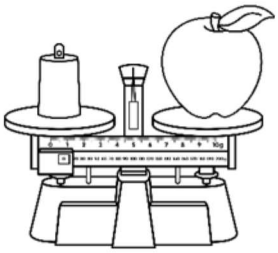
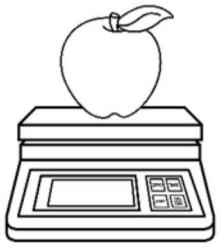
ESSENTIAL MEASUREMENT VOCABULARY

Term	Picture or Example	Definition
Perimeter	15 ft. / 7 ft. 	Distance **around** a figure
Formula for perimeter	p = 2L + 2w p = (2 x 15) + (2 x 7) p = 30 + 14 Perimeter= 44 feet	
Area	15 ft. / 7 ft. 	Space **inside** a figure
Formula for Area	A = L x w A = 15 x 7 Area = 105 square feet	

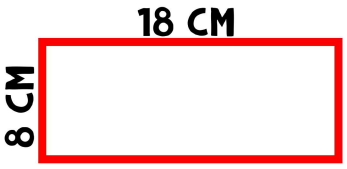
ESSENTIAL MEASUREMENT VOCABULARY

Term	Picture or Example	Definition
Customary units	Cup, quart, Gallon, inch, foot, yard, mile, lb.,	Units of measure commonly used in the U.S.
Metric units	Meter, kilometer, centimeter, liter, gram, kilogram	Units of measure usually used by scientists and many other countries
Capacity		Measurement of liquid volume
Mass		Mass is the amount of matter something contains. We use a balance to find the mass.
Weight		Weight is how heavy something is. We use a scale to measure weight.

PERIMETER and AREA

Perimeter

Perimeter is the distance around a figure



Have students trace around this rectangle.

Easy way to find the perimeter of a rectangle:

P = L + W + L + W
P = 18 + 8 + 18 + 8
P = 52 cm

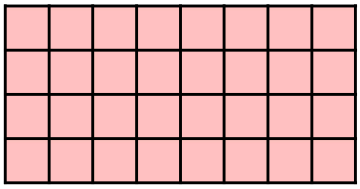
Sophisticated way to find the perimeter of a rectangle:

P = 2L + 2W
P = (2 x 18) + (2 x 8)
P = 36 + 16
P = 52 cm

Area

Area is the space inside a figure

Have students lightly shade the inside of this rectangle.



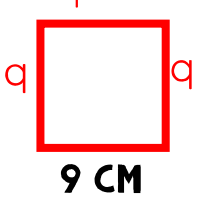
How to find the area of a rectangle:

A = L x W
A = 8 x 4
A = 32 square units

Finding the area is the same as finding the value of an Array.

Remember squares are special rectangles.

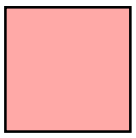
Perimeter of a SQUARE



Have students trace and label each side of the rectangle to reinforce 4x the length of the side.

P = 4s
P = 4 x 9 P=36 cm

Area of a SQUARE



Have students lightly shade the inside of this square to reinforce area as the space inside.

A = L x W
A = 9 x 9 A=81 sq. cm

Get to Know Your STAAR CHART

PART 1

PERIMETER			
Square			$P = 4s$
Rectangle	$P = l + w + l + w$	or	$P = 2l + 2w$
AREA			
Square			$A = s \times s$
Rectangle			$A = l \times w$

Look at the formulas for **AREA**.
There is **1** formula to find the area of a square.
and **1** formula to find the area of a rectangle.

Look at the formulas for **PERIMETER**.
There is **1** formula to find the perimeter of a square.
and **2** formulas to find the perimeter of a rectangle.

Why are there 2 formulas to find the perimeter of a rectangle?

P= l + w + l + w, adds the sides of a rectangle to find the perimeter. Or you could multiply the length x 2 and the width x 2 and then add those products since there are 2 lengths and 2 widths.

Draw a **SQUARE** next to the word *square*. Color your 2 squares red.

Shade all of the ***S***'s lightly in red. ***S*** = side

Draw a **RECTANGLE** next to the word *rectangle*. Color your 2 rectangles green.

Shade all of the **L**'s lightly in blue. ***L*** = length

Shade all of the ***W***'s lightly in yellow. ***W*** = width

4.5C
4.5D

Get to Know Your STAAR CHART

PART 2

Look at both sides of your STAAR Chart

The side with the length, volume & capacity, weight & mass and time conversions has a ruler that measures length using centimeters

The side with the perimeter and area formulas has a ruler that measures length using inches.

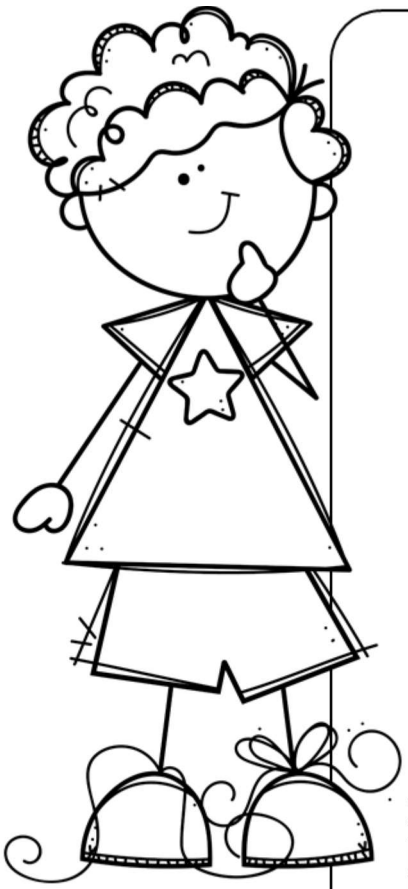
Use the rulers to answer the questions below. Highlight the unit, centimeters or inches, that each question is asking you to use.

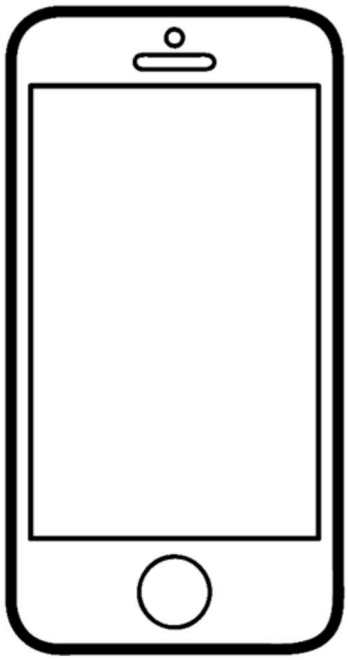
1. What is the difference between the height of the pen and the height of the marker to the nearest inch?

ABOUT 3 INCHES

ABOUT 5 INCHES

5-3 =
2 INCHES



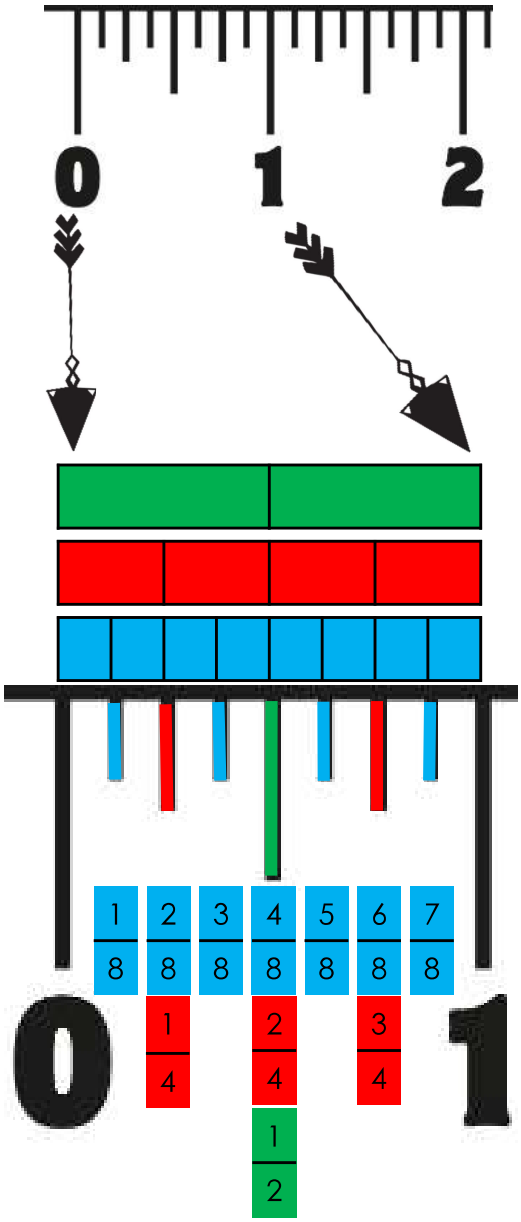


2. Measure the perimeter of the rectangular screen on the phone to the nearest centimeter.

2(4) + 2(6) = 20 CM
OR 4 + 6 + 4 + 6 = 20 CM

Understanding FRACTIONS of INCHES

Look at the ruler below that measures inches.
The Image below the ruler zooms in on the first inch.

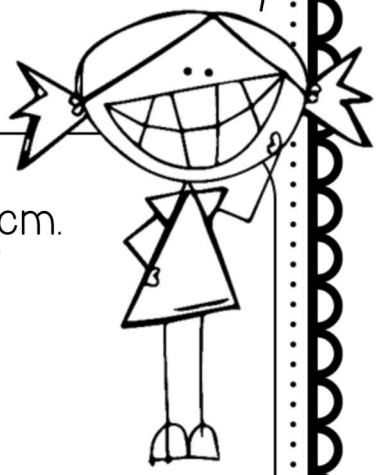


Color the shortest lines between 0 and 1 blue.
Look at the fraction bar above this inch that has 8 parts.
Shade that fraction bar blue. This fraction bar represents eighths. Each line that matches a line in this fraction bar represents 1/8 of an inch.
Label all of the lines as eighths.

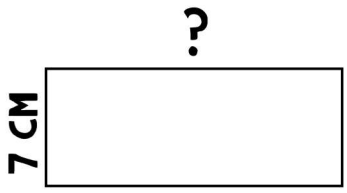
Color the next longest lines between 0 and 1 red.
Look at the fraction bar above this inch that has 4 parts.
Shade that fraction bar red. This fraction bar represents fourths. Each line that matches a line in this fraction bar represents 1/4 of an inch.
Label these lines as fourths.

Color the longest line between 0 and 1 green.
Look at the fraction bar above this inch that has 2 parts.
Shade that fraction bar green. This fraction bar represents halves. This line represents 1/2 of an inch.
Label the green line with the correct fraction.

COMPLEX Perimeter



The perimeter of the rectangle is 42 cm. What is the length?



WORK BACKWARDS.....

P = 2L + 2W Fill in the numbers you know.

42 = (2 x ?) + (2 x 7) Solve the part you can solve.

42= (2 x ?) + 14

Whole = part + part

Think about part, part, whole relationships.

42
-14

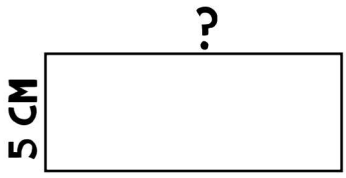
Take the part you know away from the whole to find the missing part.

This is the length of 2 sides. How do you find the length of one side?

28 ÷ 2 = 14
The length is 14 cm.

Divide by 2

The perimeter of the rectangle is 46 cm. What is the length?



WORK BACKWARDS.....

P = 2L + 2W Fill in the numbers you know.

46 = (2 x ?) + (2 x 5) Solve the part you can solve.

46= (2 x ?) + 10

Whole = part + part

Think about part, part, whole relationships.

46
-10
36

Take the part you know away from the whole to find the missing part.

This is the length of 2 sides. How do you find the length of one side?

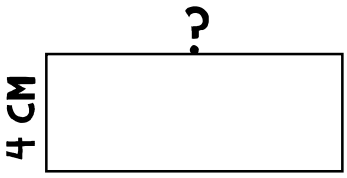
36 ÷ 2 = 18
The length is 18 cm.

Divide by 2

Challenging Problems = Strong Brains

COMPLEX Perimeter 2

The area of the rectangle is 44 square centimeters. What is the perimeter ?



WORK BACKWARDS.....

A = L x W Fill in the numbers you know.

44 = ? x 4

44 ÷ 4 = 11

Think about the relationship between multiplication and division. Write a related fact you can solve.

Now you know the missing side. Find the perimeter.

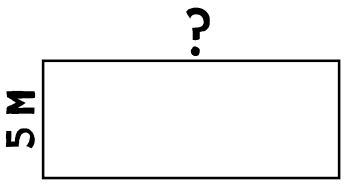
P = 2L + 2W

P = (2 x 11) + (2 x 4)

P = 22 + 8

The perimeter of the rectangle is 30 cm.

The area of the rectangle is 45 square meters. What is the perimeter?



WORK BACKWARDS.....

A = L x W Fill in the numbers you know.

45 = ? x 5

45 ÷ 5 = 9

Think about the relationship between multiplication and division. Write a related fact you can solve.

Now you know the missing side. Find the perimeter.

P = 2L + 2W

P = (2 x 9) + (2 x 5)

P = 18 + 10

The perimeter of the rectangle is 28 m.

Challenging Problems = Strong Brains

4.8B

Get to Know Your STAAR CHART

PART 3

9

Draw a vertical line between the customary and metric units.

List the 4 measurement categories:

Length	Volume & Capacity	Weight & Mass	Time

Why is (yd) written next to yard? yd is the abbreviation for yard

Label the larger and smaller units in each section.

LENGTH

larger Customary smaller

1 mile (mi) = 1,760 yards (yd)

1 yard (yd) = 3 feet (ft)

1 foot (ft) = 12 inches (in)

larger Metric smaller

1 kilometer (km) = 1,000 meters (m)

1 meter (m) = 100 centimeters (cm)

1 centimeter (cm) = 10 millimeters (mm)

VOLUME AND CAPACITY

larger Customary smaller

1 gallon (gal) = 4 quarts (qt)

1 quart (qt) = 2 pints (pt)

1 pint (pt) = 2 cups (c)

1 cup (c) = 8 fluid ounces (fl oz)

larger Metric smaller

1 liter (L) = 1,000 milliliters (mL)

WEIGHT AND MASS

larger Customary smaller

1 ton (T) = 2,000 pounds (lb)

1 pound (lb) = 16 ounces (oz)

larger Metric smaller

1 kilogram (kg) = 1,000 grams (g)

1 gram (g) = 1,000 milligrams (mg)

TIME

larger smaller

1 year = 12 months

1 year = 52 weeks

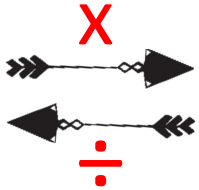
1 week = 7 days

1 day = 24 hours

1 hour = 60 minutes

1 minute = 60 seconds

Fill-in the relationship between larger to smaller units.



Measurement CONVERSIONS

The distance from Joseph's back door to his back fence is 14 yards. How many feet is that equivalent to?

Fill in the units from the problem. What am I starting with and what am I changing it into?

1	x 3 =	3
14	x 3=	42

On the first line complete what you know from your STAAR chart. Match the units to the correct column. Complete the expression column.

Fill in the numbers from the problem.

Hannah has 24 feet of fabric to make curtains. How many yards is that equivalent to?

3	÷ 3 =	1
24	÷ 3 =	8

Jacob's snake is 3 feet long. How many inches long is his snake?

1	x 12 =	12
3	x 12 =	36

Kara's jump rope is 84 inches long. How many feet is her jump rope?

12	÷ 12 =	1
84	÷ 12 =	7

Emiliano ran 3 miles. How many yards is that equivalent to?

1	x 1,760	1,760
3	x 1,760	5,280

Problem Solving with CONVERSIONS

Read each problem carefully.
Highlight the units used in the problem (cm, meters, km).
Use the tables to help you make conversions to solve each problem.

1. Isaac's soccer team is practicing on a soccer field that is 100 meters long. How many times does the team need to run the entire length of the field to run 2 km?

Step 1: convert 2 km to meters
2 x 1,000 = 2,000 meters

Step 2: Divide the total distance by the length of each run down the field. 2,000 ÷ 100 = 20.

The team needs to run the length of the field **20 times** to run 2 km.

1	X 1,000 =	1,000
2	X 1,000 =	2,000

2. Jordyn has 425 cm of pink ribbon and 275 cm of gold ribbon. How many meters of ribbon does she have in all?

Step 1: Add the lengths of the two colors of ribbon. 275 cm + 425 cm = 700 cm

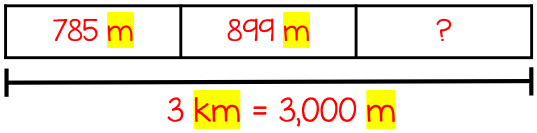
Step 2: Convert the sum to meters to answer the question. 700 cm ÷ 100 = 7m

She has **7 meters** of ribbon.

100	÷ 100 =	1
700	÷ 100 =	7

3. Evan is running a 3 km race. He ran 785 meters before the first water stop. He ran 899 meters from the first to the second water stops. How much farther does he need to run to finish the race?

Step 1: Draw a strip diagram to visualize the problem.



Step 2: Convert 3 km to meters and add the solution to the strip diagram.
3 km x 1,000 = 3,000 m

1	X 1,000 =	1,000
3	X 1,000 =	3,000

Step 3: Use the strip diagram to help solve.
3,000 m - 785 m - 899 m = **1,316 m to finish the race.**

Problem Solving with CONVERSIONS 2

Read each problem carefully.
Highlight the units used in the problem (cm, meters, km).
Use the tables to help you make conversions to solve each problem.

1. There are 128 ounces of lemonade in a jug. How many cups is this amount of lemonade equivalent to?

128 fl. oz. ÷ 8 = 16 cups

8	÷ 8	1
128	÷ 8	16

2. An ice cream parlor has 6 quarts of ice cream in a container. They make 8 one pint ice cream sundaes. How many pints of ice cream are left in the container?

Step 1: convert 6 quarts to pints.
6 q x 2 = 12 p

Step 2: Subtract the pints of cream used for sundaes from the total pints in the container.
12 p - 8 p = 4 p

There are 4 pints of ice cream left.

1	x 2	2
6	x 2	12

3. Lilliana has 1 liter of distilled water. She pours 175 mL into each of 5 graduated cylinders. How much distilled water is in her original container?

Step 1: convert 1 L to mL
Step 2: create a strip diagram

175	175	175	175	175	?

1 liter = 1,000 mL

Step 3: Find the total amount poured into cylinders. 5 x 175 = 875 mL

1	x 1,000	1,000
not used		

Step 4: Subtract the amount poured into the 5 cylinders from the total.
1,000 mL - 875 mL = 125 mL

Customary **LENGTH**

Think about the size of each unit of measure.
List things that are about that length.

INCH

small paperclip

sample answers:

width of a watch face
length of a beetle
width of a bottle cap
length of an eraser top

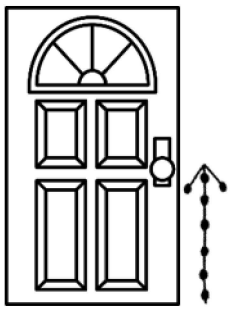
FOOT

A floor tile

sample answers:

length of a shoe
length of a sheet of paper
height of a binder

YARD



From the ground to the door knob

sample answers:

length of a baseball bat
length of 3 floor tiles

MILE

Distance you drive

sample answers:

4 laps around the track
From school to _____.
How far you can walk in 15-20 minutes.

Thinking About **MILES & KM**

Pick 3 locations to travel to from school.

Use Google Maps to find the distance in miles and km to each of those destinations.

Determine how long it would take in minutes and/or hours to drive or walk to that location.

Answers are dependent on your selections as a class.

From school to _____

is _____ miles (or _____ km)

It would take _____ to drive there.

It would take _____ to walk there.

From school to _____

is _____ miles (or _____ km)

It would take _____ to drive there.

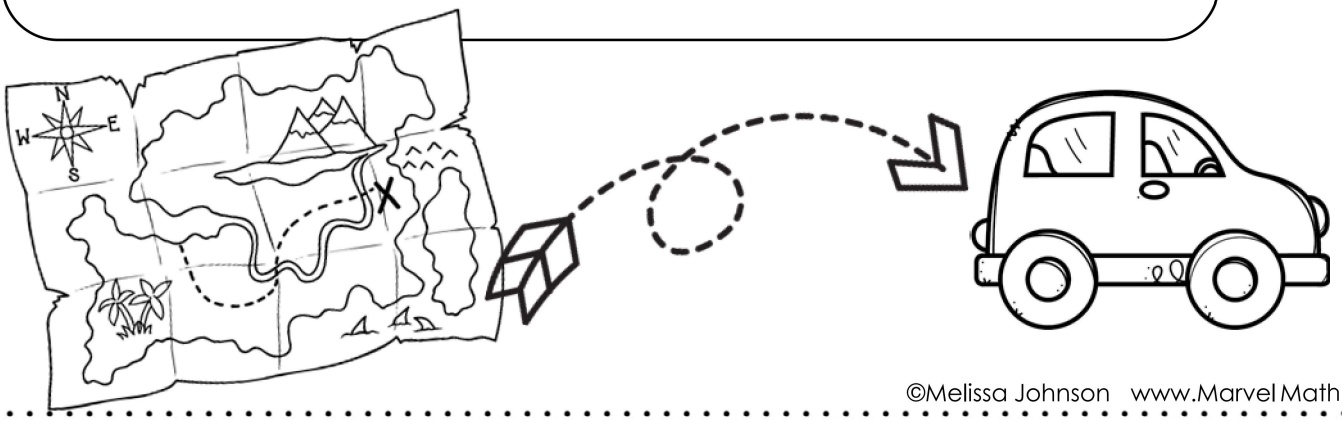
It would take _____ to walk there.

From school to _____

is _____ miles (or _____ km)

It would take _____ to drive there.

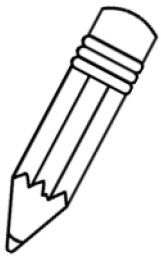
It would take _____ to walk there.



Metric LENGTH

Think about the size of each unit of measure.
List things that are about that length.

Millimeter
mm



Pencil point

sample answers:

width of the hands on a small clock face
width of a piece of spaghetti
width of a grain of rice

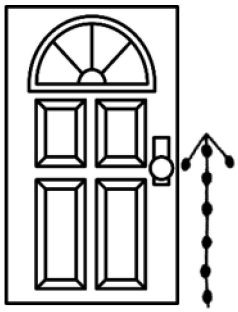
Centimeter
cm

Width of your pinky

sample answers:

length of a grain of rice
width of your pencil
width of a tube of chapstick

Meter
m



A little farther than the doorknob

sample answers:

length of a baseball bat
length of 3 floor tiles

Kilometer
km

Distance you drive, a little shorter than a mile

sample answers:

2 ½ laps around the track
From school to _____.
How far you can walk in 10-15 minutes.
(A km is about 0.62 miles)

Customary * CAPACITY * Metric

Think about the size of each unit of measure.
List things that are about that capacity.

fluid ounce
fl oz

4 spoonfuls

sample answers:
a dipping sauce at Chick-fil-A (i.e. Polynesian)

cup
c

sample answers:

mini water bottles
amount of ice cream on a cone at McDonalds

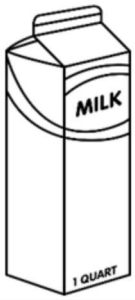
pint
p

Grande size coffee at Starbucks

sample answers:

pint of ice cream
standard size disposable water bottle

quart
q



sample answers:

large jar of pasta sauce, family size container of syrup

gallon
gal

sample answers:

milk, water jugs

milliliter
ml

a drop of water

sample answer:
drop of glue

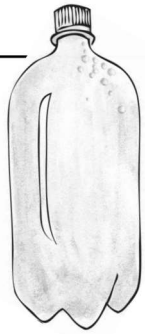
A milliliter is much smaller than a fluid ounce.

A liter is just a little larger than a quart. 1 quart = 0.946 liter

liter
l

sample answers:
large bottle of water, ½ of a 2-liter of soda

Think about a 2 liter of soda. Half of that amount is 1 liter.



Customary WEIGHT

Think about the size of each unit of measure.
List things that are about that weight.

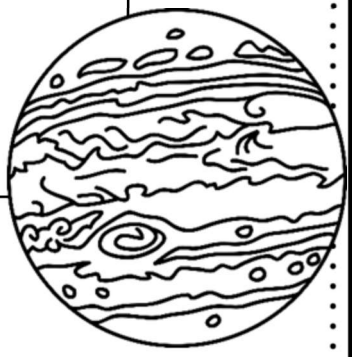
How is weight different from mass?
Weight is the measure of gravitational pull on an object. Weight will be different on different planets because their gravitational pull is different. Mass is the amount of matter in an object and never changes.

Weight of a football on earth:
1 lb

Weight of a football on the (earth's) moon:
0.166 lb

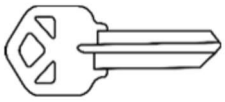
Weight on moon=
Weight on earth x 0.166

Weight of a football on Jupiter:
2.52 lb



Weight on Jupiter=
Weight on earth x 2.52

ounces
oz



Imagine holding a key

sample answers:

slice of bread
5 quarters
bouncy ball
CD

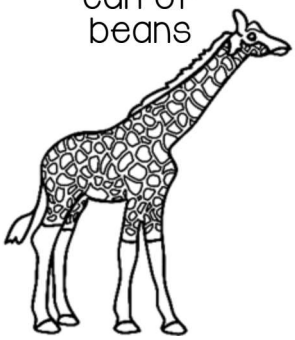
pound
lb

Imagine holding a can of beans

sample answers:

kitten
football
soccer ball (size 5)

ton
T



sample answers:

A car is about 2 tons.
A 3 person jet ski is about ½ ton.

Metric **MASS**

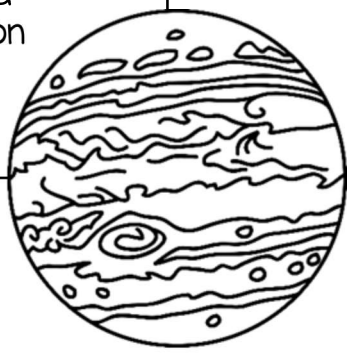
Think about the size of each unit of measure.
List things that are about that mass.

How is mass different from weight?
Mass is a measure of the amount of matter in an object. Mass does not change from planet to planet. Weight measures the gravitational pull on an object and changes from planet to planet.

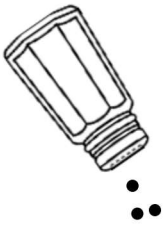
Mass of a football on earth:
400 g

Mass of a football on the (earth's) moon:
400 g

Mass of a football on Jupiter:
400 g



milligram
mg



Imagine holding one grain of salt

sample answers:

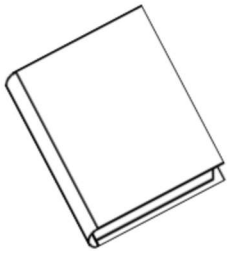
grain of rice (2-3 mg)
strand of hair

gram
g

Imagine holding a paperclip

sample answers:
cotton ball
a single m&m
US dollar bill
micro-SD card
A coffee bean weighs about 30 g.
A pencil is about 10 g.

kilogram
kg



Imagine holding a dictionary

sample answers:

math textbook
liter of water
A 2 liter of soda is about 2 kg.

Converting TIME

Change time in minutes to time in hours and minutes:

84 minutes → 84 − 60 (Take out 60 minutes and add 1 hour) = 1 hour **24** minutes

92 minutes → 92 − 60 (Take out 60 minutes and add 1 hour) = 1 hour **32** minutes

115 minutes → 115 − 60 = 1 hour **55** minutes

107 minutes → 107 − 60 = 1 hour **47** minutes

124 minutes → 124 − 120 (Take out 120 minutes and add 2 hours) = 2 hour **4** minutes

Hours	Minutes
1	60
2	120
3	180
4	240

135 minutes → 135 − 120 = 2 hours **15** minutes

247 minutes → 247 − 240 = 4 hours **7** minutes

Elapsed TIME: 2 WAYS

Jacob started mowing the lawn at 2:53 pm. It took him 42 minutes to mow the lawn. What time did he finish?

Add & Regroup

2:53 Start time

42 min Elapsed time

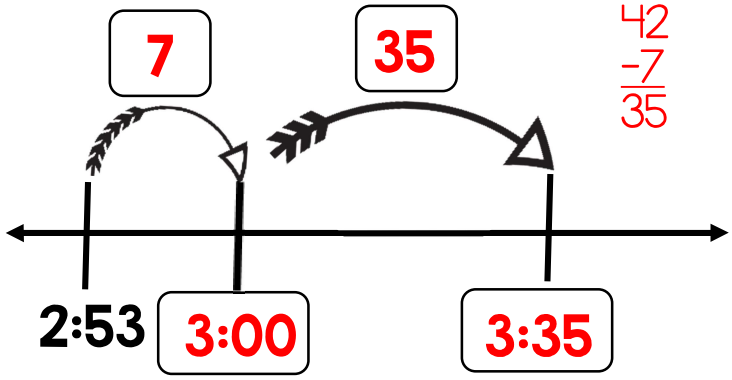
Regroup: Take out 60 minutes and add 1 hour

2:53
+ :42
2:95
-60
2:35
+1
3:35

Open Time Line

1. How many minutes do you need to jump to get to the next hour?

3. How many more minutes or hours do you need to jump?



42
-7
35

2. Label the next hour

4. What time do you end at?

Kaylee is driving to dance practice. She left her house at 3:47. It takes 25 minutes to drive to dance. What time will she arrive?

Add & Regroup

3:47 Start time

25 min Elapsed time

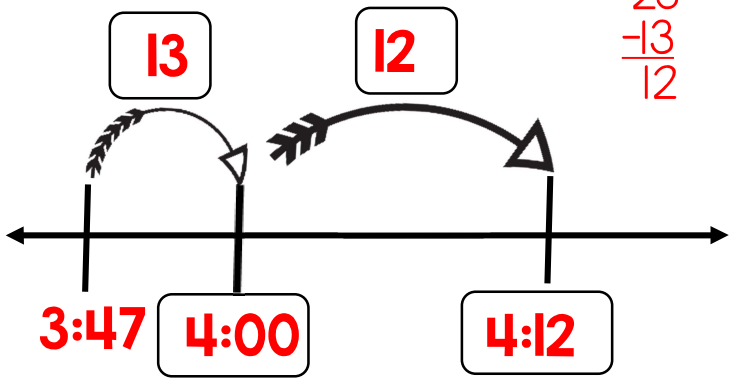
Regroup: Take out 60 minutes and add 1 hour

3:47
+ :25
3:72
-60
3:12
+1
4:12

Open Time Line

1. How many minutes do you need to jump to get to the next hour?

3. How many more minutes or hours do you need to jump?



25
-13
12

2. Label the next hour

4. What time do you end at?

Elapsed TIME: 2 WAYS

More than 1 hour

Trinity is making a pudding filled cake. The instructions say to chill the cake for 155 minutes before serving. If Trinity puts the cake in the refrigerator at 4:25 to chill, what is the earliest time she can serve the cake?

Add & Regroup

155
-120
2 hrs 35 min

4:25
+2:35
6:60
-60
6:00
+1
7:00

Regroup: Take out 60 minutes and add 1 hour

Open Time Line

1. How many minutes do you need to jump to get to the next hour?

60
-25
35

35

3. How many more minutes or hours do you need to jump?

155
-35
120= 2 hrs.

2 hrs.

4:25 | 5:00 | 7:00

2. Label the next hour

4. What time do you end at?

The first problem shows a 2 hr. jump in the open time line. Students could also jump 1 hour at a time, using 2 jumps.

Ed started horse back riding at 11:08. He rode his horse for 227 minutes. What time did he finish his ride?

227
-52 1st jump
175
-60 Jump 1 hr.
115
-60 Jump 1 hr.
55
Last jump

Add & Regroup

227
-180
3 hrs 47 min

11:08
+3:47
14:55
(military time)
14:55
-12
2:55

Subtract 12 hours

Open Time Line

1. How many minutes do you need to jump to get to the next hour?

60
- 8
52

52 min. | 1 hr. | 1 hr. | 55 min.

3. How many more minutes or hours do you need to jump?

11:08 | 12:00 | 1:00 | 2:00 | 2:55

2. Label the next hours

4. What time do you end at?

Credits


SARAH PECORINO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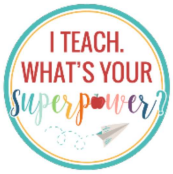
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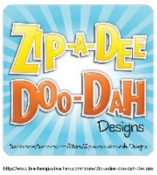
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