Incoming Grade 7 Summer Math Packet: Memorial Middle School 2021 - 2022

Dear Incoming Grade 7 Math Students,

Summer work is assigned to ensure an easier transition between 6th and 7th grade, and to keep your math skills sharp over the summer. The expectation is that all students bring the completed assignment on the first day of school. You will be given one reminder, then points will be deducted for each day the packet is late.

The idea is to do the packet throughout the summer, not complete it all in June or during the last few days of August.

If you need help completing the problems, you have a couple of options:

- Review the examples at the top of each page of the packet.
- Ask a friend/parent/guardian/sibling for help!
- Visit some helpful websites like...
  - Khan Academy
  - Virtual Nerd
- Email me at bparsons@hullpublicschools.us

All problems are non-calculator problems.
All answers must show work (where applicable)!!!

Grading Rubric

Completed/initialed Summer Math Packet Log (10 Points)

Content Pages (5 Points Per Page/70 Points Total)

- All problems attempted (1 Point Per Page/14 Points Total)
- Accuracy (2 Points Per Page/28 Points Total)
- All work shown (2 Points Per Page/28 Points Total)

Reflection Page (10 Points)

Extra Credit Page (6 points/2 Points Per Correct Answer)

2 points per day will be deducted packets that are late beyond one day

Name_____

Parent/Guardian Signature: _____

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Summer Math Packet Log

Directions: Record the date and number of minutes spent on this packet each time you work on it in the table below. Have a parent/guardian initial each time you work on the packet ☺

Date	Number of Minutes	Parent/Guardian Initial

Calculating Unit Rates

A **rate** is a ratio of two measurements having different kinds of units. When a rate is simplified so that it has a denominator of 1, it is called a **unit rate.** You can find a unit rate by dividing.

Example

Benito ate 48 raisins in 8 minutes. How many raisins did he eat per minute, if he ate the same number each minute?

$$\frac{48 \text{ raisins}}{8 \text{ minutes}} \overset{\div 8}{=} \frac{6 \text{ raisins}}{1 \text{ minute}}$$

Divide the numerator and denominator by 8 to get a denominator of 1.

The unit rate is 6 raisins per minute.

Exercises

Calculate the unit rate in each scenario. Write your answer in a complete sentence.

1. 6 eggs for 3 people
2. $12 for 4 pounds
3. 40 pages in 8 days

4. **GROCERIES** Mr. Gonzalez spends $135 for 5 bags of groceries. How much does he spend per bag of groceries, if each bag costs the same?

5. **TRAIN** Ms. Terry travels by train to see famous theme parks. She travels a distance of 728 miles in 8 hours. If the train maintains a constant speed, how many miles does she travel in one hour?

6. **FOOTBALL** A quarterback throws 222 yards in 6 games. How many yards does he throw in one game if he throws the same amount in each game?

7. **CLOTHING** It costs $15.24 for 4 t-shirts. What is the cost per t-shirt?

Points Earned: _____

Ratio and Rate Problems

You can solve rate and ratio problems by using a **bar diagram** or by using a **unit rate**.

Examples

Three servings of broccoli contain 150 Calories. How many Calories will 5 servings contain?

Method 1 Use a bar diagram.

50	50	50	150 calories

50	50	50	50	50	? Calories

Draw a bar diagram to represent the situation.
Each section represents 150 ÷ 3, or 50 Calories.
So, 5 servings of broccoli contain 250 Calories.

Method 2 Use a unit rate.

Step 1 Find the unit rate. $\frac{150 \text{ Calories}}{3 \text{ servings}} = \frac{\square \text{ Calories}}{1 \text{ serving}}$ ($\div 3$) $\quad \frac{150 \text{ Calories}}{3 \text{ servings}} = \frac{50 \text{ Calories}}{1 \text{ serving}}$ ($\div 3$)

Step 2 Multiply. $\frac{50 \text{ Calories}}{1 \text{ serving}} \times 5 \text{ servings} = 250 \text{ Calories}$

Exercises

Solve each problem using one of the methods reviewed above. Show your work.

1. **MUSIC** Jeremy spent $33 on 3 CDs. At this rate, how much would 5 CDs cost?

2. **AQUARIUM** At an aquarium, 6 out of 18 deliveries are plants. Out of 15 deliveries in one week, how many are plants?

3. **ELECTIONS** Three out of four students surveyed in a school said they will vote for Nuncio for class president. Predict how many of the 340 students in the school would vote for Nuncio.

4. **STRAWBERRIES** At a local fruit stand, Luisa spends $3.96 for 2 pounds of strawberries. How much can she expect to pay for 4 pounds of strawberries?

5. **POGO STICK** On her pogo stick, Lula made 24 hops in 30 seconds. At this rate, how many hops will she make in 50 seconds?

6. **TESTS** On a test, Matilda answered 12 out of the first 15 problems correctly. If this rate continues, how many of the next 25 problems will she answer correctly?

Points Earned: _____

Percents and Decimals

To write a percent as a decimal first rewrite the percent as a fraction with a denominator of 100. Then write the fraction as a decimal.

Example 1

Write 23% as a decimal.

$23\% = \frac{23}{100}$ Rewrite the percent as a fraction with a denominator of 100.

$= 0.23$ Write *23 hundredths* as a decimal.

Example 2

Write 7% as a decimal.

$7\% = \frac{7}{100}$ Rewrite the percent as a fraction with a denominator of 100.

$= 0.07$ Write *7 hundredths* as a decimal.

To write a decimal as a percent first write the decimal as a fraction with a denominator of 100. Then write the fraction as a percent.

Example 3

Write 0.44 as a percent.

$0.44 = \frac{44}{100}$ Write *44 hundredths* as a fraction.

$= 44\%$ Write the fraction as a percent.

Exercises

Write each percent as a decimal.

1. 39%

2. 57%

3. 82%

4. 13%

5. 8%

6. 4%

7. 6.4%

8. 125%

9. 12.5%

Write each decimal as a percent.

10. 0.86

11. 0.36

12. 0.65

13. 0.2

14. 0.48

15. 0.07

16. 1.1

17. 10.5

16. 0.004

Points Earned: _____

Percent of a Number

Example 1

Find 25% of 260.

Method 1:

Write 25% as a fraction in simplest form.
Use the fraction in a multiplication problem.

$25\% = \frac{25}{100}$ or $\frac{1}{4}$

$25\% \text{ of } 260 = \frac{1}{4} \times 260$

$= 65$

Method 2:

Write 25% as a decimal.
Then write a multiplication problem.

$25\% = 0.25$

$25\% \text{ of } 260 = 0.25 \times 260$

$= 65$

Example 2

Find 175% of 56.

Method 1:

Write 175% as a fraction in simplest form.
Use the fraction in a multiplication problem

$175\% = \frac{175}{100}$ or $\frac{7}{4}$

$175\% \text{ of } 56 = \frac{7}{4} \times 56$

$= \frac{7}{\cancel{4}_{1}} \times \frac{\cancel{56}^{14}}{1}$

$= 98$

Method 2:

Write 175% as a decimal.
Then write a multiplication problem.

$175\% = 1.75$

$175\% \text{ of } 56 = 1.75 \times 56$

$= 98$

Exercises

Find the percent of each number using one of the methods shown above. Show all of your work.

1. 48% of 50

2. 40% of 95

3. 75% of 116

4. 8% of 85

5. 98% of 30

6. 0.3% of 460

7. 15% of 342

8. 350% of 60

9. 0.25% of 500

10. 2.7% of 110

Points Earned: _____

Solve Percent Problems

In a **percent proportion,** one ratio compares a part to the whole. The other ratio is the equivalent percent written as a fraction with a denominator of 100.

$$\left.\begin{matrix}\text{part} \rightarrow \frac{p}{\text{whole} \rightarrow w} = \frac{n}{100}\end{matrix}\right\} \text{percent}$$

Example 1

What percent of 25 is 18?

$\frac{p}{w} = \frac{n}{100}$ Percent proportion

$\frac{18}{25} = \frac{n}{100}$ Write the proportion.

$\frac{18}{25} \overset{\times 4}{=} \frac{n}{100}$ Since 25 × 4 = 100, multiply 18 by 4.

$72 = n$

So, 18 is 72% of 25

Example 2

What is 60% of 300?

$\frac{p}{w} = \frac{n}{100}$ Percent proportion

$\frac{n}{33} = \frac{60}{100}$ Write the proportion.

$\frac{180}{300} \overset{\div 3}{=} \frac{60}{100}$ Since 300 ÷ 3 = 100, divide 180 by 3.

$n = 180$

So, 180 is 60% of 300.

Exercises

Write a proportion and solve each problem. Circle your final answer.

1. What number is 25% of 20?

2. What percent of 50 is 30?

3. 30 is 60% of what number?

4. 40% of what number is 4?

5. What number is 20% of 700?

6. 12 is what percent of 25?

7. 36 is 12% of what number?

8. 60 is 25% of what number?

9. 32% of what number is 320?

10. 5 is 1% of what number?

Points Earned: _____

Multiply Decimals by Decimals

When you multiply a decimal by a decimal, multiply the numbers as if you were multiplying all whole numbers. To decide where to place the decimal point, find the sum of the number of decimal places in each factor. The product has the same number of decimal places.

Example 1

Find 5.2 × 6.13.

Estimate: 5 × 6 or 30

5.2 ← one decimal place
× 6.13 ← two decimal places
156
52
+312
31.876 ← three decimal places

The product is 31.876.
Compared to the estimate, the product is reasonable.

Example 2

Find 2.3 × 0.02.

Estimate: 2 × 0.02 or 0.04

2.3 ← one decimal place
× 0.02 ← two decimal places
0.046 ← Annex a zero to make three decimal places.

The product is 0.046.
Compared to the estimate, the product is reasonable.

Exercises

Multiply.

1. 7.2 × 2.1

2. 4.3 × 8.5

3. 2.64 × 1.4

4. 14.23 × 8.21

5. 5.01 × 11.6

6. 9.001 × 4.2

7. 3.24 × 0.008

8. 0.012 × 2.9

9. 0.9 × 11.2

Points Earned: _____

Divide Decimals by Decimals

When you divide a decimal by a decimal multiply both the divisor and the dividend by the same power of ten. Then divide as with whole numbers.

Example 1

Find 10.14 ÷ 5.2.

First, estimate: 10 ÷ 5 = 2

Multiply by 10 to make a whole number.

$5.2\overline{)10.14}$ → $52\overline{)101.40}$

Multiply by the same number, 10.

$$\begin{array}{r} 1.95 \\ 52\overline{)101.40} \\ -52 \\ \hline 494 \\ -468 \\ \hline 260 \\ -260 \\ \hline 0 \end{array}$$

Place the decimal point.

Divide as with whole numbers.

Annex a zero to continue.

10.14 divided by 5.2 is 1.95.

Compare the quotient with the estimate.

Check $1.95 \times 5.2 = 10.14$ ✓

Exercises

Divide. Show all work and circle your final answer.

1. 9.8 ÷ 1.4

2. 4.41 ÷ 2.1

3. 16.848 ÷ 0.72

4. 8.652 ÷ 1.2

5. 0.5 ÷ 0.001

6. 9.594 ÷ 0.06

Points Earned: _____

Multiply Mixed Numbers

To multiply mixed numbers, write the mixed numbers as improper fractions and then multiply as with fractions.

Example 1

Find $\frac{1}{4} \times 1\frac{2}{3}$.

Estimate. Use compatible numbers. $\frac{1}{2} \times 2 = 1$

$\frac{1}{4} \times 1\frac{2}{3} = \frac{1}{4} \times \frac{5}{3}$ Write $1\frac{2}{3}$ as $\frac{5}{3}$.

$= \frac{1 \times 5}{4 \times 3}$ Multiply.

$= \frac{5}{12}$ Simplify. Compare to the estimate.

Example 2

Find $1\frac{1}{3} \times 2\frac{1}{4}$.

$1\frac{1}{3} \times 2\frac{1}{4} = \frac{4}{3} \times \frac{9}{4}$ Convert mixed numbers to improper fractions.

$= \frac{\cancel{4}^{1}}{\cancel{3}_{1}} \times \frac{\cancel{9}^{3}}{\cancel{4}_{1}}$ Divide the numerator and denominator by their common factors, 3 and 4. **(Cross-simplify)**

$= \frac{3}{1}$ or 3 Write answer in simplest form.

Exercises

Multiply. Write in simplest form.

1. $\frac{1}{3} \times 1\frac{1}{3}$

2. $1\frac{1}{5} \times \frac{3}{4}$

3. $\frac{2}{3} \times 1\frac{3}{5}$

4. $\frac{2}{3} \times 3\frac{1}{2}$

5. $\frac{2}{9} \times 1\frac{1}{6}$

6. $2\frac{4}{9} \times \frac{4}{11}$

7. $2\frac{1}{2} \times 1\frac{1}{3}$

8. $1\frac{1}{4} \times 3\frac{3}{5}$

9. Find the product of $\frac{1}{5}$ and $3\frac{1}{3}$.

10. Simplify $4\frac{2}{3} \times 1\frac{1}{4}$.

Points Earned: _____

Divide Fractions

You can use reciprocals to divide fractions. To divide by a fraction, multiply by its reciprocal.

Example 1
Find $\frac{1}{2} \div \frac{1}{5}$.

$\frac{1}{2} \div \frac{1}{5} = \frac{1}{2} \times \frac{5}{1}$ Multiply by the reciprocal, $\frac{5}{1}$.

$= \frac{5}{2}$ or $2\frac{1}{2}$ Multiply numerators and denominators.

Example 2
Find $\frac{2}{3} \div \frac{4}{5}$.

$\frac{2}{3} \div \frac{4}{5} = \frac{2}{3} \times \frac{5}{4}$ Multiply by the reciprocal, $\frac{5}{4}$.

$= \frac{\overset{1}{\cancel{2}} \times 5}{3 \times \underset{2}{\cancel{4}}}$ Divide 2 and 4 by the GCF, 2.

$= \frac{5}{6}$ Multiply numerators and denominators.

Exercises

Divide. Cross-Simplify where you can after using the reciprocal. Write answers in simplest form.

1. $\frac{1}{3} \div \frac{2}{5}$ **2.** $\frac{1}{9} \div \frac{1}{2}$ **3.** $\frac{2}{3} \div \frac{1}{4}$ **4.** $\frac{1}{2} \div \frac{3}{4}$

5. $\frac{4}{5} \div \frac{1}{2}$ **6.** $\frac{4}{5} \div \frac{1}{10}$ **7.** $\frac{5}{12} \div \frac{5}{6}$ **8.** $\frac{9}{10} \div \frac{1}{3}$

9. $\frac{3}{4} \div \frac{7}{12}$ **10.** $\frac{9}{10} \div \frac{1}{9}$ **11.** $\frac{2}{3} \div \frac{5}{8}$ **12.** $\frac{3}{4} \div \frac{7}{9}$

13. $\frac{1}{2} \div 2$ **14.** $\frac{5}{6} \div 15$ **15.** $\frac{3}{8} \div \frac{3}{4}$ **16.** $\frac{7}{10} \div \frac{5}{7}$

Points Earned: _____

Simplifying Expressions

To simplify an algebraic expression, you combine (or add) the terms that are considered **like terms.** Like terms are terms that have the same variable, or terms that do not have a variable at all (these are called **constants**).

Example 1:
$6x + 2y + 3x$

$6x$ and $3x$ are **like terms** because they share the same variable.
Add their coefficients together to simplify.

$6x + 3x + 2y = 9x + 2y$

$9x$ and $2y$ cannot be combined because they are NOT like terms.
So, this expression simplifies to $9x + 2y$.

Example 2:
$4(3x)$

This expression means "four times $3x$"

Picture it like this: $x\,x\,x + x\,x\,x + x\,x\,x + x\,x\,x$

This expression simplifies to $12x$.

Simplify each expression by combining the like terms.

1. $x + 4 + 3x$

2. $3 + x + 6$

3. $15 + 6 + x$

4. $(6 + x) + 9$

5. $x + 2 + 8x$

6. $4x + 3y + 23y$

7. $(25y + 5x) + 4y$

8. $15 \cdot (5 \cdot x)$

9. $7(4x)$

10. $8x + 16 + 4x$

11. $x + 2 + x$

12. $5 \cdot x \cdot 10$

13. $(17 \cdot x) \cdot 3$

14. $8x + 17y + 9x$

15. $3x + (24x + 8)$

16. $4(15x)$

17. $2x + 8 + x$

18. $(5x + 9y) + 32x$

Points Earned: _____

Solve One-Step Equations

When solving a one-step equation, you are trying to figure out the value of the variable that makes both sides of the equation true (or equal). To do this, use **inverse operations.**

Example 1:
Addition Equations

$x + 4 = 12$

Subtract 4 from both sides to get the solution $\boldsymbol{x = 8}$.

Example 2:
Subtraction Equations

$x - 4 = 12$

Add 4 to both sides to get the solution $\boldsymbol{x = 16}$.

Example 3:
Multiplication Equations

$4x = 12$

Divide 4 on both sides to get the solution $\boldsymbol{x = 3}$.

Example 4:
Division Equations

$\frac{x}{4} = 12$

Multiply 4 on both sides to get the solution $\boldsymbol{x = 48}$.

Exercises

Solve each equation.

1. $x + 4 = 7$

2. $t + 6 = 10$

3. $y + 3 = 7$

4. $z + 4 = 6$

5. $3 = y - 4$

6. $2 = k - 4$

7. $m - 5 = 6$

8. $n - 3 = 6$

9. $4h = 32$

10. $27 = 9h$

11. $24 = 12j$

12. $28 = 7y$

13. $12 = \frac{r}{5}$

14. $11 = \frac{d}{11}$

15. $9 = \frac{r}{13}$

Points Earned: _____

Calculating the Mean

The **mean** of a data set is the sum of the data divided by the number of pieces of data.

Example
The pictograph shows the number of members on four different swim teams. Find the mean number of members for the four different swim teams.

$$\text{mean} = \frac{9 + 11 + 6 + 10}{4}$$
$$= \frac{36}{4} \text{ or } 9$$

Swim Team Members	
Amberly	
Carlton	
Hamilton	
West High	

Key: = 1 swimmer

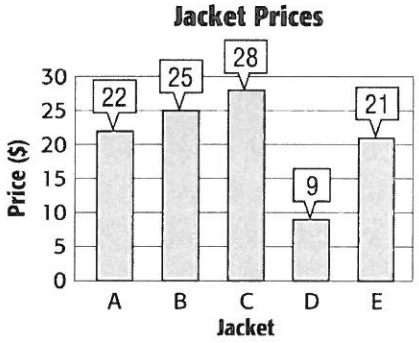
Exercises

Find the mean for each set of data.

1.

Month	Snowfall (in.)
Nov.	20
Dec.	19
Jan.	20
Feb.	17
Mar.	4

2.



3.

Number of Bicycles	
Smiths	
Castros	
Lius	

Key: = 1 bicycle

4.

Checker Pieces	
A	
B	
C	
D	

Key: = 1 checker piece

Points Earned: _____

Calculating the Median and Mode

The **median** of a list of values is the value appearing at the center of a sorted version of the list, or the mean of the two central values, if the list contains an even number of values.

The **mode** is the number or numbers that occur most often.

Example

The table shows the costs of seven different books.
Find the mean, median, and mode of the data.

Book Costs ($)			
22	13	11	16
14	13	16	

Mean: $\frac{22 + 13 + 11 + 16 + 14 + 13 + 16}{7} = \frac{105}{7}$ or 15

To find the median, write the data in order from least to greatest.
Median: 11, 13, 13, 14, 16, 16, 22

To find the mode, find the number or numbers that occur most often.
Mode: 11, 13, 13, 14, 16, 16, 22

The mean is \$15. The median is \$14. There are two modes, \$13 and \$16.

Exercises

Find the mean, median, and mode of each set of data.

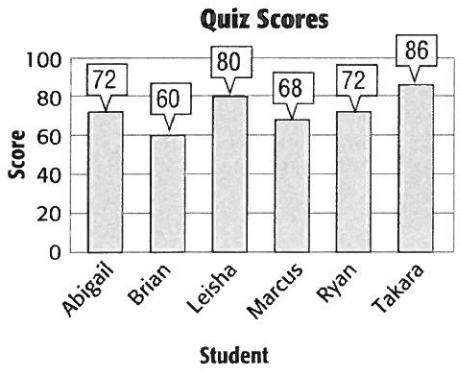
1. hours worked: 14, 13, 14, 16, 8

2. points scored by a football team:
29, 31, 14, 21, 31, 22, 20

3. miles ran: 5, 4, 9, 1, 6

4. ages of contestants:
27, 21, 22, 22, 24, 20, 25, 24

5.



6.

Snowfall (in.)					
0	2	2	3	3	3
5	5	6	7	8	

Points Earned: _____

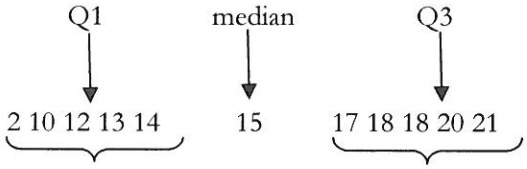
Measures of Variation

Measures of variation are used to describe the distribution, or spread, of the data. The **range** is the difference between the greatest and least data values. **Quartiles** are values that divide the data set into four equal parts. The median of the lower half of a set of data is the **first quartile** and the median of the upper half of a set of data is the **third quartile**. The difference between the third quartile and the first quartile is called the **interquartile range**.

Example 1
Find the measures of variation for the number of votes received for student government president: 13, 20, 18, 12, 21, 2, 18, 17, 15, 10, and 14.

The greatest number in the data set is 21. The least number is 2.
The range is 21 – 2 or 19 votes.

To find the quartiles, arrange the numbers in order from least to greatest.



The interquartile range is 18 – 12 or 6.

> An **outlier** is a data value that is either much greater or much less than the median. Outliers are more than 1.5 times the value of the interquartile range beyond the quartiles.

Example 2
Find any outliers for the set of data given in Example 1.

The interquartile range is 18 – 12 or 6.
Multiply the interquartile range by 1.5. $6 \times 1.5 = 9$

Subtract 9 from the first quartile. $12 - 9 = 3$
Add 9 to the third quartile. $18 + 9 = 27$

The limits of the outliers are 3 and 27. The only number of votes beyond the limits is 2. So, 2 is the only outlier.

Exercises

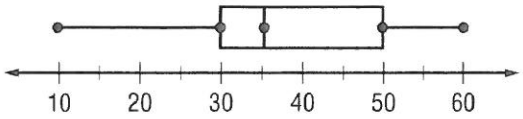
Find the range, median, first and third quartiles, and interquartile range for each data set. Name any outliers.

1. Miles driven to see a Space Shuttle launch: 19, 27, 14, 28, 30, 51, 28

2. Temperatures in Tampa: 91, 92, 88, 89, 93, 95, 65, 88, 91

Box and Whisker Plots

A **box plot** is a diagram that is constructed using the median, quartiles, and extreme values. A box is drawn around the quartile values, and the whiskers extend from each quartile to the extreme values.



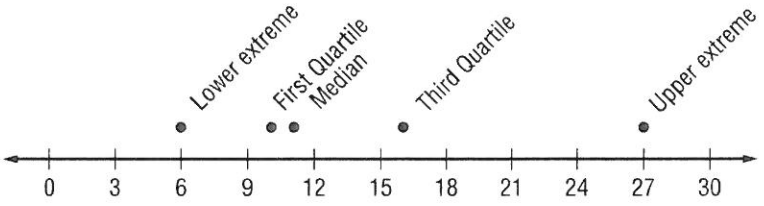
Example 1

The list below shows the number of model airplanes owned by the members of the aviation club. Draw a box plot of the data.

6, 8, 10, 10, 10, 11, 12, 14, 16, 18, 27

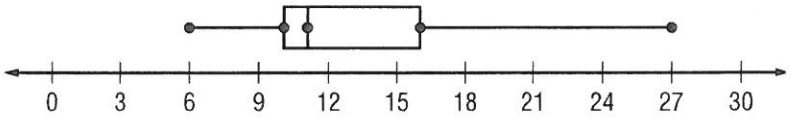
Step 1 Order the numbers from least to greatest. Then draw a number line that covers the range of the data.

Step 2 Find the median, the extremes, and the first and third quartiles. Mark these points above the number line.



Step 3 Draw the box so that it includes the quartile values. Draw a vertical line through the median value. Extend the whiskers from each quartile to the extreme data points.

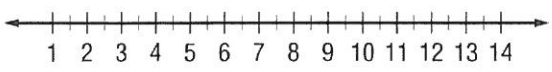
Numbers of Model Airplanes Owned



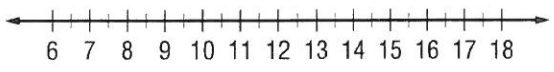
Exercises

Draw a box plot for each set of data.

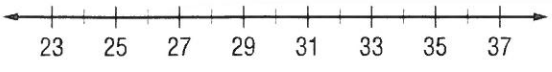
1. {4, 7, 5, 3, 12, 6, 5}



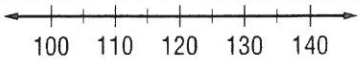
2. {13, 8, 17, 10, 6, 11, 18}



3. {23, 36, 28, 34, 30, 29, 30, 28, 34}



4. {108, 130, 110, 104, 106, 120, 140, 122, 114, 104}



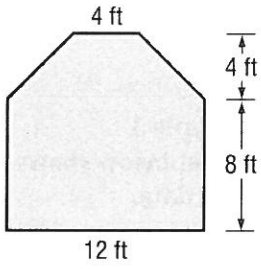
Points Earned: _____

EXTRA CREDIT: Area of Composite Figures

To find the area of a composite figure, separate it into figures whose areas you know how to find, and then add the areas.

Example

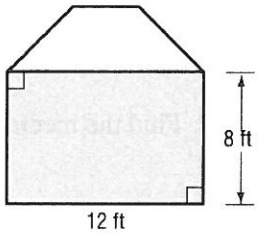
Find the area of the figure at the right in square feet.



The figure can be separated into a rectangle and a trapezoid. Find the area of each.

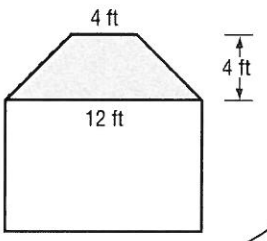
Area of Rectangle

$A = \ell w$	Area of a rectangle.
$A = 12 \cdot 8$	Replace ℓ with 12 and w with 8.
$A = 96$	Multiply.



Area of Trapezoid

$A = \frac{1}{2}h(b_1 + b_2)$	Area of a trapezoid
$A = \frac{1}{2}(4)(4 + 12)$	Replace h with 4, b_1 with 4, and b_2 with 12.
$A = 32$	Multiply.

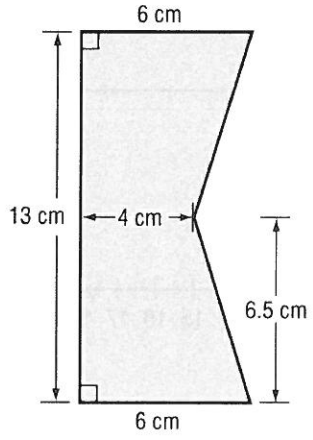


The area of the figure is 96 + 32 or 128 square feet.

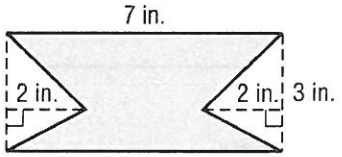
Exercises

Find the area of each figure. Round to the nearest tenth if necessary.

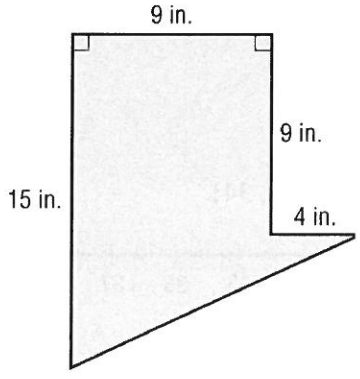
1.



2.



3.



Points Earned: _____

Summer Math Packet Reflection

Name _____

After completing your Summer Math Packet, please answer the following questions:

1) List the Math skills and concepts that you are **most confident** with. In other words, which problems were the **easiest** for you to solve? (example… order of operations)

_____ _____

_____ _____

2) List the Math skills and concepts that you found to be the most **difficult**. In other words, which problems were the **hardest** for you to solve? (example… dividing decimals)

_____ _____

_____ _____

3) What are your **expectations for Math class this year**? What do you expect to learn? What do you expect Math class to be like?

_____

_____

4) Write **two personal Math goals** to strive towards this school year.

For example…

This year in Math class, I hope to memorize my Math facts.

I also want to get better at solving word problems.

_____

_____

_____