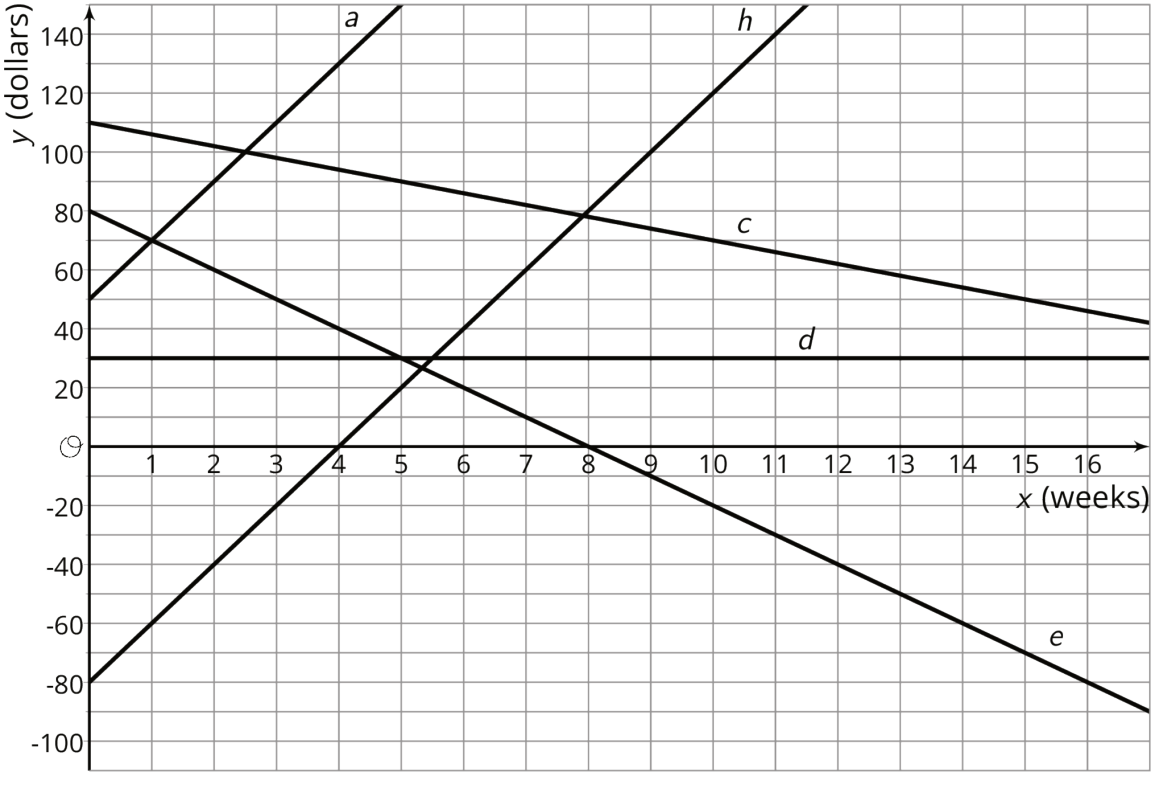
Representation: Internalize Comprehension. Activate or supply background knowledge. Allow students to use calculators to ensure inclusive participation in the activity.
Supports accessibility for: Memory; Conceptual processing

Support for English Language Learners

Conversing: MLR8 Discussion Supports. Use this routine to support discussion about the question, "What can we say about the points where two lines cross?" Invite students work with a partner to select a few of the intersection points to discuss (between lines a and c, a and e, h and c, h and d, h and e, and d and e). Consider providing these sentence frames for pairs to use: "Lines _ and _ cross at the point _ and this tells me that . . . . I know this because . . . ." Encourage students to make explicit references to the number of weeks and dollar amounts that are represented. This will help students communicate about the point where two lines intersect in the context of a real-world situation.
Design Principle(s): Support sense-making; Cultivate conversation

Student Task Statement

Each line represents one person's weekly savings account balance from the start of the year.



1. Choose one line and write a description of what happens to that person's account over the first 17 weeks of the year. Do not tell your group which line you chose.

2. Share your story with your group and see if anyone can guess your line.

3. Write an equation for each line on the graph. What do the slope, m, and vertical intercept, b, in each equation mean in the situation?

4. For which equation is $(1, 70)$ a solution? Interpret this solution in terms of your story.

5. Predict the balance in each account after 20 weeks.

Student Response

1. Answers vary. Sample responses: Person a starts with \$50 and is saving money at the rate of \$20 per week. Person h owed \$80 and is paying it back at the rate of \$20 per week, then saving once the debt is paid off. Person c starts with \$110 and is spending money at the rate of \$20 every 5 weeks, or \$4 per week. Person d has \$30 and is neither saving or spending. Person e starts with \$80 and spends at the rate of \$10 per week.

2. Responses vary.

3. a: $y = 20x + 50$; h: $y = 20x - 80$; c: $y = -4x + 110$; d: $y = 30$; e: $y = -10x + 80$; For each equation, the slope tells the rate of change of saving (positive) or spending (negative). The value of b indicates the amount of money they started with, positive represents a saved balance, negative represents money they owe. Person d shows a slope of zero—neither saving or spending, so that they remain over time with the same amount that they start with.

4. We can see from the graph that lines a and e share a common point, or solution, at $x = 1$ week, where \$ for both. Sample explanation: at 1 week, each of these people had \$70 in their accounts.

5. Person a will have \$. Person h will have \$. Person c will have \$. Person d will have \$30. Person e will have \$.

Activity Synthesis

Students should understand that points on a line show solutions to the equation of the line. Discuss with students:

- "What can we say about the points where two lines cross?" (The accounts had the same amount of money at the same time.)
- "How do the slopes of the lines help to tell the story from the graph?" (The slope tells us whether a person is spending or saving each week.)
- "What does your answer to question 3 tell us about their rates of saving?" (By knowing the value of the slope, we can compare who is spending or saving more quickly or more slowly.)

14.3 Fabulous Fish

: 20 minutes

8.EE Coffee by the Pound

Alignments to Content Standards: 8.EE.B.5

Task

Lena paid $18.96 for 3 pounds of coffee.

a. What is the cost per pound for this coffee?

b. How many pounds of coffee could she buy for $1.00?

c. Draw a graph in the coordinate plane of the relationship between the number of pounds of coffee and the total cost.

d. In this situation, what is the meaning of the slope of the line you drew in part (c)?

IM Commentary

A slight modification to this problem would make this appropriate for the 7th grade level (see 7.RP.2.d Coffee by the Pound). At the 8th grade level, the solver would be expected to identify the slope of the line with the unit rate.

Edit this solution

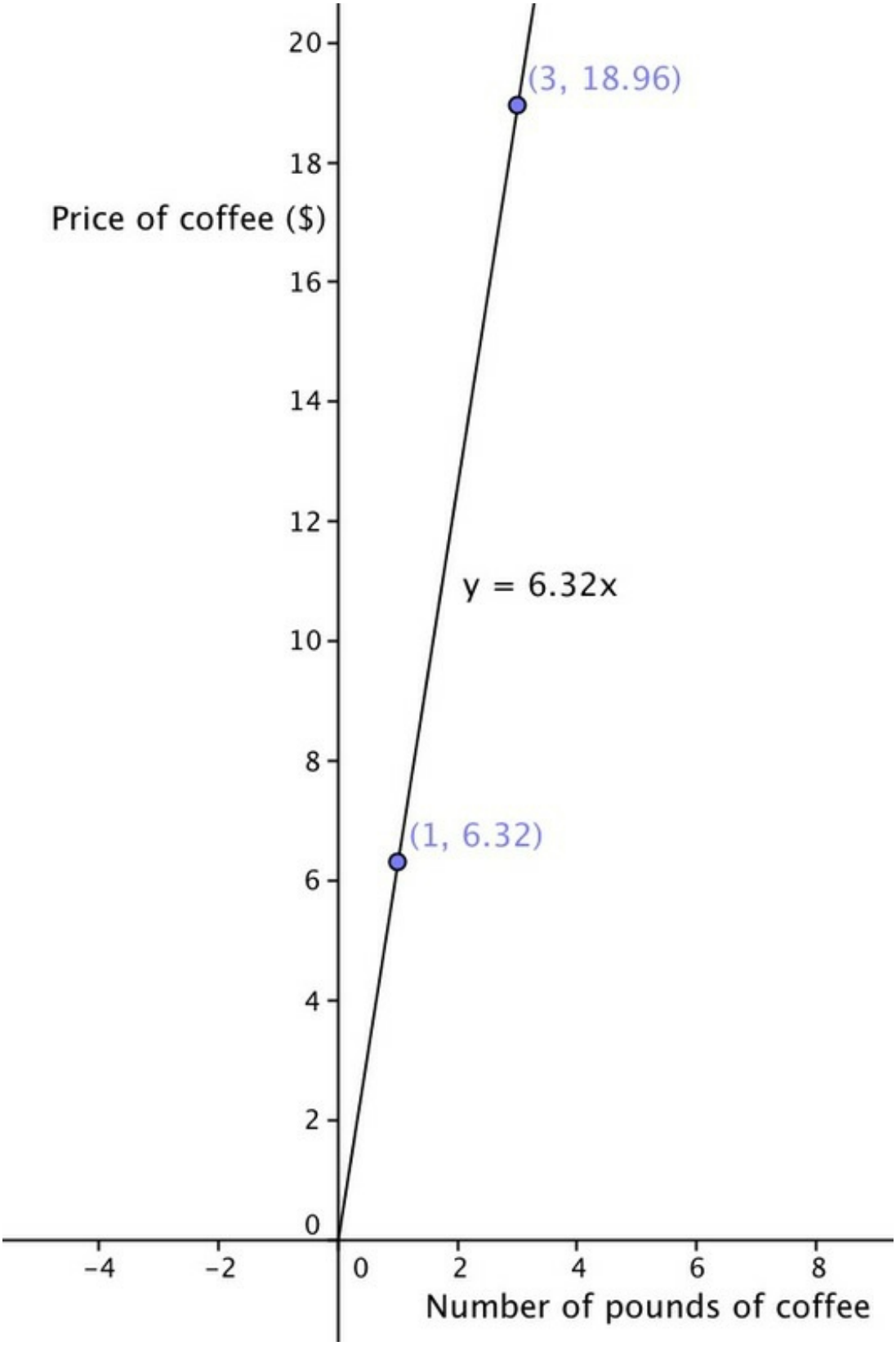
Solution

a. If you divide the cost for three pounds by three, you will get the cost per pound. Coffee costs $6.32 per pound.

b. If you divide the number of pounds by the cost for three pounds, you will get the amount of coffee one can purchase for $1.00. You can buy approximately 0.16 pounds of coffee for a dollar.

c. There are two possible graphs depending on what you choose x to represent and what you choose y to represent.

If we let x indicate the number of pounds of coffee and let y indicate the total price, then the solver may produce a graph by drawing a line through the origin and the point (3, 18.96); see below.



If we let x indicate the total price and let y indicate the number of pounds of coffee,

then the solver may produce a graph by drawing a line through the origin and the point (18.96, 3).

d. With the choice for x and y we made, the slope is the cost per pound of coffee, which is $6.32. If we had chosen the other order, the slope would have been the amount of coffee one could buy for a dollar, which is 0.16 pounds.

Student Learning Goals

Let's write equations for real-world situations and think about their solutions.

14.1 Buying Fruit

Warm Up: : 5 minutes

Students write expressions and equations representing total cost. The purpose of this activity is to support students in writing the equation for the "Ordering Fish" activity.

Addressing

- 8.EE.B.6

Instructional Routines

- Think Pair Share

Launch

Arrange students in groups of 2. Display questions for all to see. Give 2 minutes quiet think time, followed by 2 minutes partner discussion then whole-class discussion.

Anticipated Misconceptions

Some students may not be sure how to approach writing the scenario as an equation. For these students, suggest that they make a table of possible prices based on the amount of fruit purchased.

Student Task Statement

For each relationship described, write an equation to represent the relationship.

1. Grapes cost \$2.39 per pound. Bananas cost \$0.59 per pound. You have \$15 to spend on g pounds of grapes and b pounds of bananas.

2. A savings account has \$50 in it at the start of the year and \$20 is deposited each week. After x weeks, there are y dollars in the account.

Student Response

1. $2.39g + 0.59b = 15$

2. $y = 20x + 50$

Activity Synthesis

The purpose of this discussion is to have students explain strategies for writing equations for real-world scenarios. Ask students to share what they discussed with their partners by asking:

- "What did each of the variables mean in the situations?" (Since we want a price based on the number of pounds of fruit, b and g represent the amount of bananas and grapes purchased. For the savings account, the x was the number of weeks, and the y was number of dollars.)
- "Was the slope for each of these equations positive or negative? Why does that make sense with the scenario?" (For the fruit, the slope was negative, which makes sense because if you buy more of one fruit, you have to buy less of the other. For the savings account, the slope is positive, which makes sense because the more weeks go by, the more money will be in the account.)

14.2 Five Savings Accounts

: 25 minutes

Given a graph with five lines representing changes in bank account balance over time, students write equations and interpret how points represent solutions. The activity also connects to and contextualizes students' prior understanding of slope and intercepts, and lays the foundation for the coming unit on systems of equations by considering what points of intersection of lines and non-intersecting lines represent.

Addressing

- 8.EE.B.6

Instructional Routines

- MLR8: Discussion Supports

Launch

Display the image from the lesson for all to see and ask the students to consider line a. Invite 2–3 students to describe in words what line a shows. If no students bring it up, tell students that they saw this line before in the warm-up, and they wrote an equation for it. Instruct students that for #1, they should not choose line a.

Arrange students in groups of 3–4. Groups work for about 10 minutes, followed by a whole-class discussion.

Support for Students with Disabilities

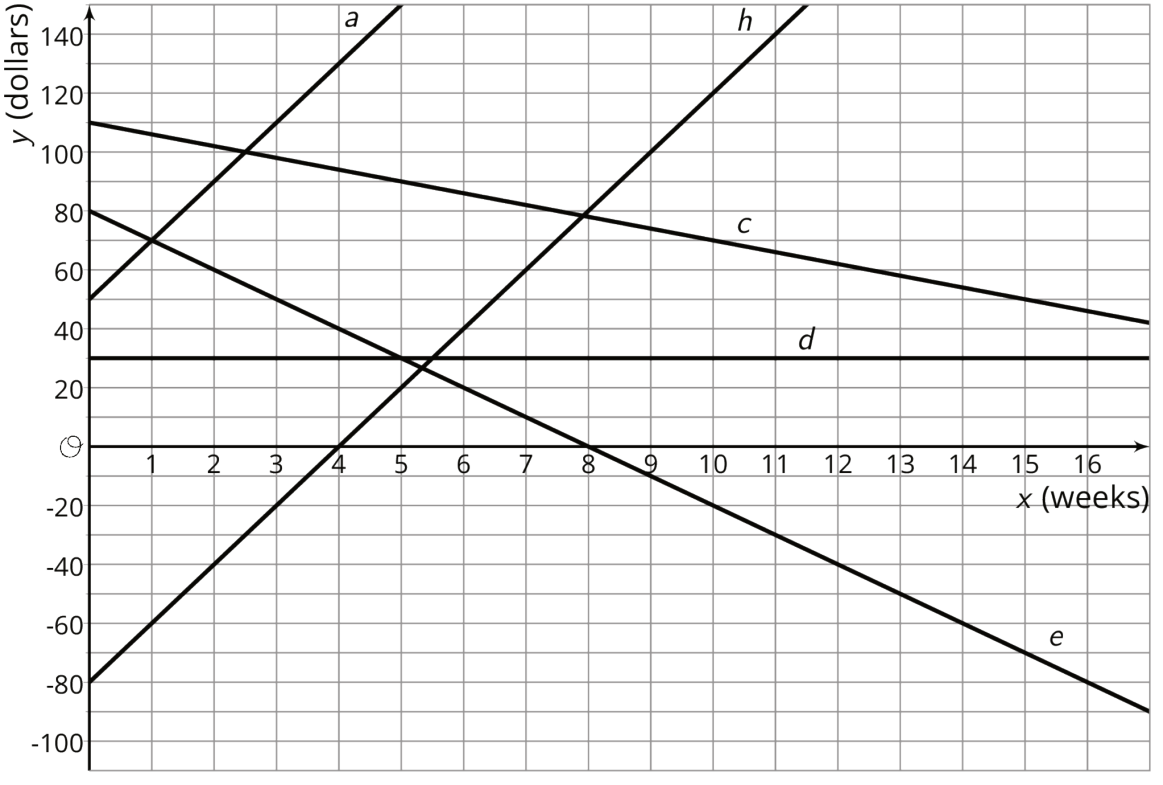
Representation: Internalize Comprehension. Activate or supply background knowledge. Allow students to use calculators to ensure inclusive participation in the activity.
Supports accessibility for: Memory; Conceptual processing

Support for English Language Learners

Conversing: MLR8 Discussion Supports. Use this routine to support discussion about the question, "What can we say about the points where two lines cross?" Invite students work with a partner to select a few of the intersection points to discuss (between lines a and c, a and e, h and c, h and d, h and e, and d and e). Consider providing these sentence frames for pairs to use: "Lines _ and _ cross at the point _ and this tells me that . . . . I know this because . . . ." Encourage students to make explicit references to the number of weeks and dollar amounts that are represented. This will help students communicate about the point where two lines intersect in the context of a real-world situation.
Design Principle(s): Support sense-making; Cultivate conversation

Student Task Statement

Each line represents one person's weekly savings account balance from the start of the year.



1. Choose one line and write a description of what happens to that person's account over the first 17 weeks of the year. Do not tell your group which line you chose.

2. Share your story with your group and see if anyone can guess your line.

3. Write an equation for each line on the graph. What do the slope, m, and vertical intercept, b, in each equation mean in the situation?

4. For which equation is $(1, 70)$ a solution? Interpret this solution in terms of your story.

5. Predict the balance in each account after 20 weeks.

Student Response

1. Answers vary. Sample responses: Person a starts with \$50 and is saving money at the rate of \$20 per week. Person h owed \$80 and is paying it back at the rate of \$20 per week, then saving once the debt is paid off. Person c starts with \$110 and is spending money at the rate of \$20 every 5 weeks, or \$4 per week. Person d has \$30 and is neither saving or spending. Person e starts with \$80 and spends at the rate of \$10 per week.

2. Responses vary.

3. a: $y = 20x + 50$; h: $y = 20x - 80$; c: $y = -4x + 110$; d: $y = 30$; e: $y = -10x + 80$; For each equation, the slope tells the rate of change of saving (positive) or spending (negative). The value of b indicates the amount of money they started with, positive represents a saved balance, negative represents money they owe. Person d shows a slope of zero—neither saving or spending, so that they remain over time with the same amount that they start with.

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5. Person a will have \$. Person h will have \$. Person c will have \$. Person d will have \$30. Person e will have \$.

Activity Synthesis

Students should understand that points on a line show solutions to the equation of the line. Discuss with students:

- "What can we say about the points where two lines cross?" (The accounts had the same amount of money at the same time.)
- "How do the slopes of the lines help to tell the story from the graph?" (The slope tells us whether a person is spending or saving each week.)
- "What does your answer to question 3 tell us about their rates of saving?" (By knowing the value of the slope, we can compare who is spending or saving more quickly or more slowly.)

14.3 Fabulous Fish

: 20 minutes

MS Science Answer Key

Assignment #1

Part I

1. Watch the following videos to observe the phenomenon we will be exploring in this lesson.
    a. April 7, 2013 - Kansas https://bit.ly/2UR9cdF
    b. October 5, 2010 - Arizona https://bit.ly/3aSZUn9
    c. June 10, 2013 - Canada https://bit.ly/3aUqmfZ

2. Complete the *Notice and Wonder* chart below.
    a. What do you notice in the videos? Write down as many observations as possible in the *Notice* column.
    b. What do the videos make you wonder? Write down questions you have about what you observed in the *Wonder* column.

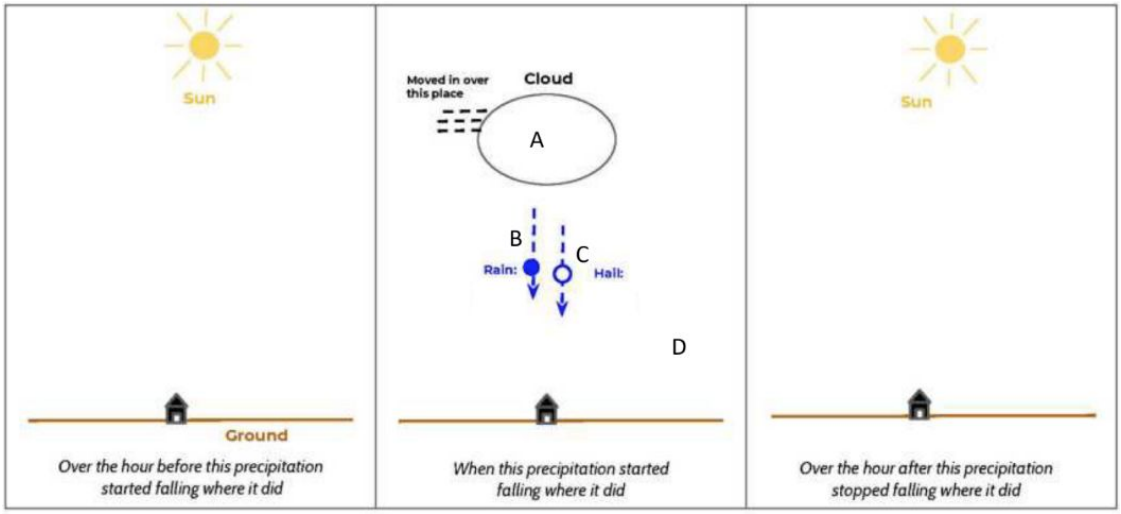
Notice	Wonder
Responses will vary. Can include: • *It looked like big pieces of ice or snow were falling in all the videos, but the size of them looked different in each of the three cases.* • *When it hit the ground, it bounced really high in the first and second videos. It made noise when it hit things in those videos.* • *The plants in the area had green leaves (e.g., grass, flowers, trees).* • *There was wind at some point in all of them. It was very strong in the second one (Arizona), and there was some in the first one (Kansas).* • *There was rain at one point along with the hail in the second one (Arizona), and there was rain before the hail in the third one (Canada), and it looked like the ground was wet in the first one—maybe from previous rain.* • *It seemed windy in the second video. And there was a moment in the third video when the tarp on the ground seemed to flap a lot.* • *It didn't seem to last very long in all three cases.*	*Responses will vary.* • ***Hail:*** *How does hail form, why do different things (hail, snow, or rain) sometimes form in clouds, and what keeps them up there?* • ***Wind:*** *Why is there a lot of wind in some storms?* • ***Clouds:*** *What is going on in the clouds?* • ***Snow and blizzards:*** *Where does the water come from in a blizzard (when it seems to be freezing cold), and how do blizzards form?* • ***Hurricanes:*** *What causes hurricanes?* • ***Rain:*** *Why does it rain heavily sometimes in some places and not in others?* • ***Elevation and temperature:*** *How does the temperature higher up in the air compare to the air closer to the ground?*

3. Share your noticings and wonderings with a classmate or family member.

Part 2

1. **Precipitation** is a way to refer to any liquid or solid forms of water that fall to the ground from above.
    a. Watch a video (https://bit.ly/2y22M2g) reviewing states of matter at the particle level.

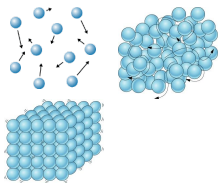
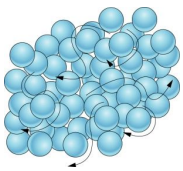
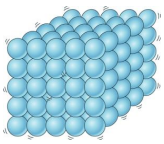
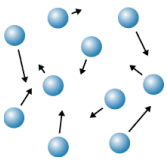
    b. Use this model of the precipitation events observed in Part 1 to answer the discussion questions below.



i. Where do you think the cloud that appeared when the precipitation occurred came from?
Answers will vary.

ii. Why would a cloud appear when precipitation occurs?
Answers will vary.

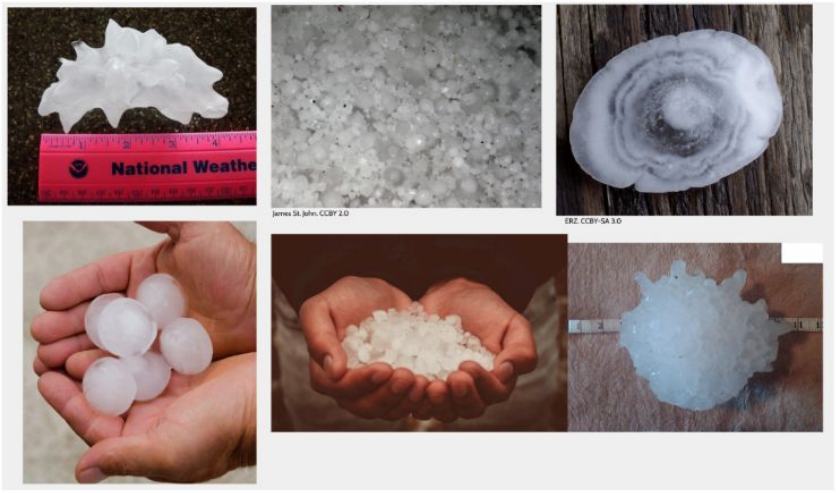
iii. Imagine you had a microscope strong enough to see matter at the particle level. Draw what you think it looks like at the particle level for each labeled part of the model. (A: Inside cloud, B: Rain, C: Hail, D: Air)

A	B	C	D
 *Combination of solid, liquid, and gas particles*	 *Liquid*	 *Solid*	 *Gas*

Assignment #2

Part I

1. Look at the images of different hailstones and write down what you notice and what questions the photos make you wonder about in the chart below.



Notice	Wonder
Answers will vary. May include: • *Some are smooth and some are spiky on the surface.* • *They range in size from the size of peas to the size of baseballs.* • *The larger ones have (3-4) rings and look like solid ice throughout their insides.*	*Answers will vary. May include:* • *I don't get why some are spiky and some are smooth.* • *Why don't they melt on the way down?* • *How could they be different sizes?*

2. Considering your observations:
   a. When do you think hail storms happen most frequently in the United States?
   Answers will vary. (e.g. winter or cold months due to hailstones being made of ice)

   b. What do you think the weather conditions are like during a hail storm?
   Answers may vary. (e.g. cold, windy, cloudy, rainy)

Part 2

1. Look at the Weather Data handout for the Fort Scott hailstorm.

    a. Based on Chart A, during what season(s) did most hailstorms occur? Does this support your prediction from Part 1?
    Most hailstorms occur during the spring and summer months. Answers comparing to prediction will vary.

    b. What was the date and time for the hailstorm in Fort Scott, KS?
    April 7, 2013 at 4:25 PM

    c. Using Chart B, what was the approximate temperature when the hailstorm occurred? Does this support your prediction from Part 1?
    Temperature is about 59 degrees Fahrenheit during the hailstorm. Answers comparing to prediction will vary.

    d. Using Chart B, what was happening with the wind around the time that the hailstorm occurred?
    The wind speed and wind gust increased around the time of the hailstorm.

2. Look at data from the two hail storms that occured in Phoenix, AZ on October 5.

    a. Based on all the data you've reviewed so far,
        i. How would you describe the typical temperature during a hailstorm?
        Temperature is relatively warm (above 55 degrees Fahrenheit) during the hailstorm. Answers comparing to prediction will vary.

        ii. Relative humidity is the quantity of water in air compared to the utmost amount of water the air can take in. How would you describe the typical relative humidity during a hailstorm?
        Humidity is relatively high when it hails. The humidity goes up around the time of a hailstorm.

        iii. How would you describe the wind during a hailstorm?
        There are changes in wind when it hails.

Assignment #3

Part I

1. Watch the video titled "Hail and Hailstones" (https://bit.ly/3aTfqiL).

2. Based on what you learned from the video, why do you think hail storms tend to happen when there are warmer temperatures even though they are made of ice?
   Answers will vary but might make the connection that warm air rising creates the air movement needed (wind) for hailstones to form in clouds.

Part 2

1. Read the article titled **"After a freak hailstorm turned a beach white, we look at what causes hail and if it's dangerous"**.

2. Draw a diagram that shows how hailstorms are formed. Include pictures, labels, and directional arrows.

   Diagram should be similar to the diagram found in the article and should include:
   - *A depiction of hail formation in a cloud*
   - *Air movement*
   - *Temperature differences at different altitudes*

3. Explain how the data you analyzed in Part 2 supports what you learned in the video and article. Why wouldn't you expect more hailstorms to happen during winter when cold temperatures are occuring?
   We saw relatively warm temperatures during the times hailstorms occur. The warm air from near the ground rises and causes the upward movement of air. That air lifts water droplets higher into the sky where they reach temperatures below freezing and form into ice. This happens again and again until the ice (hailstones) are too heavy and start to fall. This type of air movement happens more on warm, sunny days because the air right above the ground gets warmed up more by the Sun on those days.