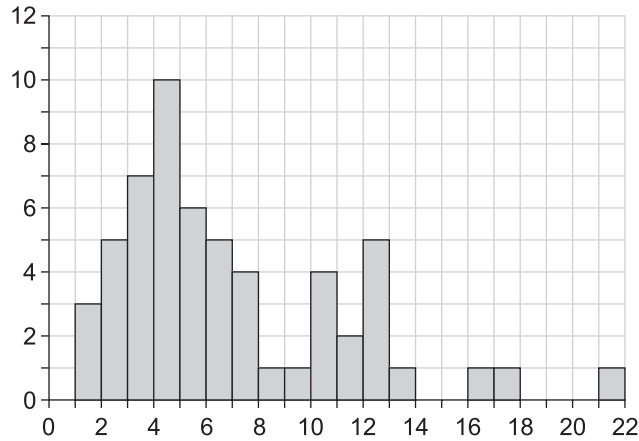


**Integrated Math 1**  
**First Semester Exam Review**

Name \_\_\_\_\_  
 Period \_\_\_\_\_ Date: **December 2017**

1. The histogram below indicates the number of runs the winning team scored during the championship game of the Little League World Series for each year from 1947–2003.



- a. Suppose that a student estimated the mean to be 9 runs. Do you think the student is correct? Support your answer using what you know about the mean of a histogram.  
 \_\_\_Yes \_\_\_x\_No Explain:  
 Nine is too high for the mean. An estimate of 6 or 7 is a better balance point for this distribution.
- b. Another student estimated the median to be 5 runs. Does this estimate seem reasonable? Explain why or why not.  
 \_x\_Yes \_\_\_No Explain:  
 Five is a reasonable estimate of the median. About half of the numbers of runs scored by winning teams are below 5 and about half are above 5.
- c. Write a short paragraph that describes the distribution of scores. (Please do not just write a list.)

The distribution is skewed to the right with about half of the number of runs scored being less than 5. There are two gaps in the data: one gap between 13 and 15 runs and one between and 21 runs. The median is about 5 Half of the winning teams scored fewer than 5 runs and half scored more. The data is quite spread out. With the number of runs ranging from 1 run to 21 runs giving a range of 20.

2. Draw a possible box plot for a set of data that is skewed to the right. In a sentence, explain how you know the data would be skewed right.



The median is to the right of center in the box and there is a longer whisker on the right.

3. John and Laura each baby-sit in order to earn spending money. The amount of money (in dollars) that each has made over the past 10 weeks is given below:

John: 25, 12, 28, 22, 30, 16, 18, 20, 27, 25

Laura: 25, 18, 30, 0, 28, 55, 30, 35, 18, 27

- a. **Without actually calculating** the standard deviations for these data sets, identify which set will have the greater standard deviation. Explain your reasoning.

\_\_\_John \_\_\_x\_Laura Explain:

The amounts given for Laura will have a greater standard deviation since they have a greater spread than the amounts for John.

b. The summary statistics for Laura’s data are as follows:

- Mean = \$26.6
- Median = \$27.5
- IQR = \$12
- Standard deviation = \$14

In addition to the money that Laura earns babysitting, she gets \$15 a week allowance. Find the summary statistics for the amount of spending money that Laura would have had each week if you consider **both** her babysitting money and her allowance.

Mean:   \$41.60  

Median:   \$42.50  

IQR:   \$12  

Standard deviation:   \$14  

4. Thomas is concerned about how much it costs to visit the doctor. He surveyed five doctor’s offices in his community and found that they charge \$45, \$50, \$50, \$65, and \$65 for a routine appointment with the doctor.

a. Find the mean cost of an appointment with these five doctors.

  55  

b. Find the standard deviation for this set of data. Use the table as necessary to show your work. You may use your calculator for the basic operations but are **not** to use **1-Var Stats** or any other function that finds the standard deviation for you. I can’t stress enough the importance of showing your work.

Charges for a routine appointment	subtract the mean	Square difference	
\$45	-10	100	$100 + 25 + 25 + 100 + 100 = 350$
\$50	-5	25	$350 / (5 - 1) = 350 / 4 = 87.5$
\$50	-5	25	$\sqrt{87.5} = 9.35$
\$65	10	100	
\$65	10	100	

**s = 9.35**

5. Describe a situation in which it would be more useful to know the *median* of a set of data than the *mean*.

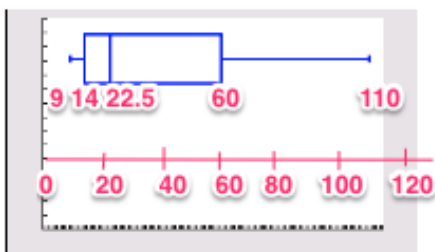
When Mr. Lemmen was moving back to Holland from California and thinking about buying a house. It would have been better for him to know the median price of the homes in Holland than the mean because the median is resistant to outliers.

6. The table below gives the number of calories in one serving of a variety of vegetables.

Vegetable	Calories	Vegetable	Calories	Vegetable	Calories
Asparagus	14	Carrots	28	Lettuce	9
Artichokes (marinated)	110	Cauliflower	10	Onion	60
Bell Pepper	20	Celery	17	Potato	89
Broccoli	25	Corn	66	Spinach	9
Brussel Sprouts	60	Green Beans	30	Tomato	35
Cabbage	17	Jalapeno Peppers	13	Zucchini	17

a. Create a box plot of this data using the number line below. (Please include labels, scale and write the *numbers* of the 5 number summary on the plot) (Note:  $\Sigma x = 629$ )

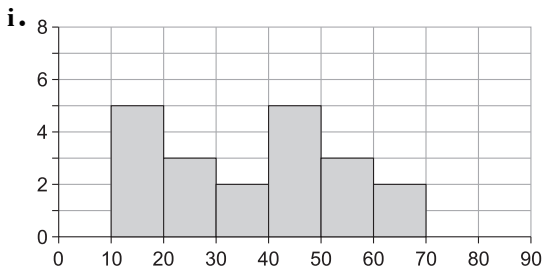
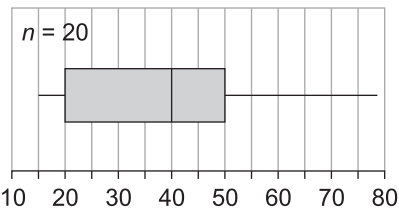
The number of calories in one serving of different vegetables.



b. Are the marinated artichokes with 110 calories an outlier? Explain

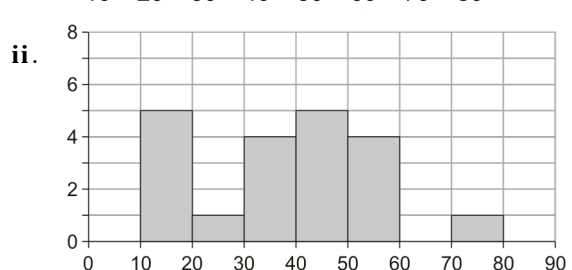
   Yes X No Explain: It is not greater than  $1.5 \times \text{IQR} + \text{UQ}$  (Upper quartile)

7. Consider this box plot to the right. Determine whether each of the following histograms could display the same distribution as the box plot to the right. Provide reasoning for your answers.



   Yes    No Explain:

X Yes    No Explain:



   Yes    No Explain:

X Yes    No Explain:

Both histograms have 20 pieces of data. Both have 5 (25%) data points between 10 and 20. It is possible that they are all equal to or more than 15 but less than 20 as shown in the box plot. Both box plots also have 5 data points equal to and more than 20 but less than 40 and 5 more data points equal to or larger than 40 but less than 50 as shown on the histogram. Why i doesn't work is the maximum in the histogram is less than 70 but the box plot shows it at 78. ii does work as the maximum in the histogram is between 70 and 80 and 78 fits in that range.

8. The top 20 cable video networks in 1993 and the number of subscribers in millions are listed in the table below.

Network	Subscribers	Network	Subscribers	Network	Subscribers
ESPN	61.6	TNT	58.4	HNN	51.4
CNN	61.0	Family	57.4	CNBC	48.3
USA	60.0	TNN	57.4	VH-1	47.4
TBS	60.0	MTV	57.4	QVC	44.6
Discovery	59.0	Lifetime	57.0	AMC	44.5
Nickelodeon	59.0	A & E	56.0	WGN	38.1
C-Span	58.7	Weather	53.4		

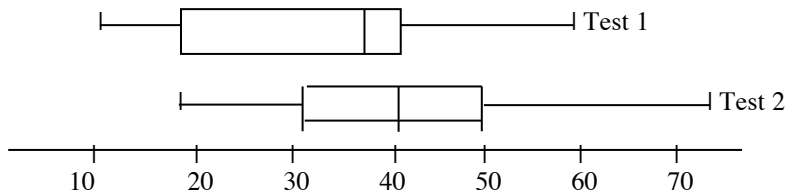
Source: *The 1994 World Almanac*

Use technology, either CPMPTools or your calculator to find the following. (Note:  $\Sigma x = 1090.6$ )

- a) Find the mean = 54.53
- b) Find the median = 57.4
- c) Find the mode = 57.4
- d) Find the IQR = 59 - 49.85 = 9.15
- e) Find the standard deviation = 6.43

9. Use the box plots to answer the next 3 questions.

**n = 20**



25% a) **What percentage** of students that took Test 1 scored higher than the median of the students that took Test 2?

25% of 20 = 5 students b) **How many** students scored between 40 and 50 on Test 2?

c) While writing this test one of the four teachers made this remark: “Test 2 must have been a retest of Test 1.” Is it possible that he/she was right? Explain your answer.

Yes  No

Explanation: Every number in the 5 number summary of test 2 is higher than test 1. The median of test 2 equals the upper quartile of test 1. All of the students of test 2 did better than 25 percent of the students who took test 1.

10. *Long life batteries* have a mean life of 12 hours with a S.D. of 1 hour. *Power Plus batteries* have mean life of 15 hours with a S.D. of 10 hours. They cost the same. If you are going caving and needed to have the assurance you will have 6 hours of battery life which would you choose and why?

I would choose **Long life** because: 68% of their batteries last between 11 and 13 hours and all of them would last longer than 6 hours. More than 16% of Power Plus batteries last less 6 hours.

11. Suppose your parents started a savings account for you with \$100.00. This account earns 2.5% interest each year.

a. Write the NEXT-NOW equation that describes this savings account.

NEXT = Now x 1.025 1<sup>st</sup> NOW = 100

- b. What will be the value of your account after one year? After 2 years? After 5 years? After 18 years when you are ready to go to college? Fill in the table with this information.

YEARS	DOLLARS
1	102.50
2	105.06
5	113.14
18	155.97

12. This table gives the average height in feet of boys in the US at the given ages.

Age (years)	2	4	6	8	10	12	14
Average height (inches)	34	40	46	50	54	58	63

- a. Assume this data is linear. Use your calculator to find the linear regression equation.

$$y = 2.34x + 30.57$$

- b. What is the slope of the line you found in part a?

slope = 2.34

- c. What does the slope mean in the context of the age, height data?

The slope of 2.34 tells us that for every year the boys increase in age they have an average height increase of 2.34 inches.

13. If a tennis ball is lobbed into the air with upward velocity of 14 meters per second, its velocity (V) and height (H) will be functions of time in flight described by the following rules.

$$V = 14 - 9.8T$$

$$H = 1 + 14T - 4.9T^2$$

**H= 11 m T= 1.429 seconds** a. Use your calculator to find the maximum height of that tennis ball and the time it takes to reach the height.

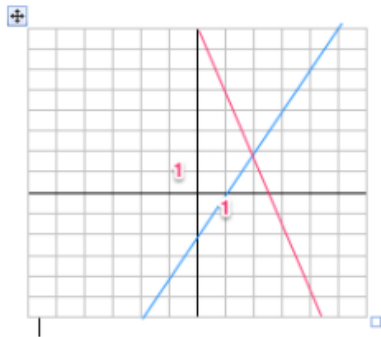
\_\_\_\_\_ **0** \_\_\_\_\_ b. What is the velocity of the ball at its maximum height?

\_\_\_\_\_ **2.9 Seconds** \_\_\_\_\_ c. Find when the ball will hit the ground. Round your answer to the nearest **tenth** of a second.

\_\_\_\_\_ **-14.42** \_\_\_\_\_ d. What is the velocity of the ball when it hits the ground?

\_\_\_\_\_ 14. Solve the system of equations  $\begin{cases} y = 2x - 2 \\ y = -3x + 8 \end{cases}$  using the following methods.

a. graphically



Solution is (2, 2)

symbolically

$$\begin{array}{r} 2x - 2 = -3x + 8 \\ +3x \quad +3x \\ \hline 5x - 2 = 8 \\ +2 \quad +2 \\ \hline 5x = 10 \\ \div 5 \quad \div 5 \\ \hline x = 2 \quad y = 2 \end{array}$$

Sub  $x = 2$  into one of the equations  $y = 2(2) - 2 = 4 - 2 = 2$   
 (2, 2) is the solution.

15. Solve the following by using symbol manipulation. Show work!

a.  $3x + 5 = -16$

$$\begin{array}{r} -5 \quad -5 \\ 3x = -21 \\ \div 3 \quad \div 3 \\ x = -7 \end{array}$$

b.  $3(x - 4) = 2x + 8$

$$\begin{array}{r} 3x - 12 = 2x + 8 \\ -2x \quad -2x \\ x - 12 = 8 \\ +12 \quad +12 \\ x = 20 \end{array}$$

c.  $4x - 7 < -19$

$$\begin{array}{r} +7 \quad +7 \\ 4x < -12 \\ \div 4 \quad \div 4 \\ x < -3 \end{array}$$

d.  $5x - 3 > 7x + 11$

$$\begin{array}{r} -5x \quad -5x \\ -3 > 2x + 11 \\ -11 \quad -11 \\ -14 > 2x \\ \div 2 \quad \div 2 \\ -7 > x \quad \text{OR } x < -7 \end{array}$$

16. Find the equation of a line given the following information: Show work!

\_\_\_\_\_ a. the line contains the points (1, 3) and (-1, 7)

$$\text{slope} = \text{rise/run} = (7 - 3) \div (-1 - 1) = 4 \div -2 = -2$$

$y = -2x + b$  Sub in a point. I picked (1, 3)

$$3 = -2(1) + b$$

$$3 = -2 + b$$

$$+2 \quad +2$$

$$5 = b$$

$y = -2x + 5$  is the equation.

\_\_\_\_\_ b. The line contains the point (4, -8) and has slope 0.5.

$$y = 0.5x + b \text{ sub in the point (4, -8)}$$

$$-8 = 0.5(4) + b$$

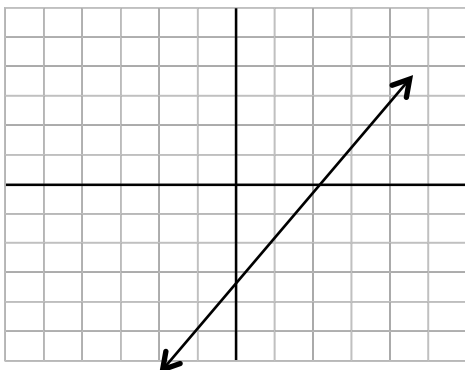
$$-8 = 2 + b$$

$$-2 \quad -2$$

$$-10 = b$$

$y = 0.5x - 10$  is the equation.

17. Use the graph of a linear equation to answer the following.



\_\_\_\_\_  $3/2$  or  $1.5$  \_\_\_\_\_ a. What is the slope of the line?

\_\_\_\_\_  $-3$  \_\_\_\_\_ b. What is the y-intercept?

\_\_\_\_\_  $y = 1.5x - 3$  \_\_\_\_\_ c. Write the equation of the line.

18. A phone call to two plumbing repair shops gave the following quotations for repair work:

Genzink Plumbing: \$30.00 for a service call, plus \$30.00 per hour for repair time.

Reimink Plumbing: \$50.00 for a service call, plus \$25.00 per hour for repair time.

a. For each shop, write an equation that shows the relation between total repair cost in dollars and the number of hours to complete the repair.

Genzink:  $y = 30 + 30x$

Reimink:  $y = 50 + 25x$

b. Compare the total cost for each shop for a repair that took 5 hours.

Genzink: \$180.00

Reimink: \$175.00

c. For what number of hours would the final bill be the same? What would be the amount of this bill?

Hours = 4

Amount = \$150

d. For what number of hours does Genzink Plumbing give a better deal?

Hours =  $X < 4$

Write the correct answer on the blank for the following multiple-choice questions.

B 19. Which of the following equations is the same as  $y = 54 - 8(x + 3)$  ?

- A.  $y = 51 - 8x$
- B.  $y = 30 - 8x$
- C.  $y = 78 - 8x$
- D.  $y = 57 - 8x$
- E.  $y = 30 - x$

B 20. Which of the following is a solution of this equation  $x^2 + x - 6 = 6 + 2x$  ?

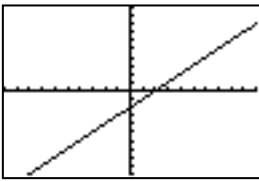
- A.  $x = -5$
- B.  $x = -3$
- C.  $x = 0$
- D.  $x = 3$
- E.  $x = 5$



- \_\_\_\_\_ **C** 21. Which of the following is a solution of this equation:  $45 = 34 + 4x$  ?
- A.  $x = 19.25$
  - B.  $x = 44$
  - C.  $x = 2.75$
  - D.  $x = -19.25$
  - E.  $x = -2.75$

- \_\_\_\_\_ **B** 22. Which of the following is a solution of this inequality:  $5x - 2 < 3x + 8$  ?
- A.  $x > 5$
  - B.  $x < 5$
  - C.  $x < 1.25$
  - D.  $x > 1.25$
  - E.  $x < 3$

- \_\_\_\_\_ **C** 23. Which of the following tables goes with this graph?



**A.**

X	Y <sub>1</sub>	
2	0	
4	6	
6	16	
8	30	
10	48	
12	70	
14	96	

X=14

**B.**

X	Y <sub>1</sub>	
1	8	
2	16	
3	24	
4	32	
5	40	
6	48	
7	56	
8	64	

X=13

**C.**

X	Y <sub>1</sub>	
2	0	
4	2	
6	4	
8	6	
10	8	
12	10	
14	12	

X=2

- \_\_\_\_\_ **C** 24. Which of the following NEXT-NOW equations goes with this table?

X	Y <sub>1</sub>	
10	16	
11	13	
12	10	
13	7	
14	4	
15	1	
16	-2	

X=6

**A.**

1<sup>st</sup> NOW = 16  
NEXT = NOW + 3

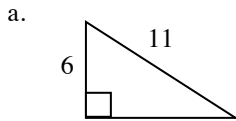
**B.**

1<sup>st</sup> NOW = 16  
NEXT = NOW\*3

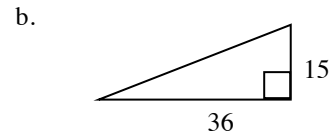
**C.**

1<sup>st</sup> NOW = 16  
NEXT = NOW - 3

25. Find the missing sides in these right triangles.



$\sqrt{85} = 9.22$



39

26. Match the equations with the appropriate calculator screen. Write the letter of the matching equation next to the screen.

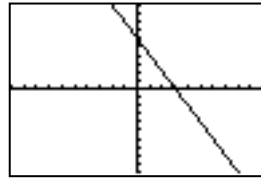
\_\_\_\_\_ **D** \_\_\_\_\_ I.

\_\_\_\_\_ **C** \_\_\_\_\_ II.

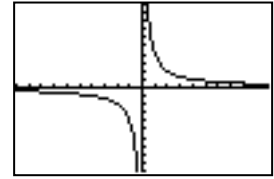
\_\_\_\_\_ **E** \_\_\_\_\_ III.

\_\_\_\_\_ **F** \_\_\_\_\_ IV.

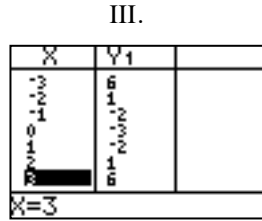
- |                       |
|-----------------------|
| a. $y = 2x - 6$       |
| b. $y = x^2 + 8$      |
| c. $y = \frac{4}{x}$  |
| d. $y = 6 - 2x$       |
| e. $y = x^2 - 3$      |
| f. $y = 6 + x$        |
| g. $y = -\frac{4}{x}$ |



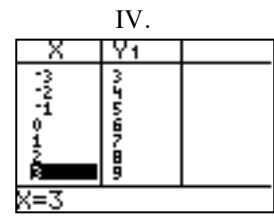
I.



II.



III.



IV.

27. Suppose 20 bacteria cells get into a cut on your leg. These cells double every 20 minutes.

a. Make a chart showing the number of bacteria in your cut at 20 minute intervals for 3 hours.

Time (min)	0	20	40	60	80	100	120	140	160	180
# of bacteria	20	40	80	160	320	640	1280	2560	5120	10240

b. Write a NOW-NEXT and equation.

**Next = Now x 2, starting at 20**

28. A Jeep decreases in value by 15% each year. Assume someone bought a new Jeep in 2002 for a price of \$25,000.

a. Write NOW-NEXT and  $y =$  equations for the value of the Jeep that remains after each year.

**Next = Now x 0.85, starting at 25000** Note if it decreases 15% there is 85% left.

b. Make a chart showing the value of the Jeep for each of the next 10 years.

Number of years	Value of Jeep
0	25000
1	21250
2	18063
put $y = 25000(0.85^x)$ in calculator	

c. To the nearest tenth of a year, when will the value of the Jeep first be below \$5,000?

**10.0**

**The year will be 2012**

29. a. Complete the following table so that the first row represents linear growth and the second row represents exponential growth.

X	0	1	2	3	4	5	6
Linear	4	12	20	28	36	44	52
Exponential	4	12	36	108	324	972	2916

30. The 2000 US Census reported a national population of about 281 million with a birth rate of 1.4%, a death rate of 0.9%, and net migration of about 1.1 million people per year. The net migration of 1.1 million people is a result of about 1.3 million immigrants entering and about 0.2 million emigrants leaving each year.

- a. Use the given data to estimate the US population for years 2001, 2005, 2010, 2015, 2020.

Year	2001	2005	2010	2015	2020
Population (in millions)	283.5	293.65	306.62	319.92	333.55

- b. Use the words NOW and NEXT to write a rule that shows how to use the US population in one year to estimate the population in the next year.

$$\text{Next} = \text{Now} * 1.005 + 1.1$$

- c. Write calculator commands that automate calculation required by your rule in part b to get the US population estimates.

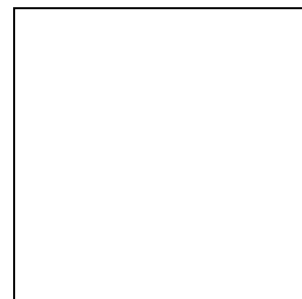
$$y = 281 * (1.005)^x + 1.1x \quad \text{Note: 281 is in millions}$$

31. The figure is a square.

- a. Use a ruler to make measurements needed to estimate the perimeter and area of the square. You should use inches for your measurements. Show your work.

*Perimeter:*

*Area:*



- b. For any square, what is the minimum number of measurements needed to determine the perimeter and area of the square? What are the required measurements?

- c. What formula shows how to calculate perimeter  $P$  of a square from the measurements described in Part b?

$$P =$$

- d. The formula for the area of a square is  $A = s^2$  where  $s$  is the length of one side. Circle the graph below that could be a graph of the relationship between the length of a side of a square and the area of the square. Explain how you can determine this without using your calculator.

*Explanation:*



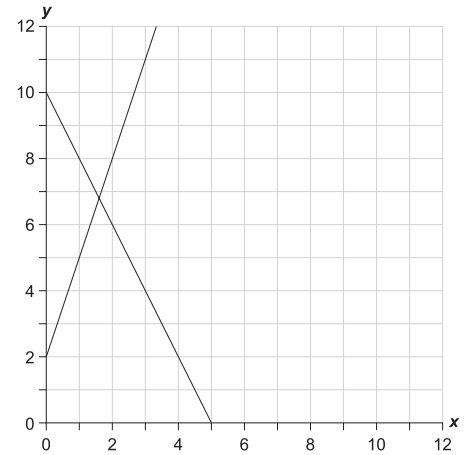
32. Graphs of  $y = 3x + 2$  and  $y = 10 - 2x$  are provided to the right.

- a. What does it mean to solve this system of equations?

**It means to find the point where the two lines intersect**

- b. Use a calculator-produced graph, a table of values, or algebraic reasoning to solve the system of linear equations. Show your work or explain your reasoning.

**(1.6, 6.8)**



*Work or reasoning:*

- b. Solve the inequality  $3x + 2 > 10 - 2x$ . How is your solution shown in the above graph?

$$x > 1.6$$

The graph of  $y = 3x + 2$  is above the graph of  $y = 10 - 2x$  for all  $x$  values greater than  $x = 1.6$ . Thus,  $3x + 2 > 10 - 2x$  whenever  $x > 1.6$ .