

MATH 8 AND ALGEBRA 1:

Week of June 1 (& summer)

- Go through the slides (notes) and work through the examples on a separate piece of paper.
- Do the given practice problems (again, on a separate piece of paper).
- Check your answers with the key given (last slide).
- Take a photo or scan in your work and submit it in Google Classroom. If you have questions or would like feedback on your work, add that as a comment with your submitted work.
- The other option for turn in is to send it in on Monday when the new packet is available.
- Check your school email/google calendar for online help sessions via Zoom.

Day 1: Slides 2-11 Day 2: Slides 12-19
 Summer Challenges: Slides 21-26
 Answers on Slides 27-28

1

Day 1: L5.4(A)/L18(M8)

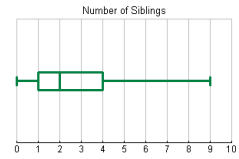
Box-And-Whisker Plots

Create and read box-and-whisker plots.

Vocabulary

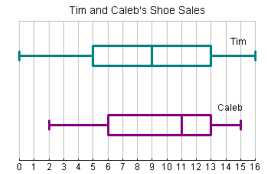
Box-And-Whisker Plot

A diagram used to display the five-number summary of a data set.



Parallel Box-And-Whisker Plot

One box-and-whisker plot placed above another used to compare two or more data sets.



2

Example 1

A grocery store manager was curious about how much each customer spent at her store. She collected data on the amount each of the next fifteen customers spent.

\$1, \$3, \$5, \$5, \$6, \$8, \$10, \$10, \$11, \$14, \$19, \$25, \$32, \$55, \$68

Construct a box-and-whisker plot to display the amounts spent by the customers.

Find the five-number summary of the data:

1, 3, 5, 5, 6, 8, 10, 10, 11, 14, 19, 25, 32, 55, 68

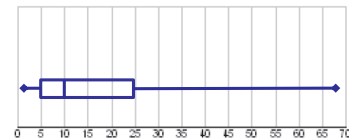
1 ~ 5 ~ 10 ~ 25 ~ 68

3

Example 1 Continued...

Draw a number line. Create equal intervals on your number line that include the minimum (1) and maximum (68) data values. For this data set, a number line spanning from 0 to 70 with intervals of 5 will work well.

Amount Spent at Store



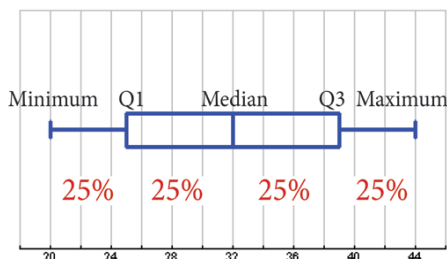
Create a box just above the number line that goes from the Q1 value (5) to the Q3 value (25). Draw a vertical line through the box where the median value (10) lies.

Add "whiskers" to the ends of the box that extend out to the minimum and maximum values.

4

Good to Know!

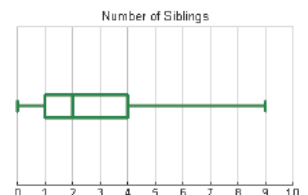
The five-number summary divides a data set into four quartiles. Each section represents 25% of the data. A box-and-whisker plot for a data set makes it easier to answer questions about the distribution of the data.



5

Example 2

The following box-and-whisker plot the number of siblings each student Mrs. Grady's class has.



a. Twenty-five percent of the students have more than __ siblings.

The question is asking about the top 25% of the data set. The top 25% starts at 4 siblings.

b. Fifty percent of the students have between __ and 4 siblings.

This question is asking about the middle 50% of the data set, which runs between Q1 and Q3. The 3rd quartile (Q3) is 4 and the missing value (Q1) is 1.

6

Example 3



Two shoe salesmen, Tim and Caleb, compare the number of shoes they each sold over the last 14 days.

Tim: 0, 1, 3, 5, 5, 6, 8, 10, 11, 12, 13, 13, 14, 16
Caleb: 2, 4, 5, 6, 9, 10, 11, 11, 11, 11, 13, 14, 15, 15

Create a parallel box-and-whisker plot for the data.

Find the five-number summary for each person.

Tim's five-number summary: 0 ~ 5 ~ 9 ~ 13 ~ 16

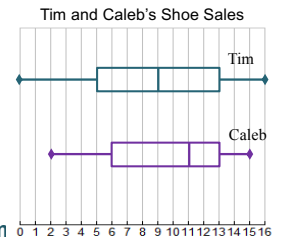
Caleb's five-number summary: 2 ~ 6 ~ 11 ~ 13 ~ 15

7

Example 3 Continued...

Draw and label a number line that will include both the minimum and maximum values of both data sets.

Use the five-number summaries to create two box-and-whisker plots. Place the plots one above the other and label each with the salesman's name.



The plots show that Tim's maximum sales day was larger, but his minimum was also smaller than Caleb's minimum.

Although Caleb's maximum is lower, 50% of the days he sold more than 11 pairs of shoes. In comparison, Tim sold more than 9 pairs of shoes on 50% of the days.

8

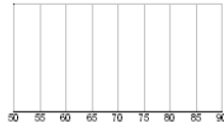
Day 1: L5.4/DA L18 Practice Problems:

Create a box-and-whisker plot for each five-number summary below.

1. 8 ~ 15 ~ 19 ~ 22 ~ 24



2. 52 ~ 65 ~ 68 ~ 72 ~ 90



3. 0 ~ 1 ~ 3 ~ 7 ~ 12



9

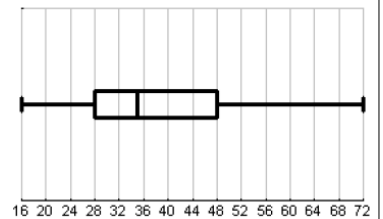
Day 1: L5.4/DA L18 Practice Problems:

Find the five-number summary and create a box-and-whisker plot for each set of data.

4. 22, 25, 25, 28, 34, 41, 44, 52, 60

5. 96, 72, 78, 88, 100, 92, 68, 82

The box-and-whisker plot shows the ages of registered drivers in a city.



6. What is the median driver's age?

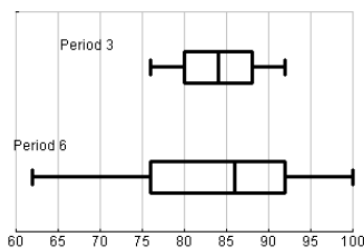
7. What percent of drivers in this town are over 28 years old?

8. Twenty-five percent of drivers are at least _____ years old.

10

Day 1: L5.4/DA L18 Practice Problems:

The parallel box-and-whisker plot shows the test scores of two different classes.



9. What is the range of the scores in Period 3?

10. What is the range of the scores in Period 6?

11. Which class had the higher Q1? Which had the higher Q3?

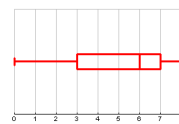
12. Which class would you say performed better on the test? Explain.

End Day 1 11

Day 1: L5.5(A) /L19(M8)

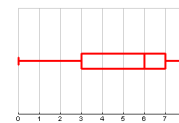
Analyzing Box-And-Whisker Plots

Use box-and-whisker plots to analyze data and make predictions.



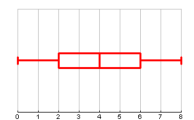
Skewed Left

The 50% "tail" on the left side is longer.



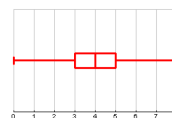
Skewed Right

The 50% "tail" on the right side is longer.



Even Distribution

A set of data values that is evenly spread across the range of the data.



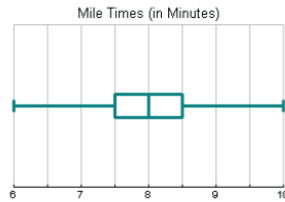
Normal Distribution

50% of the data is clustered closely in the middle, while the whiskers stretch longer to the left and the right.

12

Example 1

Mr. Jansen, the PE teacher, collected data about his students' mile times for several years. He put the data into the box-and-whisker plot at right.



a. Describe the distribution of the data.

The data has a normal distribution. Fifty percent of the students are clustered in the middle with longer whiskers on the left and right.

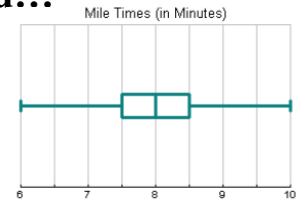
b. Approximately what percent of Mr. Jansen's students can run a mile in less than 7.5 minutes?

The first quartile (Q1) value is 7.5. Twenty-five percent of the students can run a mile in less than 7.5 minutes.

13

Example 1 Continued...

c. If one of Mr. Jansen's classes has 36 students, about how many would you expect to run the mile in more than 8.5 minutes?



Twenty-five percent of Mr. Jansen's students run a mile in more than 8.5 minutes.

Use a proportion to predict the number of students out of 36 that run a mile in this time frame.

$$\frac{25}{100} = \frac{x}{36}$$

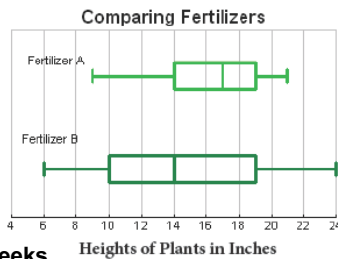
$$x = 9$$

Approximately 9 of the students would run a mile in more than 8.5 minutes.

14

Example 2

Two different fertilizers were applied to several plants of the same breed. The parallel box-and-whisker plot shows the distribution of the heights (in inches) of the plants after 6 weeks.



a. Describe the distribution of the plants for each type of fertilizer.

Since there is a longer tail on the left, Fertilizer A's graph is skewed left. Each quartile in the plot for Fertilizer B is approximately the same size. Fertilizer B has an even distribution.

15

Example 2 Continued...

b. Eighty plants were given Fertilizer A. About how many would likely grow at least 14 inches in height?

According to the graph, 75% of the plants given Fertilizer A grew to be at least 14 inches in height.

$$\frac{75}{100} = \frac{x}{80}$$

$$x = 60$$

About 60 of the plants should grow to at least 14 inches tall if given Fertilizer A.

c. Eighty plants were given Fertilizer B. About how many would likely grow at least 14 inches in height?

According to the graph, 50% of the plants given Fertilizer B grew to be at least 14 inches in height.

$$\frac{50}{100} = \frac{x}{80}$$

$$x = 40$$

About 40 of the plants should grow to at least 14 inches tall if given Fertilizer B.

16

Example 2 continued...

d. What are the advantages of each fertilizer?

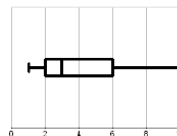
- ♦ Plants given Fertilizer B have the potential to grow the most.
- ♦ Plants given Fertilizer A seem to be more consistent in their growth.
- ♦ Fertilizer B plants have a range of 18 inches.
- ♦ Fertilizer A plants have a range of 12 inches.

17

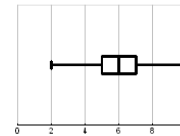
Day 2: L5.5/DA L19 Practice Problems:

Describe the distribution of each box-and-whisker plot.

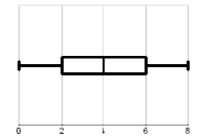
1.



2.



3.

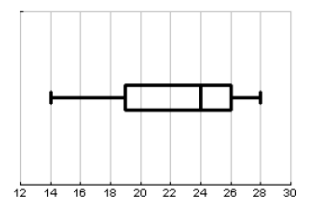


The box-and-whisker plot shows the number of students in each class at a school.

4. Describe the distribution of the data.

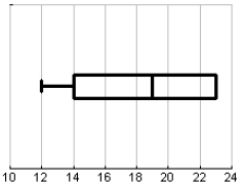
5. There are 15 classes at the school with 19 or fewer students. How many total classes are there at the school?

6. Use your answer from #5 to find the number of classes at the school with at least 24 students.



18

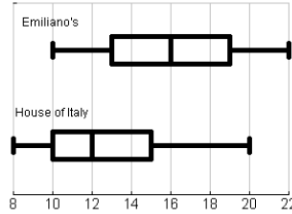
Day 2: L5.5/DA L19 Practice Problems:



- A data set has the following box-and-whisker plot.**
- What is the five-number summary of the data set?
 - Why does the plot not have a "whisker" on the right side?

Two restaurants were studying the cost of meals purchased by their customers. Use the parallel box-and-whisker plot to answer the questions.

- What does the distribution tell you about the cost of meals purchased by customers at House of Italy?
- If Emiliano's had 220 customers in one day, how many would you expect to have paid more than \$19 for their meals?



End Day 2 19

Dear Students (& Parents),

The following slides are intended as summer challenges – I do not expect them to be turned in on June 8 with the rest of your work.

It has been a delight to teach you – I miss you all and wish you the best in high school. I wish we could have had a proper goodbye, so for now I will say thank you for your hard work – you've come a long way! Each and every one of you are AMAZING.

~Mrs. Clark.



20

Summer Challenge Problem #1

Tic-Tac-Toe ~ WEIGHTED AVERAGES



A weighted average is a way of calculating the average where different data in the data set are given different weights. Many teachers use a weighted average when calculating a student's grade.

For example, Kevin's teacher uses a grading system where 60% of the student's grade is based on their homework and 40% is based on the student's tests. His teacher uses the following formula to calculate students' grades.

$$\text{Student's Overall Grade} = 0.60(\text{Homework Average}) + 0.40(\text{Test Average})$$

So far this term, Kevin had four homework assignments and two tests. His scores are listed.

Homework Grades: 80%, 60%, 80%, 90% Test Grades: 80%, 90%

Kevin calculates his grade using his teacher's grading system.

$$\text{Student's Overall Grade} = 0.60(\text{Homework Average}) + 0.40(\text{Test Average})$$

$$\text{Homework Average} = \frac{80 + 60 + 80 + 90}{4} = 77.5 \quad \text{Test Average} = \frac{80 + 90}{2} = 85$$

$$\text{Student's Overall Grade} = 0.60(77.5) + 0.40(85) = 80.5\%$$

21

Summer Challenge Problem #1

- If Kevin receives a 50% on his next test, what will be his new overall grade (percentage)?

Stephanie's teacher uses a grading system where 80% of the student's grade is based on their homework and 20% is based on their tests. So far this term, Stephanie has the following grades:

Homework Grades: 80%, 90%, 100%, 90%

Test Grades: 65%, 75%

- What is Stephanie's overall grade so far this term?
- If Stephanie receives a 90% on her next test, what will be her new overall grade?
- If Kevin were in Stephanie's class with her teacher's grading system, what would his grade be?
- If Stephanie were in Kevin's class with his teacher's grading system, what would her grade be?
- Which teacher's grading system do you prefer? Explain.

22

Summer Challenge Problem #2

Tic-Tac-Toe ~ DATA SET PUZZLES



Use the given information to find missing numbers in the data sets. The given numbers are not in order and there may be more than one answer. Show that the solution works.

- 10, 15, 16, 7, 8, ____

Five-number summary: 7 ~ 8 ~ 10 ~ 15 ~ 16
Mean = 11

- 85, 81, 62, 100, 75, ____

Five-number summary: 62 ~ 72.5 ~ 83 ~ 89 ~ 100
Mode = 85

Information about five-number summaries is in Lesson 4.7.

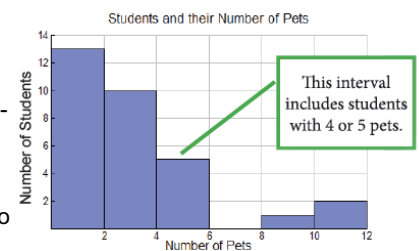
- Create two challenge problems similar to #1 and #2. The problems should have an incomplete data set and some statistics about the data set. Test the problems to make sure they work.

23

Summer Challenge Problem #3

A histogram is a bar graph in which data values are organized into equal intervals. While a bar graph typically displays data in categories, a histogram displays data in the form of numbers. There are two key parts of the histogram: the intervals along the horizontal axis of the graph and the number of students that fall into each interval along the vertical axis.

Each interval on a histogram includes the number on the left-hand side of an interval up to the number on the right-hand side. For example, the first bar in the histogram includes all students that have 0 or 1 pet. Students who have 2 pets are included in the second interval.



24

Summer Challenge Problem #3

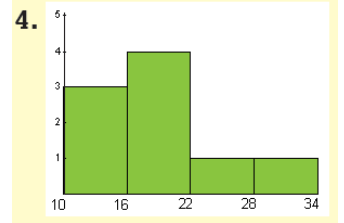
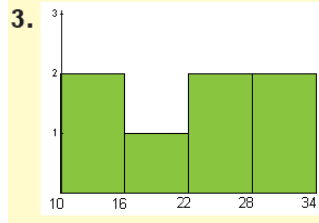
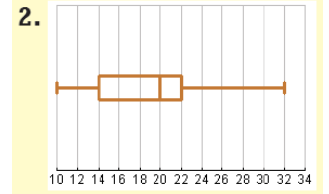
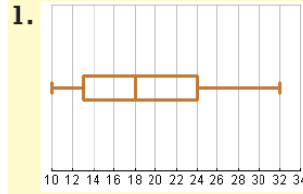
Match the four graphs on the next slide with one of the data sets below. There may be more than one correct match for each and some data sets will not be chosen.

Potential Data Sets

- A. 10, 14, 16, 18, 22, 24, 32
- B. 10, 12, 18, 22, 23, 28, 32
- C. 10, 14, 14, 19, 20, 20, 22, 26, 32
- D. 10, 13, 13, 16, 19, 20, 21, 23, 30
- E. 10, 12, 14, 16, 20, 20, 22, 26, 32
- F. 10, 14, 17, 22, 24, 28, 32
- G. 10, 13, 15, 18, 20, 21, 21, 23, 32
- H. 10, 13, 16, 18, 23, 24, 32

25

Summer Challenge Problem #3

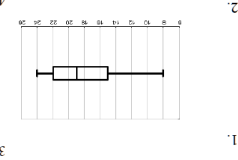
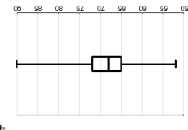
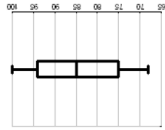


26

Answer Page Days 1-2

DAY 2:
1. Skewed right
2. Normal distribution
3. Even distribution
4. Skewed left
5. 60
6. 30
7. 12 ~ 14 ~ 19 ~ 23 ~ 23
8. The Q3 and the maximum are the same
9. More customers bought cheaper meals at House of Italy.
10. 55

6. 35
7. 75%
8. 48
9. About 16
10. About 38
11. Period 3;
Period 6
12. (Answers may vary) The median score, Q3 and the maximum was higher in period 6. The Q1 and minimum was higher in period 3.



27

Answer Page: Summer Challenge Problems

Summer Challenge #3:
1. H
2. G
3. B & F
4. D

Summer Challenge #2:
1. 7, 8, 10, 15, 16 The other two numbers must sum to 21 and not disturb the order. For example, 9 & 12 would work.
2. 62, 81, 85, 85, 93, 100 The other two numbers must average to 72.5 and be between 63 & 80.

Summer Challenge #1:
1. 75.82%
2. 86%
3. 87.34%
4. 79%
5. 82%
6. (your opinion)

MATH 8 & ALGEBRA: FINAL SLIDE!

28