

Wonder Here? 



HAZMAT(h)

Comprehensive Math Project



HAZMAT(h) Comprehensive Team Orders

Cleaning up the environment, one math problem at a time!

Comprehensive Math Benchmarks Covered

- Examine the properties of numbers (ie. Parity, multiplies, and division by two)
- Understand probability in everyday situations by concluding whether an event is impossible, possible, or certain
- Accurate use of mathematical tools
- Measure and compare volumes of liquids
- Multiplication and division are practiced with natural numbers.
- The child is first introduced to the first quarter of the system of coordinates and later to all quarters.

Scenario

It was a beautiful day in sunny Central Florida, when suddenly a loud crash was heard from around the corner! Smoke is filling the city sky. What could have happened?! On the news it is now being reported that someone accidentally ran their car right into Mr. Bucket's Gas Station and the gas station is now on fire! First Responders are now on the scene!

What will YOU do to get the situation under control, before things turn into a REAL DISASTER?! It is time for your HAZMAT(h) team to suit up!

Job 1: Secure the Situation

Your first job upon arrival to the scene, is to secure the situation. Work fast and smart to get the situation under control! You need to assess the situation, identify the immediate dangers, and establish a wide perimeter to keep the community and civilians safe. Let's GET TO WORK!

Take a close look at the dangerous situation Image 1. What is going on? Circle what is wrong with the picture and what needs to be handled.

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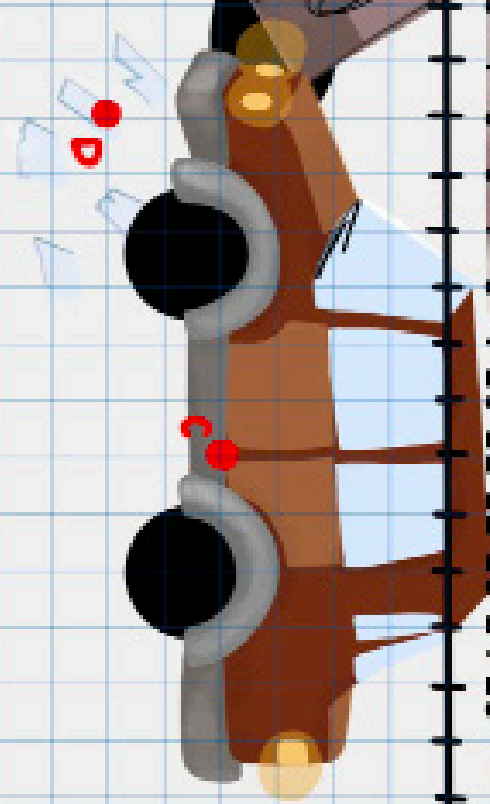
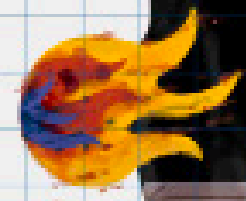
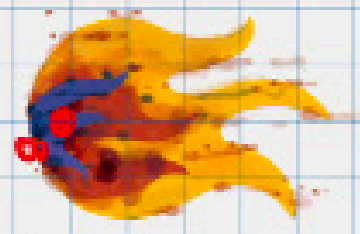
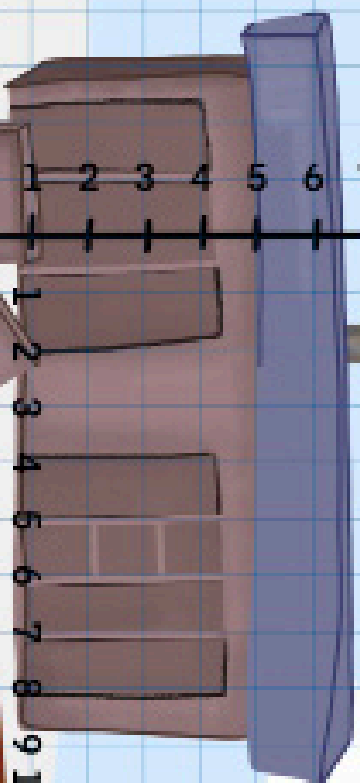
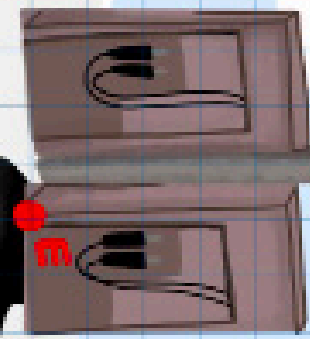
Take a close look at the dangerous situation Image 1. What is going on? Write to explain what is wrong with the picture below.



X

Y

Mrs. Buckets's go



-15 -14 -13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

-15 -14 -13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 9 10 11 12 13

A

E

F

D

C

-  LAKE
-  Dog Park
-  HOSPITAL
-  UNIVERSITY
-  SCHOOL
-  STOP SIGN
-  HOUSE
-  PARK
-  TREE
-  Gas Station
-  PARKING
-  PLAYGROUND



1 cm = 10 ft

made

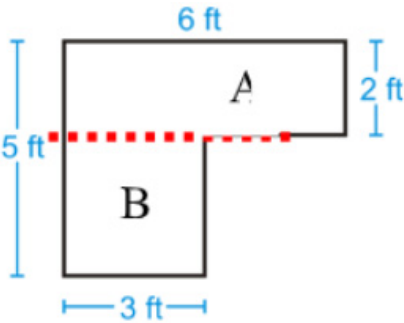
Take a look at Image 2. When entering a dangerous area, it is essential to immediately get control of the situation, by establishing a safe border around the hazardous area and securing a wide perimeter.

What is Area?

The area of a shape is the amount of total space within the shape. To determine the area of a 2-D shape, multiply the shape LENGTH x WIDTH.

To find the area of a complex shape, divide the shape into simple shapes first.

Example: If a rectangle is 2 cm x 4 cm, to find the perimeter, you would add 2 + 2 + 4 + 4. The perimeter would be 16 cm.



Area of A: $6 \times 2 = 12$ feet

Area of B: $2.5 \times 3 = 7.5$ feet

Why is the length of B 2.5 feet and NOT 5 feet? _____

Using Image 2, what is the area of the School

Show your work here.

Why is the length of B 2.5 feet and NOT 5 feet? _____

Using Image 2, measure the length and width of the gas station.

What is the length of the gas station in centimeters? _____

What is the width of the gas station in centimeters? _____

Using the equation $L \times W$ (length x width) solve to find the area. Show your work here.

What is the area of the gas station? _____

Next, measure a safety perimeter directly on Image 2 that is at least 25 yards away from the gas station all the way around. To do this, first, convert yards to feet.

1 yard = 3 feet

How many feet are in 25 yards? Show your work here.

WHAT ARE RATIOS?

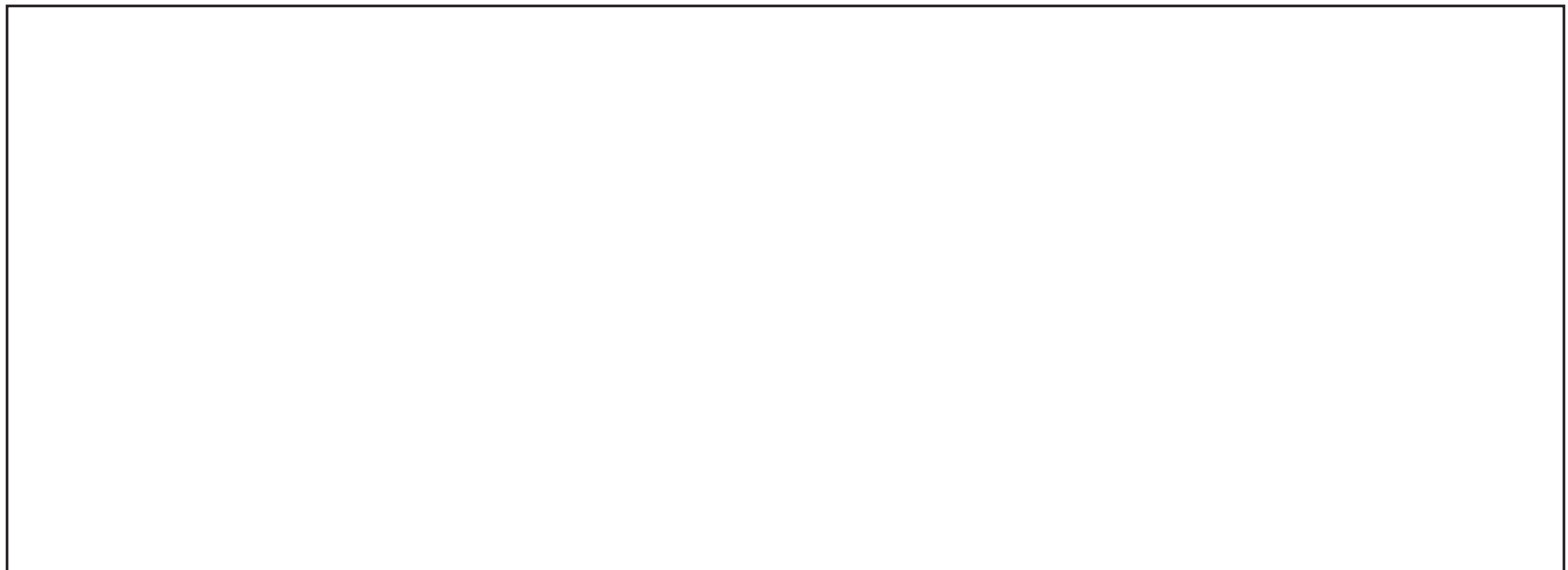
A ratio indicates how many times one number contains another. An example of this would be the ratio of inches to feet. In measurement, since 1 ft contains 12 inches, the ratio of feet to inches is 1:12 (read 1 to 12). One form of ratios can be found on maps drawn to a certain scale. When using a scale, a map or an image is drawn to a certain measurement. One can use the scale (or the ratio provided) to convert or change the smaller measurement on the map to a much larger, life-size measurement. An example of this would be a store drawn on a map with the measurements 5 cm in length and 6 cm in width. This is not an actual size measurement, but the scale it is drawn to might be 1 cm = 10 feet. To figure out the life-size measurement of that same store, you would multiply 5×10 to find the actual length of 50 ft and 6×10 to find the actual width of 60 feet.

Using the scale provided from Image 2 (1 cm: 10 ft), solve this ratio

1 cm: 10 feet so _____ cm : 25 feet

Now that you know how many centimeters around the gas station you need to draw the safety perimeter, measure and draw the perimeter all the way around the gas station. Draw this safety perimeter directly on Image 2 in yellow to resemble yellow caution tape.

Using a ruler and the equation (L X W), solve to find the area of the space within the safety perimeter you have drawn? Show your work here.



WHAT ARE 2 DIMENSIONAL (2-D) SHAPES?

In geometry, a two-dimensional shape is any flat plane figure that has two dimensions – length and width. These shapes do NOT have any thickness and can be measured in only two faces. (A face is a flat surface, like the top of a box. An edge is a line along which two faces meet.)

Use the chart below to identify common 2-D Shapes.

Number of Edges (sides)	Number of Edges (sides)	Number of Vertices (corners)	Number of Faces	Other Attributes
Circle	0	0	1	Contains no lines or edges
Square	4	4	1	Has 4 equal sides and 2 sets of parallel lines
Triangle	3	3	1	Has 3 sides
Rectangle	4	4	1	Has 4 sides and 2 sets of equal sides

WHAT ARE 3 DIMENSIONAL (3-D) SHAPES?

In geometry, a three-dimensional shape is a shape that has three dimensions- length, width, AND height. These shapes DO have thickness and can be measured in three faces or more.

Use the chart below to identify common 3-D Shapes and their identifying attributes

Shape	Number of Faces	Number of Edges	Number of Vertices
Sphere	0	0	0
Cube	6	12	8
Rectangular Prism	6	12	8
Cone	1	0	1
Cylinder	2	0	0
Pyramid	5	8	5

What shape is the hospital as it is drawn on the map in Image 2?

How do you know (Use terms like edges, vertices, and parallel)?

What shape are the trees as they are drawn on the map in Image 2?

How do you know (Use terms like edges, vertices, and parallel)?

What shape is the grocery store as it is drawn on the map in Image 2?

How do you know (Use terms like edges, vertices, and parallel)?

What shape is a school as it is drawn on the map in Image 2?

How do you know (Use terms like edges, vertices, and parallel)?

What shape are the stop signs as they are drawn on the map in Image 2?

How do you know (Use terms like edges, vertices, and parallel)?

What is a circle?

What is a rhombus?

Measuring Distance

Using a centimeter ruler, how far away is the gas station from the nearest hospital?

Distance in centimeters _____

Distance in feet (convert using the provided ratio) _____

Using a centimeter ruler, how far away is the gas station from the nearest school?

Distance in centimeters _____

Distance in feet (convert using the provided ratio) _____

Strategize. What should you do to protect the hospital and school from being harmed during this developing situation regarding the gas station?

Job 2: Contain the Spill & Ready for Transport

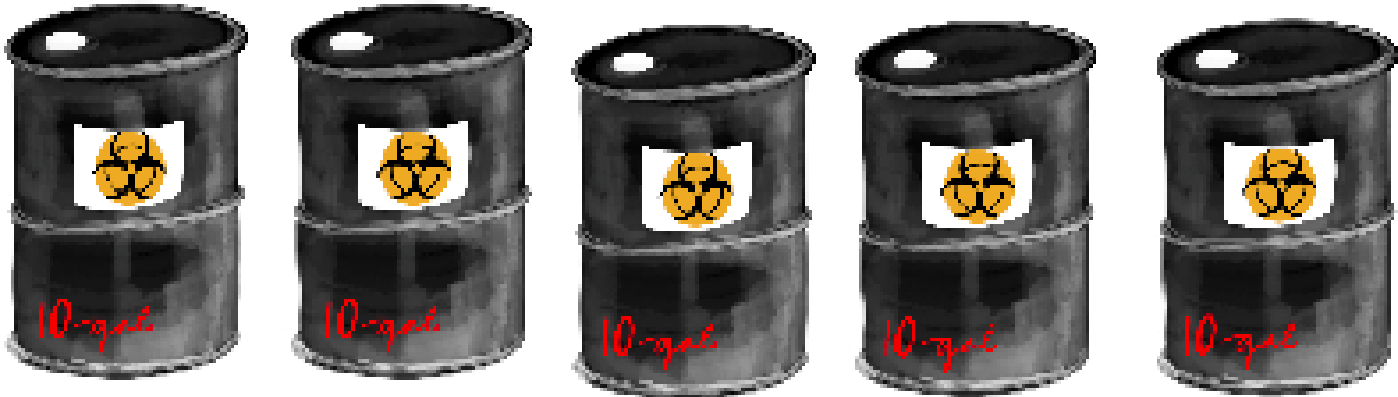
You have successfully secured the situation, now you need to clean up the mess! It is important to move swiftly and smartly, being sure to limit the disruption of business and transit in the surrounding areas.

WHAT IS VOLUME?

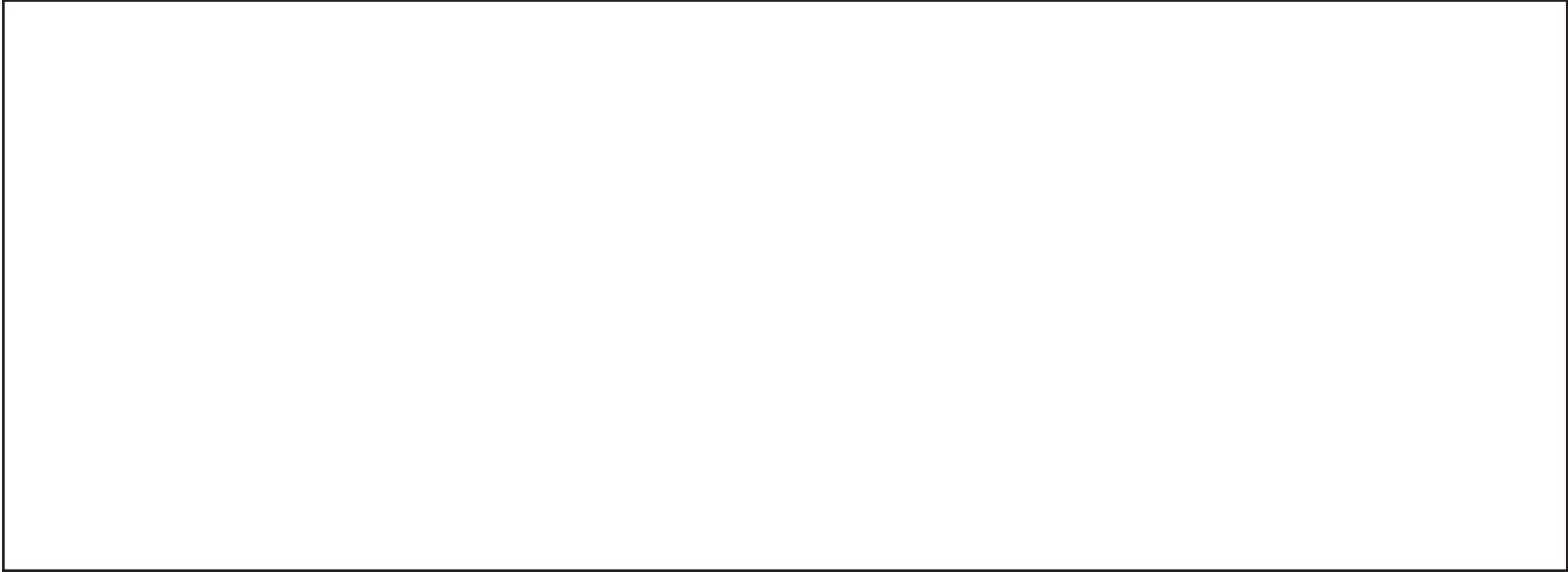
Volume is the amount of space a three-dimensional shape can hold. Volume can be measured in cubic centimeters, liters, or gallons. In the US Standard System (Customary System), volume is measured in gallons. Use the chart below to see the different conversions within the US Standard System for measuring volume.

Customary Units of Capacity		
1 pint (pt)	=	2 cups (c)
1 quart (qt)	=	2 pints (pt)
1 quart (qt)	=	4 cups (c)
1 gallon (gal)	=	4 quarts (qt)
1 gallon (gal)	=	8 pints (pt)
1 gallon (gal)	=	16 cups (c)

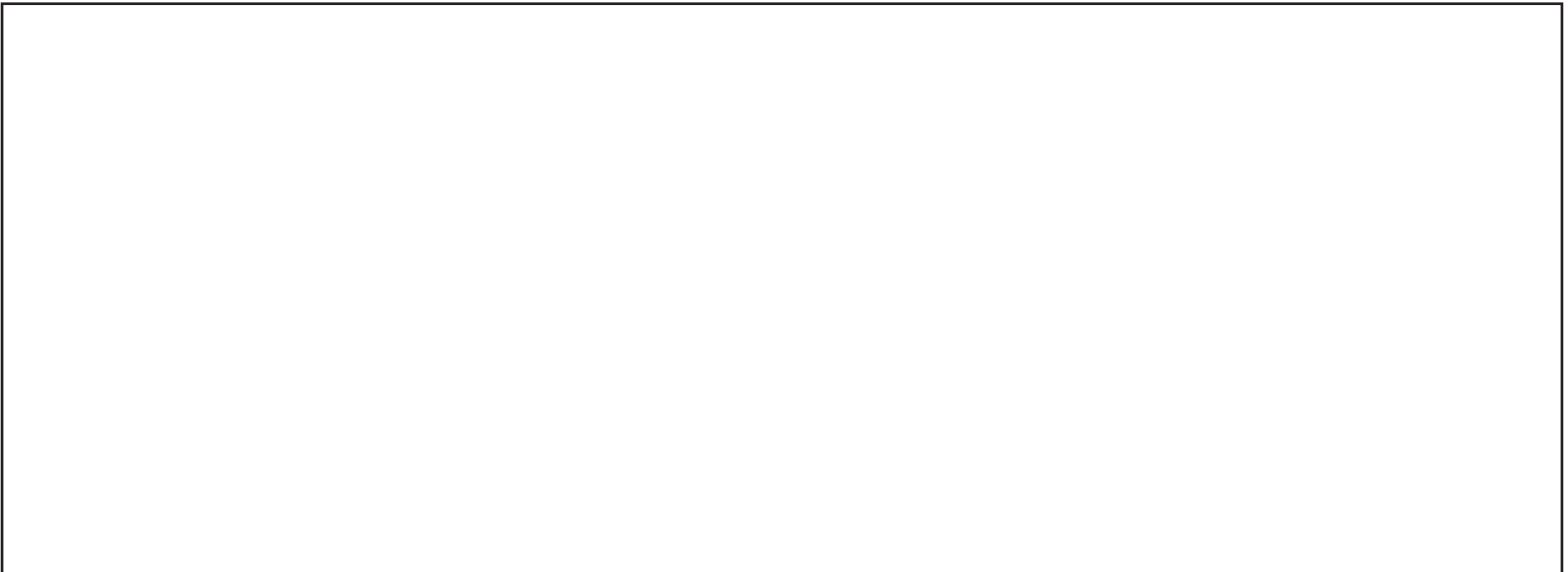
Below are the barrels of gas you can fill from the gas you collect from the spill site. The special tool that can be used to safely scoop all of the gasoline from the ground measures in cups.



How many cups would it take to fill all 5 barrels? Show your work here.

A large, empty rectangular box with a thin black border, intended for the student to show their work for the first problem.

How many quarts would it take to fill all 5 barrels? Show your work here.

A large, empty rectangular box with a thin black border, intended for the student to show their work for the second problem.

Job 3: Decontamination of Area

The job is nearly completed! Now that the gasoline spilled has been securely stored in the transport barrels, it is essential to pour the correct amount of sand to cover the contaminated area in correct proportion to the amount of gasoline spilled.

(Remember, a ratio indicates how many times one number contains another.)

For every 5 gallons of gasoline spilled, the area needs to be covered in 2 pounds of sand.

If the ratio of gasoline spillage to sand is 5:2, how many pounds of sand is needed to decontaminate the area? Show your work here.

How many pounds of sand is needed? _____ lbs

The cost of sand is \$35.20 per pound. Using the number above, solve to determine the total cost of sand needed to decontaminate the area.

Total cost of sand is \$ _____ . _____

WHAT IS PROBABILITY?

Probability is the mathematical word used to describe the likelihood an even will occur. Probability is used in daily life to assist with decision making. When determining the probability of an event, the terms "possible" (it might happen), "impossible" (could NEVER happen), and "certain" (absolutely will happen) can be used to describe the likelihood of something happening.

Before you arrived on the scene, based on Image 1, what was the probability that the gas station fire could have spread? (Circle one of the choices below)

Possible Impossible Certain

Explain your reasoning. _____

Now that the situation has been handled, what is the probability that the situation will occur again tomorrow? (Circle one of the choices below)

Possible Impossible Certain

Explain your reasoning. _____

What is the probability that you could go back in time and make it so that the gas station accident NEVER occurred to begin with? (Circle one of the choices below)

Possible Impossible Certain

Explain your reasoning. _____

If the gas station owner works really hard to repair any remaining damage left at his facility, what is the probability that cars will return to the gas station for service in the morning? (Circle one of the choices below)

Possible Impossible Certain

Explain your reasoning. _____

