1.a Use the information provided to fill in the missing information.

Story	Table		Is it proportional?
Lucia earns \$12 per hour.	Hours (x)	Pay (y)	Yes
	0	0	
Equation	1	12	Explain how you know.
y = 12x	2.5	30	The constant of proportionality is always 12.
	*	*	
	*Responses vary.		

1.b Use the information provided to fill in the missing information.

Story	Table		Is it proportional?
The recipe calls for 1 banana for every 2 smoothies.	Smoothies (x)	Bananas (y)	Yes
Gilliouring.	0	0	
Equation	1	0.5	Explain how you know.
y = 0.5x	5	2.5	The constant of proportionality is
	*	*	always $\frac{1}{2}$.
	*Responses vary.		

2.a Use the information provided to fill in the missing information.

Story	Table		Is it proportional?	
The cell phone costs \$500, plus \$35 per	Months (x)	Total Cost (y)	No	
month for the plan.	0	500		
Equation	1	535	Explain how you know.	
y = 35x + 500	3	605	The constant of proportionality is	
	*	*	not the same for each row.	
	*Responses vary.			

2.b Use the information provided to fill in the missing information.

Story	Table		Is it proportional?
The area of a square is the side length multiplied by itself.	Side Length (x)	Area (y)	No
	0	0	
Equation	1	1	Explain how you know.
$y = x^2$	10	100	The constant of proportionality is not the same for each row.
	*	*	
	*Responses vary.		

Unit 7.3, Lesson 6: Radius Squares

Answer Key

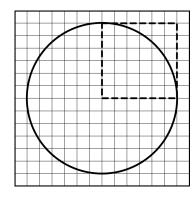
Warm-Up

Responses vary. Ayaan may have noticed that the circle is completely enclosed in the larger square, so its area must be less than $8 \cdot 8 = 64$ square units. Likewise, Ayaan may have noticed that the smaller square (or diamond) is completely enclosed by the circle, and so its area must be less than $8 \cdot 4 = 32$ square units.

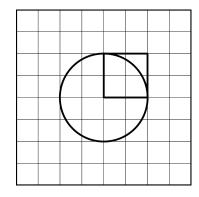
Activity 1: Estimating Circle Area

- 1. Responses and strategies vary. 49. I counted all of the squares that fit inside of the circle, including those where most of the square was inside of the circle.
- 2. Responses vary. I think we call this a radius square because its shape is a square, and it has a side length that is the radius of the circle.
- 3. Responses vary. I think it will take a little more than three radius squares to cover the circle because three radius squares have an area of $16 \cdot 3 = 48$ square units, and I estimated that my circle has an area of 49 square units.

4.



5.



Activity 2: Circle vs. Radius Square

	Radius of the Circle	Number of Radius Squares Needed to Cover the Circle
Circle A	9	About 3
Circle B	2	About 3
Circle C	7	About 3
Circle D	5	About 3

Responses vary.

It takes about 3 radius squares to cover each circle

Unit 7.3, Lesson 6: Radius Squares

Answer Key

Activity 2 Synthesis

- 1. Responses vary. Since it takes about 3 radius squares to cover the circle, the area of the circle is about the same as the area of the 3 radius squares. Each radius square has an area of r^2 , so the area of the circle is about $3 \cdot r^2$.
- 2. Responses vary. I agree with Precious. For each of the circles my group looked at, three of the radius squares fit entirely inside of the circle with just a small amount of space left.

Activity 3: Circle Area

- 1. Underestimate. Explanations vary. I think the formula $A = 3 \cdot r^2$ is an underestimate for the area of a circle because the three radius squares don't quite cover the circle. That means there is more area of the circle that we haven't counted yet.
- 2. $A = \pi \cdot r^2$ (or equivalent)

3.1 36π square units 3.2 $\frac{9}{4}$ π square inches

3.3 56.25π square centimeters 3.4 81π square feet

Are You Ready for More?

No. *Explanations vary*. If there was a proportional relationship between the radius of a circle and its area, there would be a constant of proportionality that I could multiply any circle radius by to get its area. Since the area of a circle with radius 1 is π square units, the area of a circle with radius 2 would be 2π square units, which isn't true. Therefore, the relationship between radius of a circle and its area isn't proportional.

Lesson Synthesis

Responses vary. If I know the diameter of a circle, I can divide that by 2 to find the radius of the circle. Then, I can square the radius and multiply by π to figure out the area of the circle.

Cool-Down

B. Explanations vary. If the diameter of the circle is about 20 inches, then its radius is about 10 inches. The area of the circle is a little more than 3 times the area of the radius square, which would be $10^2 = 100$ square inches. This means the area of the circle is a little more than $100 \cdot 3 = 300$ square inches.

Unit 7.4, Lesson 2: Peach Cobbler

Answer Key

Warm-Up: Number Talk

- 1. 15
- 2. 3
- 3. $7\frac{1}{2}$
- 4. $1\frac{1}{2}$

Activity 1: Which Recipe?

1. No.

Explanations vary. Recipe A has $\frac{1}{8}$ of a cup of sugar per serving, Recipe B has $\frac{1}{9}$ of a cup of sugar per serving, and Recipe C has $\frac{1}{6}$ of a cup of sugar per serving. Recipe C has the least total amount of sugar, but it has the most sugar per serving. This means it will be the sweetest tasting recipe.

2. Recipe B

Explanations vary. Recipe B has the least amount of sugar per serving.

3. Yes.

Explanations vary. The constant of proportionality between the amount of sugar and number of servings stays the same. For example, if you double the number of servings, you will also need to double the amount of sugar.

Answer Key

Activity 2: Adjusting a Recipe

1.

Recipe B

Number of Servings: 1

$$\frac{1}{3}$$
 lb. of peaches

$$\frac{1}{16}$$
 cups of butter

$$\frac{1}{16}$$
 cups of flour

$$\frac{1}{9}$$
 cups of sugar

$$\frac{1}{24}$$
 tsp. of lemon juice

2.1 Responses vary.

Recipe B

Number of Servings: $4\frac{1}{2}$

$$1\frac{1}{2}$$
 lb. of peaches

$$\frac{9}{32}$$
 cup of butter

$$\frac{9}{32}$$
 cup of flour

$$\frac{1}{2}$$
 cup of sugar

$$\frac{3}{16}$$
 tsp. of lemon juice

Recipe B

Number of Servings: 5

$$1\frac{2}{3}$$
 lb. of peaches

$$\frac{5}{16}$$
 cup of butter

$$\frac{5}{16}$$
 cup of flour

$$\frac{5}{9}$$
 cup of sugar

$$\frac{5}{24}$$
 tsp. of lemon juice

desmos

Unit 7.4, Lesson 2: Peach Cobbler

Answer Key

2.2 Responses vary.

- $\frac{3}{16}$ tsp. of lemon juice would need $1\frac{1}{2}$ scoops.
- $\frac{5}{24}$ tsp. of lemon juice would need $1\frac{2}{3}$ scoops.

Lesson Synthesis

Responses vary. You could use a double number line or a table or calculate the unit rate to compare the amount of carrots each person's recipe has in one liter.

Cool-Down

Esteban's lemonade tastes stronger.

Explanations vary. Aba uses $7\frac{1}{2}$ cups of water per 1 cup of lemon juice because $2\frac{1}{2} \div \frac{1}{3} = 7\frac{1}{2}$.

Esteban uses $6\frac{2}{3}$ cups of water per 1 cup of lemon juice, because $1\frac{2}{3} \div \frac{1}{4} = 6\frac{2}{3}$.

Esteban's mixture has less water for the same amount of lemon juice.

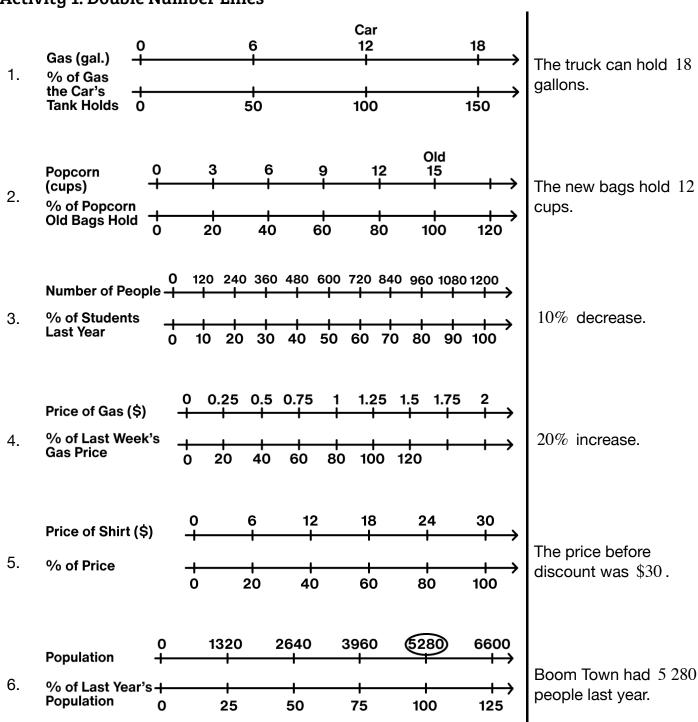
Unit 7.4, Lesson 6: 100%

Warm-Up

These are the true statements:

- 1. The original cereal box weighs 500 grams.
- 3. A 400-gram box contains 20% less cereal than the original box.

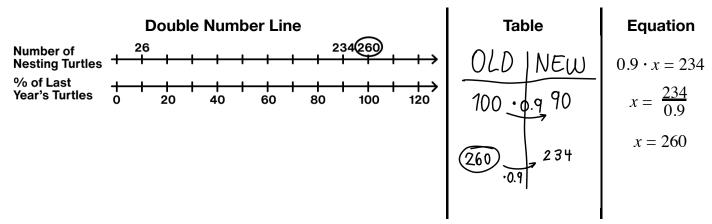
Activity 1: Double Number Lines



Unit 7.4, Lesson 6: 100%

Answer Key

Activity 2: Green Sea Turtles



There were 260 nesting turtles last year.

Lesson Synthesis

Abdullah's double number line is correct.

Explanations vary. The number 12 should be lined up with 100% because that is the original number of fluid ounces.

Cool-Down

74.2 fluid ounces

Unit 7.4, Lesson 9: Minimum Wage

Answer Key

Warm-Up

Responses vary.

- Yes, this seems fair. Restaurant servers have a lower minimum wage, but the tips they receive probably make up for it. If tipped workers made the same wage as other minimum wage jobs, then their tips would mean their pay ends up being way more than minimum wage.
- No, this doesn't seem fair. Earning \$2.13 per hour isn't enough to live on. It's true that the wages are actually higher because of tips, but that relies on customers to tip, which doesn't always happen.

Activity 1: Waiting Tables

1. **Laila:** $(40 \cdot 2.13) + (75 \cdot 41 \cdot 0.18) = \638.70 per week **Tiana:** $(40 \cdot 2.13) + (45 \cdot 130 \cdot 0.20) = \$1\ 255.20$ per week **Julian:** $(40 \cdot 2.13) + (95 \cdot 22 \cdot 0.15) = \398.70 per week

Peter: $(40 \cdot 7.25) + (90 \cdot 21 \cdot 0.15) = 573.50 per week

2. Laila's new amount: $(40 \cdot 2.13) + (75 \cdot 41 \cdot 0.23) = \792.45 . This is about a 24% increase. Tiana's new amount: $(40 \cdot 2.13) + (45 \cdot 130 \cdot 0.25) = \1547.70 . This is about a 23% increase. Julian's new amount: $(40 \cdot 2.13) + (95 \cdot 22 \cdot 0.2) = \503.20 . This is about a 26% increase. Peter's new amount: $(40 \cdot 7.25) + (90 \cdot 21 \cdot 0.2) = \668.00 . This is about a 16% increase.

3. Tiana makes the most money. Julian makes the least money.

Responses vary.

- Yes, the system seems fair. Tiana works at the fanciest restaurant, so she should make the most money.
- No, the system does not seem fair. Peter and Julian seem to work at similar restaurants, but because Peter's state has different laws, he makes more money.
- No, the system does not seem fair. It seems pretty random that everyone's pay depends
 mostly on how expensive the food is at the restaurant where they work. Laila and Julian
 have children to support, so they should make more money.

Activity 2: What's Fair?

1. Responses vary. Under this policy, each server would earn \$600 per week. Julian and Peter would probably be happy with this new approach because they make less than that amount in a typical week. Laila and Tiana would probably be unhappy because they make more than that right now.

desmos

Unit 7.4, Lesson 9: Minimum Wage

Answer Key

2. Responses vary. The system that seems the most fair doesn't involve optional tipping from customers. All servers should make an hourly wage high enough to live—maybe \$13 per hour—and then certain servers could make more money.

Here is how servers could earn more:

- A server could make an extra \$1 per hour for every year that they've worked at the restaurant (since they will be more experienced and valuable to the restaurant).
- A server could make an extra \$2 per hour for every child that they support (since those workers need more money than those without children).

All customers would have 18% added to their bill automatically to provide for this extra pay. If that 18% is collected and there's money left over, it should be distributed to all the servers equally.

Using this system, Laila would make at least \$800 per week, Tiana would make at least \$520 per week, Julian would make at least \$720 per week, and Peter would make at least \$520 per week.

Are You Ready for More?

Responses vary.

Lesson Synthesis

Responses vary. To determine how much a server makes, first multiply the number of hours they work by their hourly rate. Then, add that to the amount they make from tips. You can figure out that amount by multiplying the average number of tables they serve, the average bill at those tables, and the percentage people usually tip.

Cool-Down

Responses vary.

- No. During a typical 8 -hour shift, Tariq currently makes $9 \cdot 8 + 65$ or \$137. A 50% raise means making \$13.50 per hour. In an 8 -hour shift without tips, he would make only \$108.
- Yes. During a typical 8-hour shift, Tariq currently makes $9 \cdot 8 + 65$ or \$137, but it could vary depending on tips. With the raise, he would make less money on average, but at least the amount he makes would be predictable.

Unit 7.4, Lesson 12: Posing Percent Problems

Answer Key

Warm-Up

Responses vary.

Questions that meet both criteria:

- How many pieces of clothing did we buy 20 years ago?
- How many tons of carbon dioxide did we emit 20 years ago?
- How many more tons of carbon dioxide do we emit now?

Questions we could not figure out from this information:

- How much clothing does the average person buy?
- How much space does a ton of carbon dioxide take up?

Questions whose answers are given:

- How much carbon dioxide does the fashion industry emit per year?
- How many pieces of clothing do we buy every year?

Activity 1: Stronger and Clearer Each Time

Responses vary.

Wage Gap

- Is the wage gap for Black women and White women closing at the same rate?
- How much did the average White woman make per year in 2017?
- How much did the average Black man make per year in 2017?

Prison Populations

- Did the prison populations of the U.S. and China change at the same rate between 1986 and 2018?
- How many people were in U.S. prisons in 2018?
- What was the prison population in India in 1986?

Activity 2: Make a Poster

Posters vary.

Activity 2 Synthesis

Responses vary.

desmos

Unit 7.4, Lesson 12: Posing Percent Problems

Answer Key

Activity 3: Warm-Up

Responses vary.

Activity 3: Gallery Tour

Responses vary.

Activity 4: Revisions and Reflection

Responses vary.

Lesson Synthesis

Responses vary.

- The math we learned in this unit can help us understand how different things have changed over time.
- We can use what we've learned about percentages to help make comparisons between different things and different groups.

Cool-Down

Questions and answers vary.

- How many wild tigers are there in the world in 2022?
- About 4 891. 8 tigers

Unit 6.7, Lesson 3: Order in the Class

Answer Key

Warm-Up

Responses vary.

- **A:** The only inequality with two positive numbers.
- **B:** The only inequality with a < symbol.
- **C:** The only inequality that does not include a 3.
- **D:** The only inequality with two negative numbers.

Activity 1: Greater Than? Rounds 1–3

Responses vary.

Intermission (Page 5 of the Teacher Projection Sheets)

1.
$$-2 < 1 \frac{1}{2}$$
 $-1.5 < -1$

- 2. $1 \frac{1}{2}$ is the opposite of -1.5 because they are the same distance from 0 and on different sides of the number line.
- 3. From least to greatest: -2, -1.5, -1, 1 $\frac{1}{2}$

Activity 2: Least to Greatest Rounds 4–6

Responses vary.

Are You Ready for More?

The cards from least to greatest:

$$-9.2, -9.02, -5, -3, -\frac{8}{3}, -2\frac{1}{2}, -2.10, -2.01, -2, -1\frac{1}{2}, -\frac{5}{4}, -1, -\frac{6}{7}, -0.4, -\frac{1}{3}, -\frac{1}{7}, \frac{1}{7}, \frac{2}{5}, \frac{6}{7}, 1, +1.25, +1.5, +2, +2.01, 2.10, 2.5, 2\frac{2}{3}, 3, +5, 9.02, +9.2$$

Lesson Synthesis

Responses vary.

- 1. M is the opposite of P because they are the same distance from 0 and on different sides of the number line.
- 2. R is greater than N because it is farther to the right on the number line.
- 3. M is the least of the numbers because it is the farthest to the left on the number line.

Cool-Down

- 1. Responses vary. 4.5 is greater than -2.7 because it is farther to the right on the number line.
- 2. From least to greatest: -3, -2.5, $\frac{1}{4}$, 2.5, 3.1

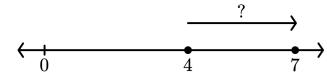
Warm-Up

- 1. 1
- 2. -1
- 3. -1
- 4. 5

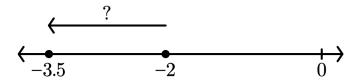
Activity 1: Draw Your Own Diagram

1. Responses vary. Renata put a dot at each number and then figured out how far it was from the second number to the first.

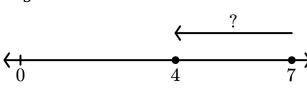
2.1 3



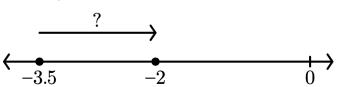
2.2 - 1.5



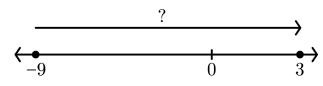
-3



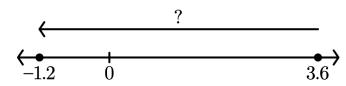
1.5



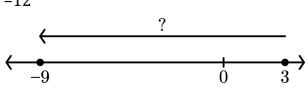
2.3 12



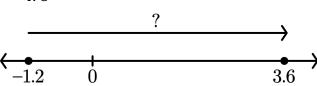
2.4 -4.8



-12



4.8



Unit 7.5, Lesson 4: Draw Your Own

Answer Key

- 3. Responses vary.
 - I noticed that when you switch the order of the numbers, the number is the opposite of what it was before. This only happens with subtraction.
 - I noticed that if the larger number is first in a subtraction problem, then the answer is positive, but if the larger number is second, the answer is negative.

Activity 2: Draw Your Own Conclusion

1. This statement is **never** true.

Reasoning varies. x + 2 is always 2 to the right of x, so it's always greater than x.

2. Statement A: Sometimes true

Statement B: Always true

Statement C: Never true

Reasoning varies.

3. Statement D: Always true

Statement E: Sometimes true

Statement F: Sometimes true

Reasoning varies.

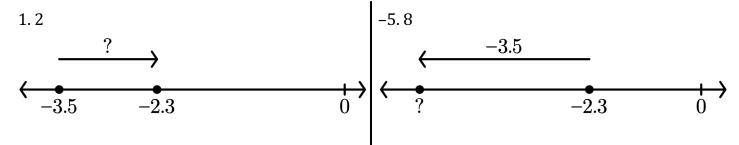
Are You Ready for More?

Responses vary.

Lesson Synthesis

Responses vary. When you switch the order, the number stays the same, but it is the opposite. This makes sense because you're looking for the change but going in the opposite direction. For example, 7-4 is like the change from 4 to 7 and 4-7 is like the change from 7 to 4.

Cool-Down

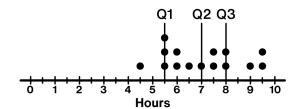


Unit 6.8, Lesson 14: Car, Plane, Bus, or Train?

Answer Key

Warm-Up

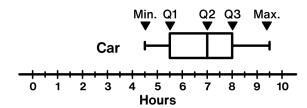
1. Q1: 5.5 hours Q2: 7 hours Q3: 8 hours



2.1 Responses vary.

- I notice that there's a rectangle with a line through it, or maybe two rectangles next to each other, and then little lines coming out the side.
- I wonder why people use box plots.

2.2



Activity 1: Car or Plane?

1. Minimum: 4 hours

Quartile 1: 4.5 hours

Median: 5 hours

Quartile 3: 6.5 hours Maximum: 7 hours

2. Responses vary.

- Range and IQR are similar because they are both measures of spread that measure distance from a "low" part of the data to a "high" part of the data.
- Range and IQR are different because range is calculated using the least and greatest values and IQR is calculated using the least and greatest quartiles.
- 3. Jalen is probably talking about the IQR. *Explanations vary*.

 Half of the data points are between Quartile 1 and Quartile 3, and the distance between those is what IQR measures.

4. Range: 3 hours IQR: 2 hours

5. Responses vary. I would probably recommend that Jalen's family go by plane. The median travel time is 5 hours compared to 7 hours, but flying by plane might be more expensive.

Answer Key

Activity 2: Bus or Train?

1.	Bus	Train		
Travel Times (hours)	7.5 10.5 9.5 9.5 6	6.5 8.5 6 10.5 6.5		
	7 6.5 7.5 11 8.5	8 7 7 9 8		
Dot Plot	2 3 4 5 6 7 8 9 10 11 12 Hours	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
Box Plot	2 3 4 5 6 7 8 9 10 11 12 Hours (Students will make this box plot.)	2 3 4 5 6 7 8 9 10 11 12 Hours		
Median	8 hours	7. 5 hours		
IQR	2. 5 hours	2 hours		
Range	5 hours	4. 5 hours		

2. Responses vary.

- I would recommend a plane because its median is the lowest and its spread is low too.
- I would recommend a train because the median is not that different than the others. Plus, they avoid traffic (unlike cars and buses) and train tickets are probably cheaper than plane tickets.

Lesson Synthesis

Box plot	Dot plot	Responses vary.	Box plot
The median?	The number of data points?	The range?	The IQR?

Cool-Down

Median: 30 minutes IQR: 15 minutes Range: 25 minutes

Warm-Up

1. Responses vary.

2. Responses vary.

- 3. Explanations vary.
 - I think 7th graders have more homework because they are older.
 - I think students send more text messages because teachers are more likely to make a phone call when they want to talk to someone instead of texting.

Activity 1: Homework Headlines

- 1.1 Responses vary. Someone might believe this headline because 6th graders have more dots on the left side of the dot plot, which shows less homework.
- 1.2 Responses vary. Someone might not believe this headline because there is a lot of overlap between the dots.
- 2. Responses and explanations vary. I agree with Ama. There isn't a very big difference between 64.3 and 67.7 minutes of homework if the MAD is 10 minutes.
- 3. Responses vary. Ama would say that 8th graders definitely have more homework than 7th graders because the difference between the means is 17. 3 minutes or close to 2 MADs.

Activity 2: Texting Title

- 1.1 Responses vary. Someone might believe this title because most of the data points for teachers are larger than the data points for students.
- 1.2 Responses vary. Someone might not believe this headline because the survey doesn't include very many people, so you don't really know how many texts other people send.
- 2. Responses vary depending on which MAD students use.

Students

Teachers

Mean:
$$\frac{0+3+5+10+20+30+100}{7} = 24$$
 Mean: $\frac{2+20+30+45+50+90}{7} = 41$

MAD:
$$\frac{24+21+19+14+4+6+76}{7}$$
 = 23.4 MAD: $\frac{39+21+11+4+9+9+49}{7}$ = 20.3

The means are about
$$\frac{41-24}{23.4}$$
 = 0.7 or $\frac{41-24}{20.3}$ = 0.8 MADs apart.

3. Responses and explanations vary. My calculations make me believe the headline less. Ama's strategy shows that the means aren't even 1 MAD apart.

Unit 7.8, Lesson 14: School Newspaper

Answer Key

4.1

Students Teachers

 Median: 10
 Median: 45

 IQR: 27
 IQR: 30

4.2 The difference between the medians is about $\frac{45-10}{30}$ = 1.1 IQR.

5. Responses and explanations vary. This calculation makes me believe the headline more since the difference between the medians is more than one IQR.

Activity 3: Write Your Own

1. Responses vary.

Sample responses for each card:

Backpack Weights

Possible headline: Survey Finds 8th Graders Have Much Heavier Backpacks Than 6th Graders

Evidence/explanation: The mean weight of 8th graders' backpacks is 14.5 pounds. The difference between the mean backpack weights is 14.5 - 6.3 = 8.2, which is about 3 MADs.

Online Videos

Possible headline: Survey Finds Students on Average Watch More Online Videos Than Teachers

Evidence/explanation: The median number of hours of online videos watched last year for students is 610 hours and the IQR is 40. The difference between the medians is 36 hours, which is about the size of the IQR for both data sets.

Cell Phone

Possible headline: Survey Finds No Real Difference in Cell Phone Usage Between 6th and 8th Graders

Evidence/explanation: The median number of minutes of cell phone use last week for 6th graders is 360 minutes and the IQR is 180. The difference between the medians is 13 minutes, which is less than the IQR of either sample.

Hot Lunch

Possible headline: Survey Finds No Real Difference in Hot Lunch Purchasing between 6th and 7th Graders

Evidence/explanation: The mean number of hot lunches purchased last month by 7th graders is 12.7 lunches, with a MAD of about 3.4. The difference between the mean number of hot lunches purchased by 6th and 7th graders is 1.3, which is less than 1 MAD.

4. Backpack weights and online videos have a big difference between their centers. Cell phone usage and hot lunches do not.

desmos

Unit 7.8, Lesson 14: School Newspaper

Answer Key

Lesson Synthesis

Responses vary. I can use the MAD to decide how different two populations are by seeing if the means are at least one MAD apart. If they are, that means the populations are probably different. If they aren't, the populations might not be very different.

Cool-Down

No.

Explanations vary. I don't agree with Caasi because the difference between the means is 5.3 - 3 = 2.3, which is more than one MAD of either data set (0.9 and 0.8). When the difference between the means is equal to one or more MADs, that means there is a big difference between the number of movies watched by each population.