

**Integrated Math 3
Module 7 Honors
Statistics
Ready, Set, Go! Homework
Solutions**

Adapted from

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Ready, Set, Go!**Ready**

Topic: Standard deviations, percentiles

1. Jordan scores a 53 on his math test. The class average is 57 with a standard deviation of 2 points. How many standard deviations below the mean did Jordan score?

2

2. In Jordan's science class, he scored a 114. The class average was a 126 with a standard deviation of 6 points. How many standard deviations below the mean did Jordan score?

2

3. Rank the data sets below in order of greatest standard deviation to smallest:

$$A = \{1, 2, 3, 4\} \quad B = \{2, 2, 2, 2\} \quad C = \{2, 4, 6, 8\} \quad D = \{4, 5, 6, 8\} \quad E = \{1, 1.5, 2, 2.5\}$$

C, A or D, E, B

4. Robin made it to the swimming finals for her state championship meet. The times in the finals were as follows:

$$\{2:10.3, \quad 2:12.5, \quad 2:12.38, \quad 2:12.7, \quad 2:20.45, \quad 2:21.43\}$$

If Robin's time was a 2:12.7, what percent of her competitors did she beat?

40%

5. In statistics, μ is the symbol for **mean** and σ is the symbol for **standard deviation**. Using technology (i.e. a graphing calculator or the website <http://www.miniwebtool.com/population-standard-deviation-calculator/>), identify the mean and standard deviation for the data set below. Round to the nearest hundredth.

$$\{1.23, 1.3, 1.1, 1.48, 1, 1.14, 5.21, 5.1, 4.63\}$$

$$\mu = \mathbf{2.466}$$

$$\sigma = \mathbf{1.788}$$

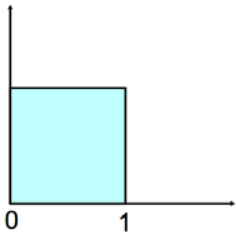
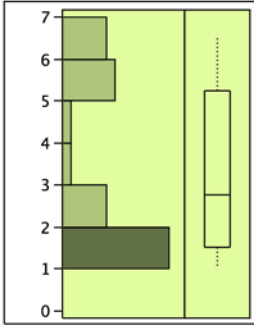
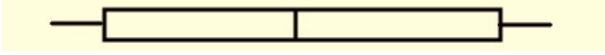
6. For the data in number 5, what value is one standard deviation above the mean? **4.254**

Three standard deviations below the mean? **-2.898**

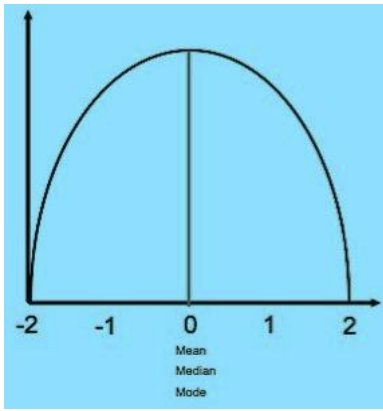
Set

Topic: Properties of normal curves

7. For each distribution, identify the properties that match with a *normal distribution*. Then decide if the distribution is normal or not.

<p>A.</p>  <p>A histogram with a single cyan bar on the x-axis from 0 to 1. The y-axis is unlabeled.</p>	<p>Normal Properties:</p> <p>Answers vary</p> <p>Normal? Yes or No</p>
<p>B.</p>  <p>A histogram with a y-axis from 0 to 7. It features several bars of varying heights and widths. Some bars are shaded green, and one bar at the bottom is dark grey. A vertical dashed line is present on the right side.</p>	<p>Normal Properties:</p> <p>Answers vary</p> <p>Normal? Yes or No</p>
<p>C.</p>  <p>A horizontal box plot with a yellow background. It shows a median line, a box representing the interquartile range, and whiskers extending to the minimum and maximum values.</p>	<p>Normal Properties:</p> <p>Answers vary</p> <p>Normal? Yes or No</p>

D.

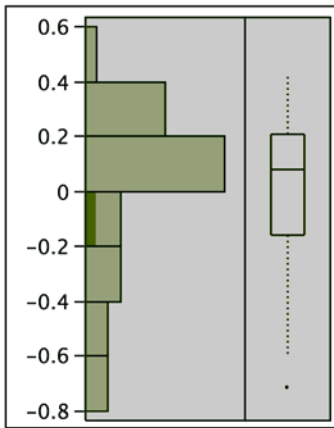


Normal Properties:

Answers vary

Normal? Yes or **No**

E.



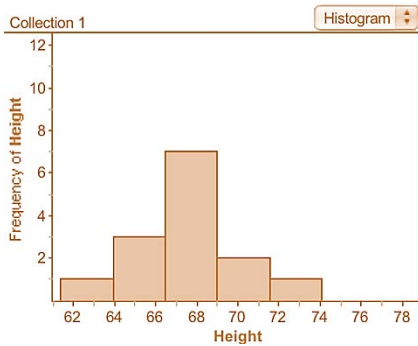
Mean = 0 Median = 0.1 Mode = 0.1

Normal Properties:

Answers vary

Normal? Yes or **No**

F.



Mean = 68 Median = 68 Mode = 68

Normal Properties:

Answers vary

Normal? **Yes** or No

8. If two normal distributions have the same standard deviation, 4.9, but different means (3 and 6), how will the two normal curves look in relation to each other? Draw a sketch of each normal curve below.

Horizontal translations of each other

9. If two normal distributions have the same mean, 3, but different standard deviations (1 and 4), how will they look in relation to each other? Draw a sketch of each normal curve below.

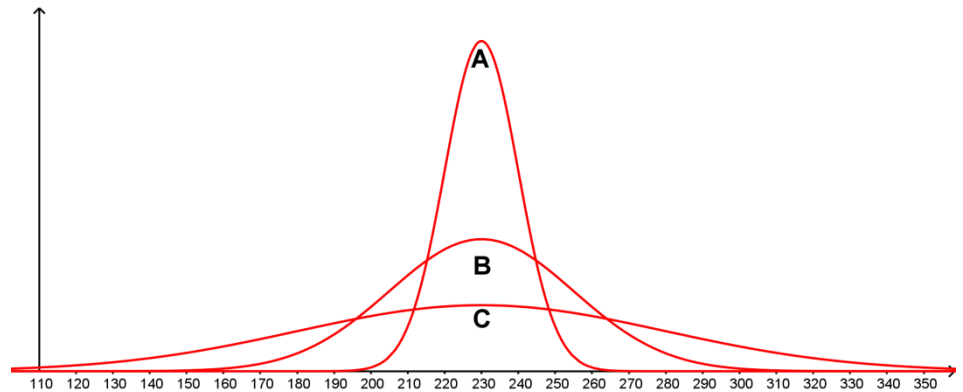
One would be wider than the other

10. Several normal curves are given below. Estimate the standard deviation of each one using the mean and location of the inflection point.

A: _____ **15 (estimated)**

B: _____ **40 (estimated)**

C: _____ **60 (estimated)**



Go

Topic: Inverses

Write the inverse of the given function. Keep the answer in the same format as the problem:

11. $f(x) = 3x^2 + 2$

$$f^{-1}(x) = \sqrt{\frac{x-2}{3}}, x \geq 0$$

or

$$f^{-1}(x) = -\sqrt{\frac{x-2}{3}}, x \leq 0$$

12. $g(x) = \frac{2x-7}{4}$

$$g^{-1}(x) = \frac{4x+7}{2}$$

13. $h(x) = 3 + \sqrt{2x-1}$

$$h^{-1}(x) = \frac{(x-3)^2+1}{2}$$

14.

x	y
12	24
14	38
-7	4
13	6
7	0

x	y^{-1}
24	12
38	14
4	-7
6	13
0	7

Determine if the following functions are inverses by finding $f(g(x))$ and $g(f(x))$

15. $f(x) = 2x + 3$ and $g(x) = \frac{1}{2}x - \frac{3}{2}$

$$\text{Yes; } f(g(x)) = g(f(x)) = x$$

16. $f(x) = 2x^2 - 3$ and $g(x) = \sqrt{\frac{x^2}{2} + 3}$

$$\text{No; } f(g(x)) = x^2, g(f(x)) = \sqrt{\frac{(2x^2-3)^2}{2} + 3}$$

Topic: Solving rational and quadratic equations

Solve each rational equation.

17. $\frac{5}{x} - \frac{6}{x^3-2x^2} = \frac{x^2+5x-6}{x^3-2x^2}$

$$x = \frac{15}{4}$$

18. $\frac{x+2}{x} = \frac{x-1}{x} - \frac{4x+2}{x^2-3x}$

$$x = 1$$

Solve each quadratic equation.

19. $x^2 - 6x = -34$

$$x = 3 \pm 5i$$

20. $9x^2 - 11 = 6x$

$$x = \frac{1 \pm 2\sqrt{3}}{3}$$

Ready, Set, Go!**Ready**

Topic: Law of large numbers

1. You and your friend are rolling one die over and over again. After 6 rolls, your friend has rolled four fives. Are you surprised by these results? Explain

Yes, theoretically you would expect to roll only one 5

2. After rolling the die 50 times, you now notice that you rolled a total of 20 fives. Are you surprised now? Explain.

Yes, theoretically you would expect to roll only eight 5s

3. You survey 100 people in your school and ask them if they feel your school has adequate parking. Only 30% of the sample feels the school has enough parking. If you have 728 students total in your school, how many would you expect out of all the student body that felt there was enough parking?

218 students

Set

Topic: Normal curves

4. The population of NBA players heights is normally distributed with a mean of 6'7" and a standard deviation of 3.9 inches. (<http://www.wikipedia.org>) Greg is considered unusually tall for his high school at 6' 2".
 - a. What percent of NBA players are taller than Greg? **about 85%**
 - b. What percent are shorter? **about 15%**
 - c. How tall would Greg have to be in order to be in the top 2.5% of NBA player heights? **about 7'3"**

5. The average height of boys at Greg's school is 5'6" with a standard deviation of 2" (reminder: Greg is 6'2" tall). If we assume the population is normal...
- What percent of students in Greg's school is he taller than? **almost 100%**
 - What percent of students are between 5' and 5'8"? **83.85%**
6. Jordan is drinking a cup of hot chocolate. From previous research, he knows that it takes a cup of hot chocolate 10 minutes to reach a temperature where his tongue will not burn. The time it takes the chocolate to cool varies normally with a standard deviation of 2 minutes.
- How long should Jordan wait to drink his hot chocolate if he wants to be 84% sure that he won't burn himself? **12 minutes**
 - If Jordan waits 8 minutes, what percent of the time will he not burn his tongue? **16%**

Go

Topic: Logarithms

Use the properties of logarithms to expand the expression as a sum or difference, and/or constant multiple of logarithms. Assume all variables are positive.

7. $\log_2 3x$
 $\log_2 3 + \log_2 x$

8. $\log_x \frac{5}{7}$
 $\log_x 5 - \log_x 7$

9. $\ln \sqrt[3]{x}$
 $\frac{1}{3} \ln x$

10. $\log \frac{x^2 2y^4}{3z^2}$
 $2 \log x + \log 2 + 4 \log y - \log 3 - 2 \log z$

11. $\log_3 \frac{16x^2 - 36}{x^2}$
 $\log_3 4 + \log_3 (2x + 3) + \log_3 (2x - 3) - 2 \log_3 x$

12. $\log \frac{x^2 + 12x + 20}{5}$
 $\log(x + 2) + \log(x + 10) - \log 5$

13. $\log_3 27x^7$
 $3 + 7 \log_3 x$

14. $\log 10^5 \sqrt{y}$
 $5 + \frac{1}{2} \log y$

Topic: Solving trigonometric equations.

Solve each equation over the domain $[0, 2\pi)$.

15. $2 \cot^2 x - 3 \csc x = 0$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

16. $2 \cos x \sin x - \sin x = 0$

$$x = 0, \frac{\pi}{3}, \pi, \frac{5\pi}{3}$$

17. $2 \cos^2 x = 13 \sin x - 5$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

18. $3 \sec^2 x - 4 = 0$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

Name _____

Ready, Set, Go!**Ready**

Topic: Probability



At Cardiff Kook Academy, there are 2500 students attending. Mariana surveys 40 of her friends on where they prefer to eat lunch. She created the following two-way table showing her results:

	9 th Grade	10 th Grade	11 th Grade	12 th Grade	Totals
School Cafeteria	18	6	2	1	28
Off Campus	2	4	3	4	12
Totals	20	10	5	5	40

Mariana plans to use her data to answer the following questions:

- I. Do students, overall, prefer to eat on campus or off campus?
- II. Is there a difference between grade levels for where students prefer to eat lunch?

1. In Mariana's sample, what percent of students prefer to eat in the school cafeteria? What percent prefer to eat off campus?

Cafeteria 70%, Off campus 30%

2. For each grade level in her sample, determine the percent of students that prefer to eat in the school cafeteria and the percent that prefer to eat off campus. Do you notice anything unusual?

9th grade: 90% cafeteria, 10% off campus

10th grade: 60% cafeteria, 40% off campus

11th grade: 40% cafeteria, 60% off campus

12th grade: 20% cafeteria, 80% off campus

The older the student the more likely they will want to eat off campus.

3. Based on her sample, Mariana concludes that, overall, students at Cardiff Kook Academy like to eat lunch in the school cafeteria. Do you agree or disagree? Why?

Answers will vary, so arguments should be checked. The whole student body tends to agree, but when broken down by grades, you get different stories.

Set

Topic: z-scores

A company makes a mean monthly income of \$20,300 with a standard deviation of \$3,200. In one given month, the company makes \$29,500.

4. Find the z-score.

2.88

5. Assuming the company's monthly income follows a normal distribution, what percent of the time does the company make more than this amount? Less than this amount?

Less: 99.86%, More: 0.14%

6. What percent of the time does the company make between \$15,000 and \$25,000?

88.07%

7. If the company needs to make \$16,400 in order to break even, how likely in a given month is the company to make a profit?

88.88%

On the Wechsler Adult Intelligence Scale, an average IQ is 100 with a standard deviation of 15 units. (Source: http://en.wikipedia.org/wiki/Intelligence_quotient)

8. IQ scores between 90 and 109 are considered average. Assuming IQ scores follow a normal distribution, what percent of people are considered average?

47.43%

9. One measure of "genius" is an IQ score of above 135. What percent of people are considered "genius"?

0.99%

10. Einstein had an IQ score of 160. What was his z-score?

4

11. What is the probability of an individual having a higher IQ than Einstein?

Less than 0.02%

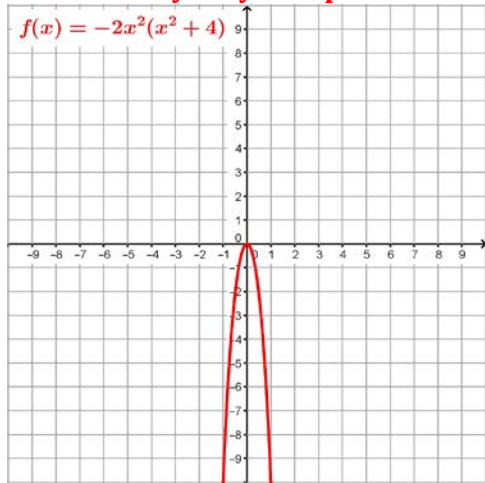
Go

Topic: Sketching polynomials

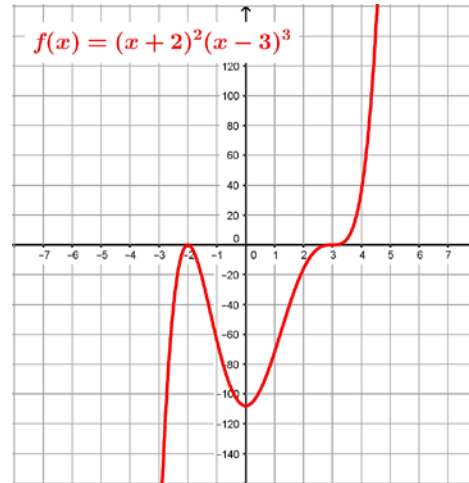
Without using technology, sketch the graph of a polynomial function with the given characteristics. Explain how you know the graph of $f(x)$ looks like this.

12. A quartic function with a leading coefficient of -2 with one double zero and two complex roots.

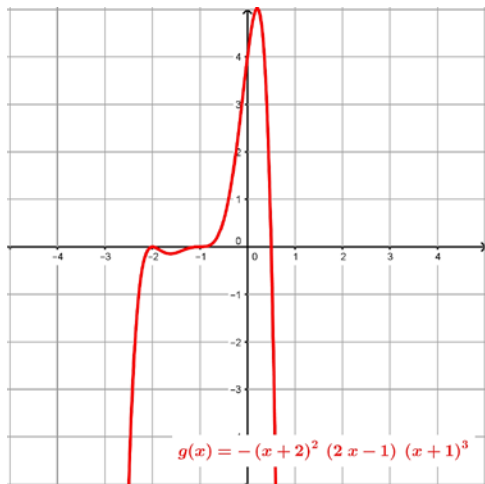
Answers may vary. Sample answer:



13. $f(x) = (x + 2)^2(x - 3)^3$

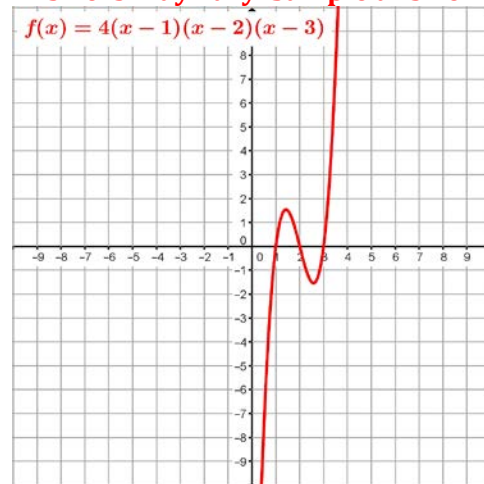


14. $g(x) = -(x + 2)^2(2x - 1)(x + 1)^3$



15. A cubic function with a leading coefficient of 4 and three positive roots.

Answers may vary. Sample answer:



Topic: Simplifying rational expressions

Simplify each expression completely.

$$16. \frac{x^2+12x+32}{2x^2+15x-8}$$

$$\frac{x+4}{2x-1}$$

$$17. \frac{9x^2-1}{6x^2+13x-5}$$

$$\frac{3x+1}{2x+5}$$

$$18. \frac{4x^2-21x-18}{x^2-10x+24}$$

$$\frac{4x+3}{x-4}$$

$$19. \frac{2x^2+x-21}{4x^2-49}$$

$$\frac{x-3}{2x-7}$$

Ready, Set, Go!**Ready**

Topic: Causation

When collecting data, statisticians are often interested in making predictions. Sometimes, statisticians simply want to know if one variable is **correlated** with another variable. Often times, statisticians want to determine if one variable actually **causes** a change in another variable.

Given the examples below, decide whether you think the variables are correlated with each other or if one variable causes the other to change.

1. As the amount of food Ollie the elephant eats increases her weight also increases.

Causes

2. As Popsicle sales go up in the summer, the number of drownings also increases.

Correlated

3. As Erika's feet grow longer, she grows taller.

Correlated

4. As Tabatha gets older, her reading score improves in school.

Causes**Set**

Topic: Population vs sample

For the following scenarios, identify the **population**, **sample** and **parameter** of interest.

5. The local school board wants to get parents to evaluate teachers. They select 100 parents and find that 89% approve of their child's teacher.

Population: **All parents** Sample: **100 parents** Parameter: **Parents' approval of teachers**

6. Jarret wants to know the average height of the students in his school. There are 753 students in his high school; he finds the heights of 52% of them.

Population: **All students** Sample: **391 students** Parameter: **Height of students**

7. A government official is interested in the percent of people at JFK airport that are searched by security. He watches 300 people go through security and observes 42 that are searched.

Population: **All people at JFK** Sample: **300 people** Parameter: **Percent searched**

Topic: Types of samples

For each scenario, identify what type of sampling was used to obtain the sample. Explain whether or not you think the sample will be representative of the population it was sampled from.

8. Elvira surveys the first 60 students in the lunch line to determine if students at the school are satisfied with school lunch.

Type of sample: **Convenience**

Representative? **No**

Explain. **Answers will vary**

9. Elvira selects every 5th student in the lunch line to determine if students at the school are satisfied with school lunch.

Type of sample: **Systematic random sample**

Representative? **Yes**

Explain. **Answers will vary**

10. Elvira randomly selects 7 different tables in the lunchroom and surveys every student at the table to determine if students at the school are satisfied with school lunch.

Type of sample: **Cluster random sample**

Representative? **Yes**

Explain. **Answers will vary**

11. Elvira assigns every student in the school a number and randomly selects 60 students to survey to determine if students at the school are satisfied with school lunch.

Type of sample: **Simple random sample**

Representative? **Yes**

Explain. **Answers will vary**

12. Elvira wants to determine if students are satisfied with school lunch. She leaves surveys on a table for students to answer as they walk by.

Type of sample: **Volunteer**

Representative? **No**

Explain. **Answers will vary**

13. Elvira wants to determine if students are satisfied with school lunch. She wants to include input from each grade level at the high school. She randomly surveys 25 freshman, 25 sophomores, 25 juniors, and 25 seniors.

Type of sample: **Stratified random sample**

Representative? **Yes**

Explain. **Answers will vary**

Go

Topic: Graphs of trigonometric functions

For each function identify the amplitude, period, horizontal shift, and vertical shift.

14. $f(t) = 120 \cos\left(\frac{\pi}{4}(t - 3)\right) + 30$

Amplitude: **120**

Period: **8**

Horizontal Shift: **right 3**

Vertical Shift: **up 30**

15. $f(t) = 3.5 \sin\left(\frac{\pi}{6}t + \frac{1}{3}\right) + 7$

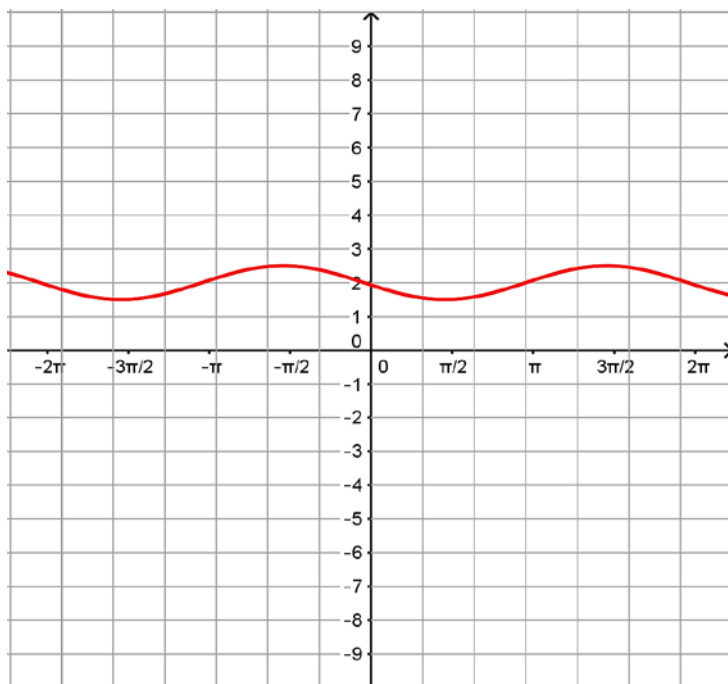
Amplitude: **3.5**

Period: **12**

Horizontal Shift: **left $\frac{2}{\pi}$**

Vertical Shift: **up 7**

16. Graph $f(x) = \frac{1}{2} \sin(x - 3) + 2$



Topic: Simplifying complex fractions

Simplify each expression.

$$17. \frac{\frac{\frac{25}{1} + x + 1}{12} - \frac{4}{1}}{\frac{1}{18} - \frac{x+1}{36}}$$

$$\frac{84+9x}{1-x}$$

$$18. \frac{\frac{\frac{16}{m-3} - 4}{16} - \frac{m-4}{m-4}}{\frac{m^2}{m^2} - \frac{m-3}{m-3}}$$

$$\frac{12m^3 - 52m^2}{192 - 112m - m^4 + 8m^3}$$

$$19. \frac{\frac{1}{2} - \frac{x+5}{4}}{\frac{x^2}{2} - \frac{5}{2}}$$

$$\frac{-3-x}{2x^2-10}$$

$$20. \frac{\frac{\frac{4}{3x} + \frac{2}{x^2}}{x} - \frac{4}{4}}{x+1 - \frac{4}{x+1}}$$

$$\frac{4x^2+10x+6}{3x^3-12x^2}$$

Name _____

Ready, Set, Go!**Ready**

Topic: Two-way tables

The data below is the data from Mrs. Hender's class. Students needed to score a 60% or better to pass the test.

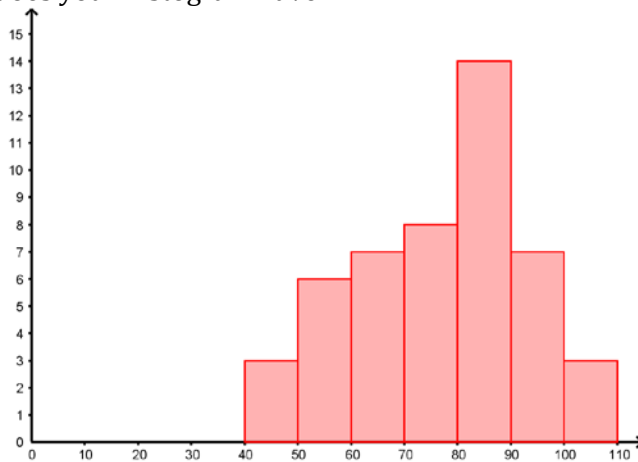
1 st Period:	2 nd Period:	3 rd Period:
72, 83, 56, 63, 89, 92, 92, 67, 88, 84, 67, 97, 96, 100, 84, 82	80, 83, 81, 81, 67, 90, 70, 71, 72, 77, 81, 85, 86, 77, 74, 51	51, 45, 67, 83, 99, 100, 94, 52, 48, 46, 100, 59, 65, 56, 72, 63

1. Make a two-way frequency table showing how many students passed the test and how many failed each class.

	1 st Period	2 nd Period	3 rd Period	Total
Passed	15	15	9	39
Failed	1	1	7	9
Total	16	16	16	48

2. What percent of students passed Mrs. Hender's test in each class? What is the total percent that passed?
1st period: 93.75%, 2nd period: 93.75%, 3rd period: 56.25%, Total: 81.25%

3. Use the data from all three classes to create a histogram. What properties of the normal curve does your histogram have?



The histogram shows the data to be somewhat normally distributed.

4. If Mrs. Hender's were going to predict her total pass rate using only 2nd period, would she have a good prediction? Explain why or why not.

She would not have a good prediction because the low test values in her 3rd period bring the average down.

Set

Topic: Sampling methods

Determine which type of sampling method is represented in each scenario.

- A. Simple random sample
 - B. Systematic random sample
 - C. Stratified random sample
 - D. Cluster random sample
 - E. Convenience sample
 - F. Volunteer sample
5. A researcher is studying the education levels of the population of Spain. The researcher randomly selects 20 cities in Spain and surveys every person in those cities.
D. Cluster random sample
6. Cardiff Kook Academy wants to examine the college and career goals of the students. Each student is assigned a random number. A random digit between 0 and 9 is selected to represent the first student to be surveyed and then every 20th student after that is surveyed.
B. Systematic random sample
7. Astroducks Coffee House wants to know how much caffeine college students drink in a day. Astroducks sends a surveyor out to the college that is closest to their headquarters in Carlsbad.
E. Convenience sample
8. A group of 25 employees are chosen out of a hat from a company of 250 employees.
A. Simple random sample
9. A company wants to know how much time the population spends answering email in a given day. They post a link on their website asking for people to take an online survey.
F. Volunteer sample
10. A company is investigating differences in income for various ethnicities. The company chooses to randomly survey 500 people in each of the designated ethnicities.
C. Stratified random sample

Go

Topic: Logarithms

Solve each equation below for x by applying properties for exponents and logarithms.

11. $2^{x-5} = 128$

$x = 12$

12. $243^x = 27$

$x = \frac{3}{5}$

13. $3^{x+2} = 27^{x-3}$

$x = \frac{11}{2}$

14. $\log(2x + 4) - \log(3x) = 0$

$x = 4$

15. $\log_2(2x^2 + 4x - 2) - \log_2 10 = 0$

$x = -1 + \sqrt{7}$

$x = -1 - \sqrt{7}$ is extraneous

16. $\frac{\ln(x+7)}{\ln(2x-3)} = 1$

$x = 10$

17. $\frac{\log 4x+2}{\log 15} = 1$

$x = \frac{13}{4}$

18. $\frac{\log_3(3x+6)}{\log_3 81} = 1$

$x = 25$

Topic: Graphing and identifying features of functions

For each function, graph the function and identify the domain, range, intervals of increase and/or decrease, and end behavior.

19. $f(x) = \log_2(x + 4) - 3$

Domain: $(-4, \infty)$

Range: $(-\infty, \infty)$

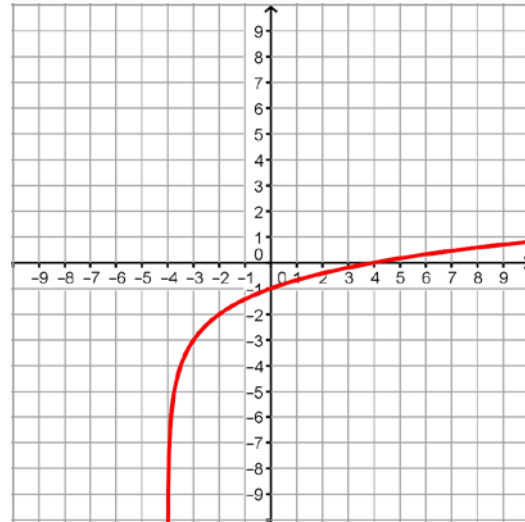
Increasing: $(-4, \infty)$

Decreasing: **NA**

End Behavior:

as $x \rightarrow -4$, $f(x) \rightarrow -\infty$

as $x \rightarrow \infty$, $f(x) \rightarrow \infty$



20. $f(x) = -\frac{1}{2}(x - 3)^2 + 8$

Domain: $(-\infty, \infty)$

Range: $(-\infty, 8]$

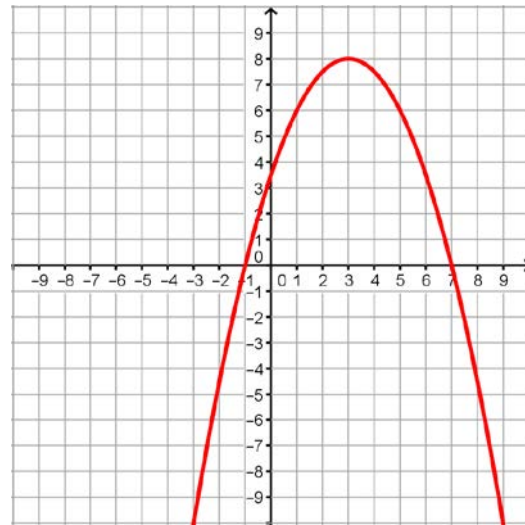
Increasing: $(-\infty, 3)$

Decreasing: $(3, \infty)$

End Behavior:

as $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$

as $x \rightarrow \infty$, $f(x) \rightarrow -\infty$



21. $f(x) = -0.5(x + 3)(x + 1)(x - 2)$

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

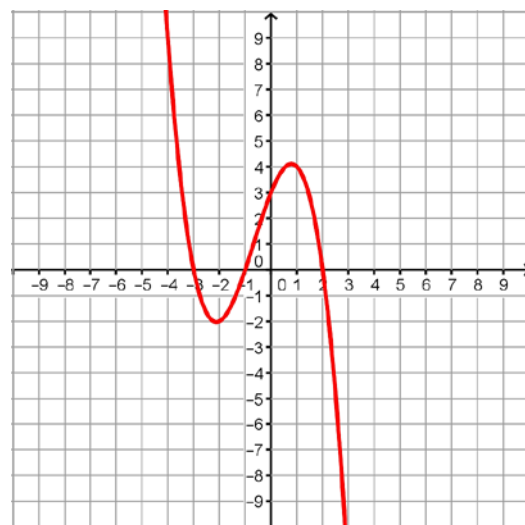
Increasing: **Approximately $(-2, 0.8)$**

Decreasing: **Approximately $(-\infty, -2) \cup (0.8, \infty)$**

End Behavior:

as $x \rightarrow -\infty$, $f(x) \rightarrow \infty$

as $x \rightarrow \infty$, $f(x) \rightarrow -\infty$



$$22. f(x) = -2\sqrt{x+6} + 4$$

Domain: $[-6, \infty)$

Range: $(-\infty, 4]$

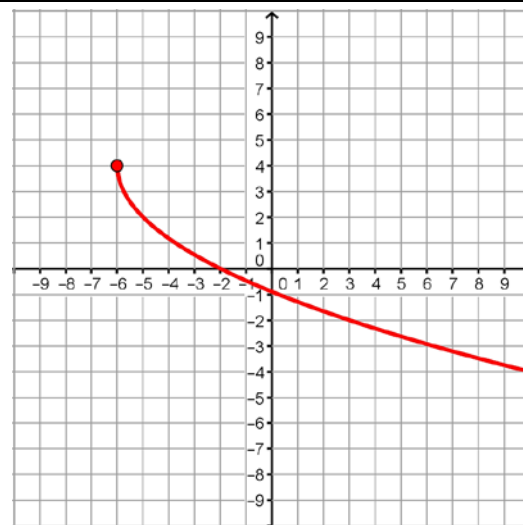
Increasing: **NA**

Decreasing: $(-6, \infty)$

End Behavior:

as $x \rightarrow -6$, $f(x) \rightarrow 4$

as $x \rightarrow \infty$, $f(x) \rightarrow -\infty$





Name _____

Ready, Set, Go!

Ready

Topic: End Behavior

Describe the end behavior of each function.

1. $f(x) = \frac{x-1}{x+4}$

as $x \rightarrow -\infty, f(x) \rightarrow \mathbf{1}$

as $x \rightarrow \infty, f(x) \rightarrow \mathbf{1}$

2. $f(x) = \log_2(x - 3)$

as $x \rightarrow 3, f(x) \rightarrow -\infty$

as $x \rightarrow \infty, f(x) \rightarrow \infty$

3. $f(x) = \frac{2x-3}{x+2}$

as $x \rightarrow -\infty, f(x) \rightarrow \mathbf{2}$

as $x \rightarrow \infty, f(x) \rightarrow \mathbf{2}$

Set

Topic: Methods of investigating parameters of interest

For the following scenarios, identify each situation as a survey, observational study, or an experiment.

- To determine if a new pain medication is effective, researchers randomly assign people into two groups: Group 1 receives pain medication and group 2 receives a placebo. Both groups are asked to rate their pain and the results are compared.
Experiment
- Officials want to determine if raising the speed limit from 75 mph to 80 mph will have an impact on safety. To determine this, they watch a stretch of the highway when the speed limit is 75 and see how many accidents there are. Then they observe the number of accidents over a period of time on the same stretch of highway for a speed limit of 80 mph. They then compare the difference.
Observational study
- To determine if a new sandwich on the menu is liked more than the original, the manager of the restaurant takes a random sample of customers that have tried both sandwiches and asks them which sandwich they prefer.
Survey
- A newspaper wants to know what their customer satisfaction is. They randomly select 500 customers and ask them.
Survey

Mrs. Goodmore wants to know if doing homework actually helps students do better on their unit exams.

8. Describe how Mrs. Goodmore could carry out a survey to determine if homework actually helps. Explain the role of randomization in your design.

Answers may vary

9. Describe how Mrs. Goodmore could carry out an observational study to determine if homework helps test scores.

Answers may vary

10. Describe how Mrs. Goodmore could carry out an experiment to determine if homework helps test scores. Explain how you will use randomization in your design and how you will use a control.

Answers may vary

11. If Mrs. Goodmore wants to determine if homework causes test scores to rise, which method would be best? Why?

Answers may vary

Topic: Simulations

In 1963, NBC started to host a game called *Let's Make a Deal!* Contestants were given three doors to choose from. Behind one door was a prize. After selecting one door, the contestant was shown what was behind one of the doors they did not select. The contestant is then asked if they would like to stick with the door they first selected, or switch to the remaining one.

12. Which strategy do you think would result in the best chance of selecting the winning door? Should the contestant switch doors or stick with the first one they chose?

Answers may vary

Go to the following website: <http://www.shodor.org/interactivate/activities/SimpleMontyHall/>
 Select a door. One other door will be opened. Then select the same as the original door or switch doors and see if you win. Click "Let's do it again" to play another round.

13. Play the game 20 times using the "Stayed" method and 20 times using the "Switch" method. Record your wins and losses in the table below:

	Stick	Switch	Total
Win			
Lose			
Total			

14. Based on the simulation, what is $P(\text{winning}|\text{stay}) =$

Answers will vary

15. Based on the simulation, what is $P(\text{winning}|\text{switch}) =$

Answers will vary

16. Repeat the process above to simulate 100 games for each strategy. What is the probability of winning using each method?

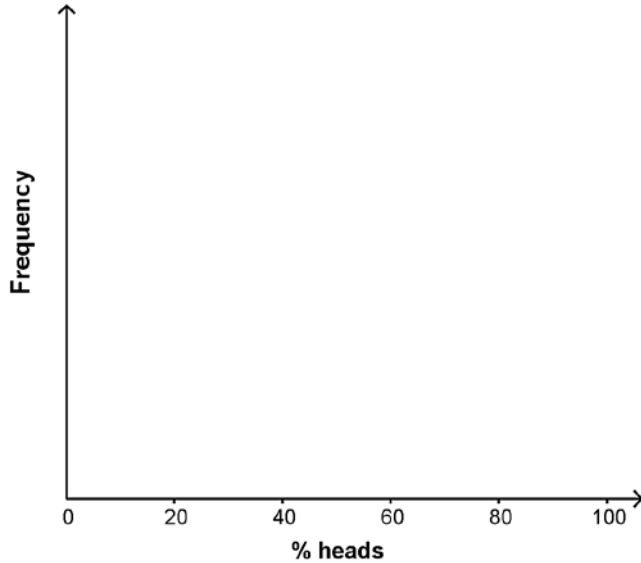
Answers will vary

Topic: Features of histograms

17. Take a coin and flip it 5 times. Record the number of times the coin landed with heads up. Repeat this process 20 times either by hand or by simulation using technology, <http://www.rossmanchance.com/applets/OneProp/OneProp.htm> each time recording your results in the table below.

# Heads	% Heads	Frequency
0	0%	
1	20%	
2	40%	
3	60%	
4	80%	
5	100%	

18. Create a frequency bar graph of your results below. Describe the shape, center, and spread.



19. Flip a coin 20 times. Record the number of times heads lands up. Repeat this process 20 times either by hand or by simulation using technology.

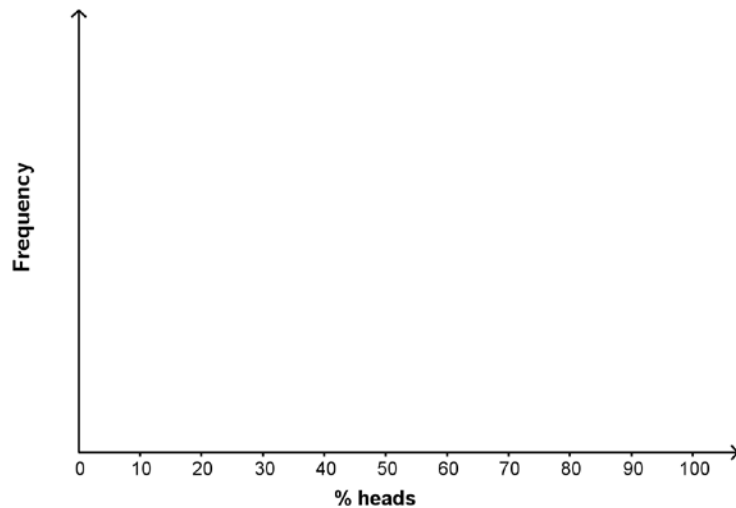
<http://www.rossmanchance.com/applets/OneProp/OneProp.htm>

Record your results in the table below.

# Heads	% Heads	Frequency	# Heads	% Heads	Frequency
0	0%		11	55%	
1	5%		12	60%	
2	10%		13	65%	
3	15%		14	70%	
4	20%		15	75%	
5	25%		16	80%	
6	30%		17	85%	
7	35%		18	90%	
8	40%		19	95%	
9	45%		20	100%	
10	50%				

Answers will vary

20. Create a frequency bar graph of your results below. Describe the shape, center, and spread.



Answers will vary

21. Compare the shape, center, and spread of the graphs in questions 2 & 4. What do you notice?

Answers will vary

22. If you repeated this process with 500 flips, instead of 5 or 20, predict what would happen to the shape, spread, and center of the new histogram.

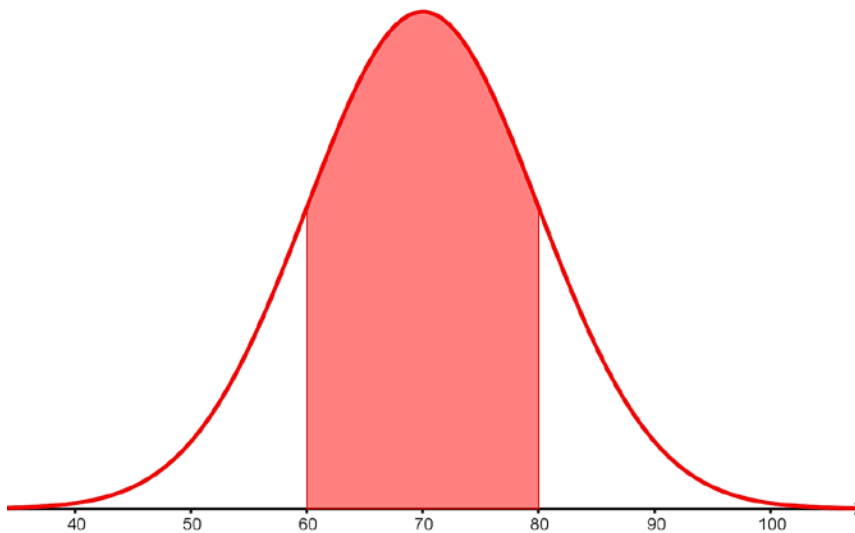
It will become more normally distributed

Go

Topic: Normal curves

The average resting heart rate of a young adult is approximately 70 beats per minute with a standard deviation of 10 beats per minute. Assuming resting heart rate follows a normal distribution, answer the following questions.

23. Draw and label the normal curve that describes this distribution. Be sure to label the mean, and the measurements 1, 2, and 3 standard deviations away from the mean.



24. What percent of people have a heart rate between 55 and 80 beats per minute? Label these points on your normal curve in question 21 and shade in the area that represents the percent of people with heartbeats between 55 and 80 beats per minute.

77.45%

25. If a resting heart rate above 80 beats per minute is considered unhealthy, what percent of people have an unhealthy heart rate?

15.9%

Topic: z-scores

26. A normal distribution of scores has a standard deviation of 10. Find the z-scores corresponding to each of the following values:
- A score that is 20 points above the mean.
 $z = 2$
 - A score that is 10 points below the mean.
 $z = -1$
 - A score that is 15 points above the mean
 $z = 1.5$
 - A score that is 30 points below the mean.
 $z = -3$
27. The Welcher Adult Intelligence Test Scale is composed of a number of subtests. On one subtest, the raw scores have a mean of 35 and a standard deviation of 6. Assuming these raw scores form a normal distribution:
- What number represents the 65th percentile (what number separates the lower 65% of the distribution)?
37.31
 - What number represents the 90th percentile?
42.71
 - What is the probability of getting a raw score between 28 and 38?
57.05%
 - What is the probability of getting a raw score between 41 and 44?
9.19%
28. Scores on the SAT form a normal distribution with a mean of 500 and standard deviation of 100.
- What is the minimum score necessary to be in the top 15% of the SAT distribution?
604
 - Find the z-scores that define the middle 80% of the distribution of SAT scores (372 and 628).
Find the z-scores: $-1.28, 1.28$

29. For a normal distribution, find the z-score that separates the distribution as follows:

- a. Separate the highest 30% from the rest of the distribution.
0.525
- b. Separate the lowest 40% from the rest of the distribution.
0.255
- c. Separate the highest 75% from the rest of the distribution.
-0.675

Topic: Sampling methods

Which sampling method was utilized? Why?

30. Student organization looking to get signatures for a petition camp out in front of Class of 1950 Lecture Hall.
Convenience Sample / Voluntary Response Sample, because the selection process is seeking those individuals easiest to reach in front of Class of 1950 Lecture Hall.
31. Select three students from a class to receive ice cream by putting all the students' names in a hat and picking out three names randomly.
Simple Random Sample (SRS), because every individual has an equal chance of being sampled.
32. Select three female students and three male students to receive ice cream by putting all the men's names in one hat and all the women's names in a different hat and picking out three names from each hat.
Stratified Random Sample, because the population is first broken up into 2 subpopulations, one female and the other male students, then a SRS is done within each subpopulation.
33. In Fall 1995, the BBC in Britain requested viewers to call the network and indicate their favorite poem.
Convenience Sample / Voluntary Response Sample, viewers who do not want to call will not be able to participate.
34. Divide the class into four groups (freshman, sophomore, junior and senior) and take a random sample of two students from each group.
Stratified Random Sample, because the population is first broken up into 4 subpopulations, then a SRS is done within each subpopulation.
35. Priceline.com randomly e-mails a Customer Satisfaction Survey for certain transactions done on its site in which customers choose to either respond or not.
Convenience Sample / Voluntary Response Sample, customers who choose not to respond will not be able to participate.