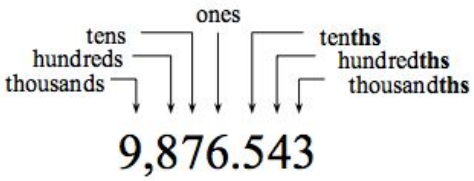
2020 Summer Review for Students Entering Concepts of Math 7 or Mathematics 7

1. Using Place Value to Round and Compare Decimals
2. Addition and Subtraction of Decimals
3. Multiple Representations of Portions
4. Addition and Subtraction of Fractions
5. Locating Points on a Number Line and Coordinate Graph
6. Multiplication and Division of Fractions
7. Multiplication and Division of Decimals
8. Area and Perimeter of Irregular Rectangles, Quadrilaterals and Triangles
9. Rewriting and Evaluating Variable Expressions
10. Data Displays: Histograms
11. Solving One-Step Equations
12. Measures of Central Tendency (mean, median, mode) & Variance (range)
13. Distributive Property
14. Order of Operations
15. Generic Rectangle for Multiplication
16. Finding Greatest Common Factor (GCF)
17. Adding Integers

2020 Summer Review for Students Entering Concepts of Math 7 or Mathematics 7

Using Place Value to Round and Compare Decimals



Example 1: Round 17.23579 to the nearest hundredth.
Solution: We start by identifying the digit in the hundredths place—the 3. The digit to the right of it is 5 or more so hundredths place is increased by one. 17.24
Example 2: Round 8.039 to the nearest tenth.
Solution: Identify the digit in the tenths place– the 0. The digit to the right of it is less than 5 so the tenths place remains the same. 8.0 (the zero must be included)

Addition and Subtraction of Decimals

To add or subtract decimals, write the problem in column form with the decimal points in a vertical column so that digits with the same place value are kept together. Include zeros so that all decimal parts of the number have the same number of digits. Add or subtract as with whole numbers. Place the decimal point in the answer aligned with those in the problem.

Example 1: Add: 37.68 + 5.2 + 125

Solution:

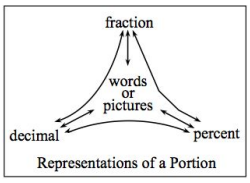
$$\begin{array}{r} 37.68 \\ 5.20 \\ +125.00 \\ \hline 167.88 \end{array}$$

Example 2: Subtract: 17 − 8.297

Solution:

$$\begin{array}{r} 17.000 \\ -8.297 \\ \hline 8.703 \end{array}$$

Multiple Representations of Portions



Portions of a whole may be represented in various ways as represented by this web. Percent means "per hundred" and the place value of a decimal will determine its name. Change a fraction in an equivalent fraction with 100 parts to name it as a percent.

Example 1: Write the given portion as a fraction and as a percent. 0.3

Solution: The digit 3 is in the tenths place so, $0.3 = \textit{three-tenths} = \frac{3}{10}$. On a diagram or a hundreds grid, 3 parts out of 10 is equivalent to 30 parts out of 100 so $\frac{3}{10} = \frac{30}{100} = 30\%$.

Example 2: Write the given portion as a fraction and as a decimal. 35% Solution: $35\% = \frac{35}{100} = 0.35$

2020 Summer Review for Students Entering Concepts of Math 7 or Mathematics 7

Addition and Subtraction of Fractions

To add or subtract two fractions that are written with the same denominator, simply add or subtract the numerators and then simplify if possible. For example: $\frac{5}{9}+\frac{1}{9}=\frac{6}{9}=\frac{2}{3}$.

If the fractions have different denominators, a common denominator must be found. One way to find the lowest common denominator (or least common multiple) is to use a table as shown below.

The multiples of 3 and 5 are shown in the table at right. 15 is the least common multiple and a lowest common denominator for fractions with denominators of 3 and 5.

3	6	9	12	15	18
5	10	15	20	25	30

After a common denominator is found, rewrite the fractions with the same denominator (using the Giant One, for example).

Example 1: $\frac{1}{5}+\frac{2}{3}$ Solution: $\frac{1}{5}+\frac{2}{3}\Rightarrow\frac{1}{5}\cdot\boxed{\frac{3}{3}}+\frac{2}{3}\cdot\boxed{\frac{5}{5}}\Rightarrow\frac{3}{15}+\frac{10}{15}=\frac{13}{15}$

Example 2: $\frac{5}{6}-\frac{1}{4}$ Solution: $\frac{5}{6}-\frac{1}{4}\Rightarrow\frac{5}{6}\cdot\boxed{\frac{2}{2}}-\frac{1}{4}\cdot\boxed{\frac{3}{3}}\Rightarrow\frac{10}{12}-\frac{3}{12}=\frac{7}{12}$

To add or subtract two mixed numbers, you can either add or subtract their parts, or you can change the mixed numbers into fractions greater than one.

Example 3: Compute the sum: $8\frac{3}{4}+4\frac{2}{5}$

Solution: This addition example shows adding the whole number parts and the fraction parts separately. The answer is adjusted because the fraction part is greater than one.

$$\begin{aligned} 8\tfrac{3}{4} &= 8+\tfrac{3}{4}\cdot\boxed{\tfrac{5}{5}} = 8\tfrac{15}{20} \\ +4\tfrac{2}{5} &= 4+\tfrac{2}{5}\cdot\boxed{\tfrac{4}{4}} = +4\tfrac{8}{20} \\ & \qquad 12\tfrac{23}{20}=13\tfrac{3}{20} \end{aligned}$$

Example 4: Compute the difference: $2\frac{1}{6}-1\frac{4}{5}$

$$\begin{aligned} 2\tfrac{1}{6}-1\tfrac{4}{5} &\Rightarrow \tfrac{13}{6}-\tfrac{9}{5} \\ &\Rightarrow \tfrac{13}{6}\cdot\boxed{\tfrac{5}{5}}-\tfrac{9}{5}\cdot\boxed{\tfrac{6}{6}} \\ &\Rightarrow \tfrac{65}{30}-\tfrac{54}{30}=\tfrac{11}{30} \end{aligned}$$

Solution: This subtraction example shows changing the mixed numbers to fractions greater than one and then computing in the usual way.

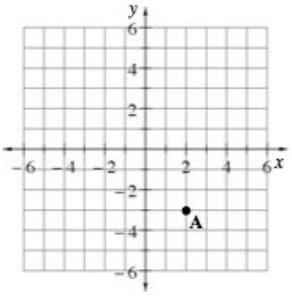
2020 Summer Review for Students Entering Concepts of Math 7 or Mathematics 7

Locating Points on a Number Line and on a Coordinate Graph

Points on a number line represent the locations of numbers. Numbers to the right of 0 are positive; to the left of 0, they are negative. For vertical lines, normally the top is positive.

Point a at right approximates the location of $2\frac{1}{3}$.

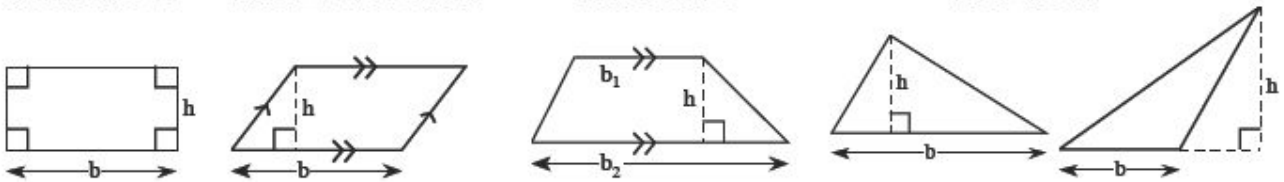
Two perpendicular intersecting number lines (or axes) such as the ones below create a coordinate system for locating points on a graph. Points are located using a pair of numbers , or coordinates, where x represents the horizontal direction and y represent the vertical direction. In this case "A" represents the point (2, −3).



Area and Perimeter of Irregular Rectangles Quadrilaterals and Triangles

Area is the number of square units in a flat region. The formulas to calculate the areas of several kinds of quadrilaterals or triangles are:

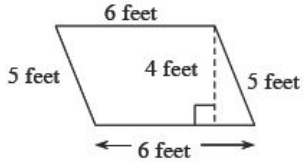
RECTANGLE PARALLELOGRAM TRAPEZOID TRIANGLE



$A = bh$ $A = bh$ $A = \frac{1}{2}(b_1 + b_2)h$ $A = \frac{1}{2}bh$

Perimeter is the number of units needed to surround a region. To calculate the perimeter of a quadrilateral or triangle, add the lengths of the sides.

Example 1:
Compute the area and perimeter.

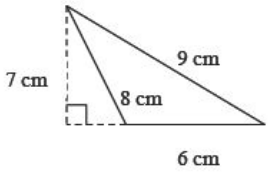


parallelogram

$A = bh = 6 \cdot 4 = 24 \text{ feet}^2$

$P = 6 + 6 + 5 + 5 = 22 \text{ feet}$

Example 2:
Compute the area and perimeter.



triangle

$A = \frac{1}{2}bh = \frac{1}{2} \cdot 6 \cdot 7 = 21 \text{ cm}^2$

$P = 6 + 8 + 9 = 23 \text{ cm}$

2020 Summer Review for Students Entering Concepts of Math 7 or Mathematics 7

Multiplication of Fractions

To multiply fractions, multiply the numerators and then multiply the denominators. To multiply mixed numbers, change each mixed number to a fraction greater than one before multiplying. In both cases, simplify by looking for factors than make "one."

Example 1: Multiply $\frac{3}{8} \cdot \frac{4}{5}$

Solution:

$$\frac{3}{8} \cdot \frac{4}{5} \Rightarrow \frac{3 \cdot 4}{8 \cdot 5} \Rightarrow \frac{3 \cdot \cancel{4}}{2 \cdot \cancel{4} \cdot 5} \Rightarrow \frac{3}{10}$$

Example 2: Multiply $3\frac{1}{3} \cdot 2\frac{1}{2}$

Solution:

$$3\frac{1}{3} \cdot 2\frac{1}{2} \Rightarrow \frac{10}{3} \cdot \frac{5}{2} \Rightarrow \frac{10 \cdot 5}{3 \cdot 2} \Rightarrow \frac{5 \cdot \cancel{2} \cdot 5}{3 \cdot \cancel{2}} \Rightarrow \frac{25}{3} \text{ or } 8\frac{1}{3}$$

Note that we are simplifying using Giant Ones but no longer drawing the Giant One.

Multiplication of Decimals

There are at least two ways to multiply decimals. One way is to use the method that you have used to multiply integers; the only difference is that you need to keep track of where the decimal point is (place value) as you record each line of your work. The other way is to use a generic rectangle.

Example 1: Multiply 12.5 · 0.36

Solution: 4.500

12.5	(one decimal place)
x0.36	(two decimal places)
750	
3750	
4.500	(three decimal places)

Division of Decimals

To divide decimals, change the divisor to a whole number by multiplying by a power of 10. Multiply the dividend by the same power of 10 and place the decimal directly above in the answer. Divide as you would with whole numbers. Sometimes extra zeros may be necessary for the number being divided.

Example 1: Find 53.6 ÷ 0.004.

Solution: Multiply both numbers by 1000 (move the decimal 3 places) to change the divisor into a whole number. Place the new decimal location from the dividend directly above in the answer and then divide.

$$0.004\overline{)53.6} \Rightarrow 4\overline{)53600.} \Rightarrow 4\overline{)\overset{13400.}{53600.}}$$

2020 Summer Review for Students Entering Concepts of Math 7 or Mathematics 7

Solving One-Step Equations

To solve an equation (find the value of the variable which makes the equation true) we want the variable by itself. To undo something that has been done to the variable, do the opposite arithmetical operation.

Example 1: Solve: $x - 17 = 49$

Solution: 17 is subtracted from the variable. To undo subtraction of 17, add 17.
$x = 49 + 17 \Rightarrow x = 66$

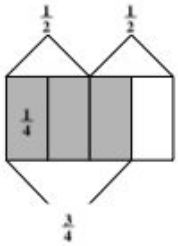
Division of Fractions

Division of fractions can be shown using an area model or a Giant One. Division using the invert and multiply method is based on a Giant One.

Example 1: Use an area model to find $\frac{3}{4} \div \frac{1}{2}$.

Solution: $\frac{3}{4} \div \frac{1}{2}$ means, in $\frac{3}{4}$, how many $\frac{1}{2}$s are there?

Start with $\frac{3}{4}$



In $\frac{3}{4}$ there is one full $\frac{1}{2}$ shaded and half of another one (that is half of one-half).

So $\frac{3}{4} \div \frac{1}{2} = 1\frac{1}{2}$ (one and one-half halves)

Example 2: Use a Giant One to find . $1\frac{1}{3} \div 1\frac{1}{2}$

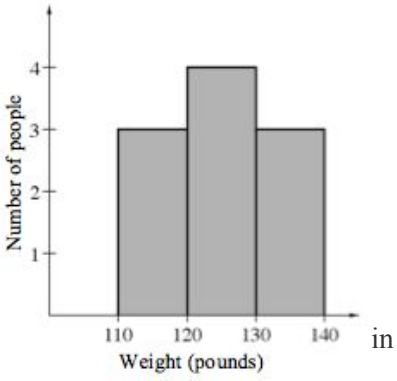
Solution: Write the division problem as a fraction and then use a Giant One to change the denominator into "one."

$$1\tfrac{1}{3} \div 1\tfrac{1}{2} \Rightarrow \frac{1\frac{1}{3}}{1\frac{1}{2}} \Rightarrow \frac{\frac{4}{3}}{\frac{3}{2}} \cdot \boxed{\frac{\frac{2}{3}}{\frac{2}{3}}} \Rightarrow \frac{\frac{8}{9}}{1} \Rightarrow \frac{8}{9}$$

Note that this method leads to the invert and multiply method: $\frac{4}{3} \div \frac{3}{2} \Rightarrow \frac{4}{3} \cdot \frac{2}{3} \Rightarrow \frac{8}{9}$.

Histograms

A histogram is a method of showing data. It uses a bar to show the frequency (the number of times something occurs). The frequency measures something that changes numerically. (In a bar graph the frequency measures something that changes by category.) The intervals (called bins) for the data are shown on the horizontal axis and the frequency is represented by the height of a rectangle above the interval. The labels on the horizontal axis represent the lower end of each interval or bin.



Example: Sam and her friends weighed themselves and here is their weight in pounds: 110, 120, 131, 112, 125, 135, 118, 127, 135, and 125. Make a histogram to display the information. Use intervals of 10 pounds.

Solution: See histogram at right. Note that the person weighing 120 pounds is counted the next higher bin. Solution: See histogram at right. Note that the person weighing 120 pounds is counted in the next higher bin.

2020 Summer Review for Students Entering Concepts of Math 7 or Mathematics 7

Least Common Multiple

The **least common multiple** (LCM) of two or more positive or negative whole numbers is the lowest positive whole number that is divisible by both (or all) of the numbers.

For example, the multiples of 4 and 6 are shown in the table at right. 12 is the least common multiple, because it is the lowest positive whole number divisible by both 4 and 6.

4	8	12	16	20	24	28	32
6	12	18	24	30	36	42	48

Measures of Central Tendency

Numbers that locate or approximate the "center" of a set of data are called the **measures of central tendency**. The mean and the median are measures of central tendency.

The **mean** is the arithmetic average of the data set. One way to compute the mean is to add the data elements and then to divide the sum by the number of items of data. The mean is generally the best measure of central tendency to use when the set of data does not contain **outliers** (numbers that are much larger or smaller than most of the others). This means that the data is symmetric and not skewed.

The **median** is the middle number in a set of data arranged numerically. If there is an even number of values, the median is the average (mean) of the two middle numbers. The median is more accurate than the mean as a measure of central tendency when there are outliers in the data set or when the data is either not symmetric or skewed.

The **mode** is the value that is represented most often. If no numbers repeat = no mode; you can have more than 1 number represent the mode.

Measure of Variance: range is the difference between the largest value and the smallest.

When dealing with measures of central tendency, it is often useful to consider the distribution of the data. For symmetric distributions with no outliers, the mean can represent the middle, or "typical" value, of the data well. However, in the presence of outliers or non-symmetrical distributions, the median may be a better measure.

Examples: Suppose the following data set represents the number of home runs hit by the best seven players on a Major League Baseball team:

16, 26, 21, 9, 13, 15, and 9.

The mean is $\frac{16+26+21+9+13+15+9}{7} = \frac{109}{7} \approx 15.57$.

The median is 15, since, when arranged in order (9, 9, 13, 15, 16, 21, 26), the middle number is 15

The mode is 9.

The range is 26-9 = 17; 17 is the range.

2020 Summer Review for Students Entering Concepts of Math 7 or Mathematics 7

1. Add or subtract as indicated. NO calculators! Don't forget to line up your decimal points.

   a. $1039.9 + 93.07$

   b. $398.32 - 129$

2. Multiply or divide as indicated. NO calculators! Show your work. **Review the Math Notes above first!**

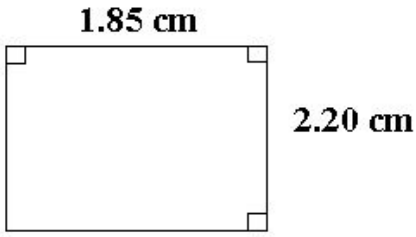
   a. $8\overline{)325}$

   b. $827 \cdot 14$

   c. $12.5 \cdot 3.4$

   d. $12.62 \div 0.4$

3. Find the area of the rectangle at right. $A = l \bullet w$



4. Round each number to the given place. Watch Screencastify

   a. 23.679 (hundredths)

   b. 55.55 (ones)

   c. 2,840.12 (tenths)

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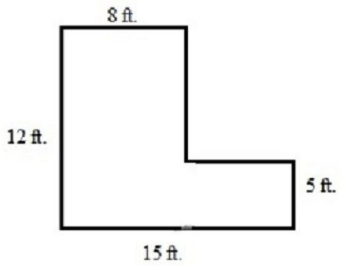
5. Cathy is putting new carpet in her room. Help her find the area so she knows how much to buy. Show your work. Remember to include the units.



6. Fill in the blank with either $<$, $>$, or $=$.

   a. 91.01 _____ 91.10

   b. 0.123 _____ 0.0123

7. If you have 8 pieces of licorice to share among 5 people, how much licorice will each person get? Show your thinking.

8. What is the **first step** in adding the fractions listed? $\frac{2}{5} + \frac{3}{10}$

   a. Add the Numerators, then the Denominators
   b. Find the Least Common Denominator or the Least Common Multiple

9. Calculate. Show your work. Check your answer with your calculator.

   a. $\frac{1}{10} + \frac{3}{5}$

   b. $\frac{5}{8} - \frac{3}{16}$

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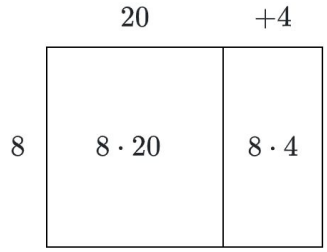
10. Evaluate the expression for $x = -5$ and $y = -2$.

x + y + 14

11. The **Distributive Property** states that the multiplier of a sum or difference can be "distributed" to multiply each term. Which of these is NOT an expression you could use to solve this problem?

a. 8(20 + 4)
b. (8 x 20) x (8 x 4)
c. 8(24)
d. (8 x 20) + (8 x 4)



12. Mr. Jones feeds his big cat $\frac{1}{3}$ of a can of cat food and he feeds his small cat half that amount.

Watch Screencastify

a. How much of a can does he feed his small cat?

b. How much of a can does he feed both cats?

13. Simplify each statement fully: Use Order of Operations. Watch screencastify

a. $18 - 6 \cdot 2$

b. $\frac{32-(3+9)}{4+6}$

c. $\frac{15-10}{2.5} \cdot 3 - \frac{65}{5}$

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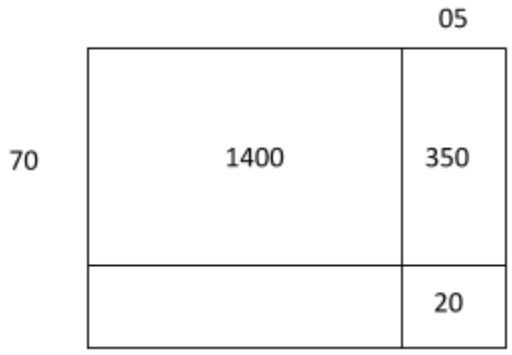
14. Complete the generic rectangle below by filling in any missing dimensions or area. Write a mathematical sentence showing the multiplication problem and the product.



15. What is the greatest common factor of 9 and 12?

16. Add or subtract as indicated. NO calculators! Khan Academy Video

a. 1039.9 + 93.07

c. 67.234 – 23.05

b. 0.827 + 432.1

d. 398.32 – 129

17. Represent the portion in three different ways.

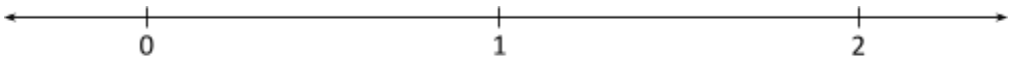
Of 25 students interviewed, 21 said they believe in the Loch Ness monster.

Fraction: _____

Decimal: _____

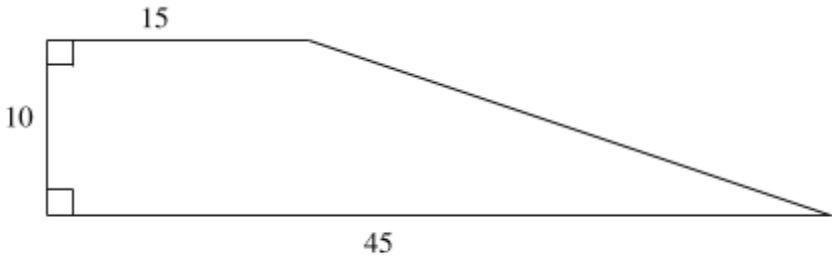
Percent: _____

18. Label the following numbers at their approximate place on the number line. To help you, turn all fractions into decimals to help you compare them.



a. $\frac{1}{5}$ b. –0.1 c. $\frac{9}{8}$ d. 210% e. 1.9

19. Calculate the area of the shape below. Do you see rectangles or other shapes within this shape? If so, what? Does that help you? Use your formulas listed above on page 4.



Area =

20. Solve. Use your calculator to check your work. Remember to use the Opposite Operation.

a. $x + 14 = -4$ b. $y - 14 = -4$ c. $\frac{n}{6} = 42$

2020 Summer Review for Students Entering Concepts of Math 7 or Mathematics 7

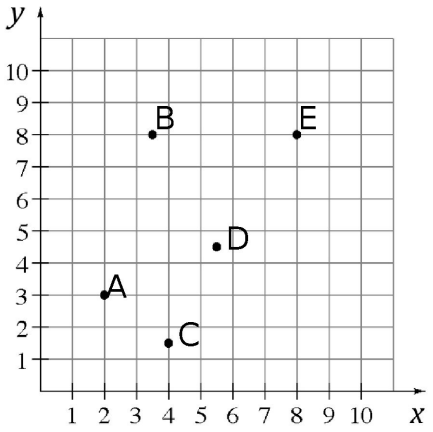
21. Multiply. Do not use a calculator. Don't forget to turn all mixed numbers into improper fractions.

a. $\frac{1}{3} \cdot \frac{1}{9}$ b. $(1\frac{1}{4}) \cdot \frac{4}{5}$ c. $\frac{1}{2} \div \frac{3}{5}$

22. The perimeter of the rectangle is 18 inches. How long is m?

23. Denise has 12 yards of fabric. How many ties can be made from the fabric if each tie uses $\frac{3}{4}$ yard of fabric?

24. Consider the graph shown here.



a. What is the coordinate point for A? (,)

b. What is your estimate for the coordinate points for D? (,)

c. Which two points have the same y value? (,) and (,)

25. Logan bought 5 books that all cost the same amount. His bill was $78.25. How much did each book cost?

26. The following wingspan measurements of butterflies (in mm) have been recorded:

42, 38, 20, 45, and 38.

Find the mean, median, mode and range of the data. Look at the Screencastify to review how to find these measures of Central Tendency. Definitions on page 8 above.

mean:

median:

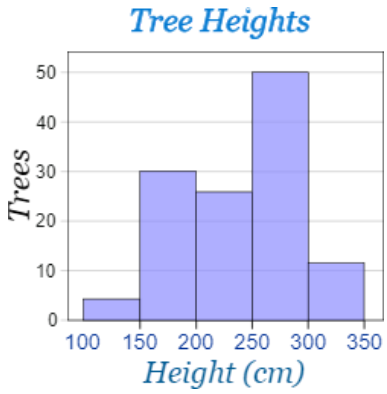
mode:

range:

27. Add the Integers below. Watch the Screencastify to review Addition of Integers.

a. 18 + (-6) = b. (-12) + 5 = c. (-9) + (-8) =

28. Look at the Histogram to answer the questions below about the Height of Orange Trees.



a. How many trees were 150 - 200 cm tall?
b. What was the height of the trees when there were 50 trees?
c. Can you tell how many trees were exactly 225 cm tall? Yes or No? _____
d. Why or why not? _____