# Math Challenge #13

**SOLUTIONS**

## Measurement

Measurement is finding a number that shows the size or amount of something. We measure different things, but we mostly measure ***Length, Weight, Time, Volume and Capacity***. In this challenge, you will be solving math problems involving the different types of measurements.

| Customary Length | |
|---|---|
| 12 in | 1 ft |
| 3 ft | 1 yd |
| 1760 yd | 1 mi |

| Customary Weight | |
|---|---|
| 16 oz | 1 lb |
| 2000 lb | 1 ton |

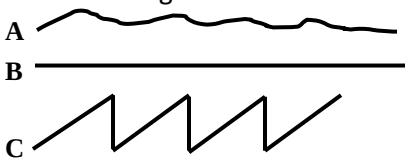
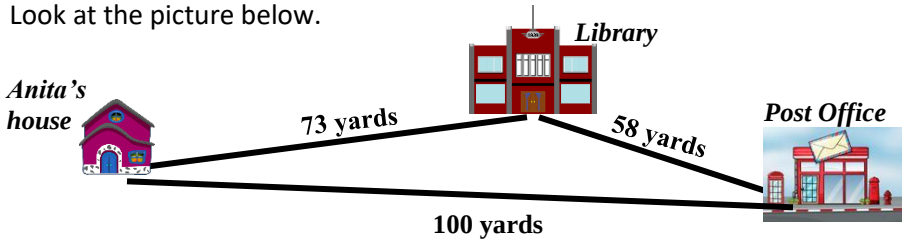
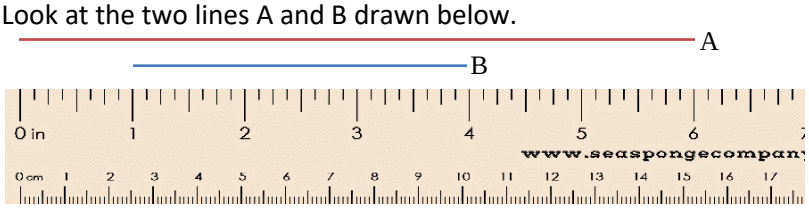
| Customary Capacity | |
|---|---|
| 8 fl oz | 1 c |
| 2 c | 1 pt |
| 2 pt | 1 qt |
| 4 qt | 1 gal |

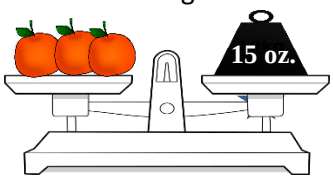
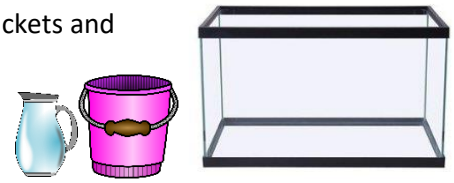
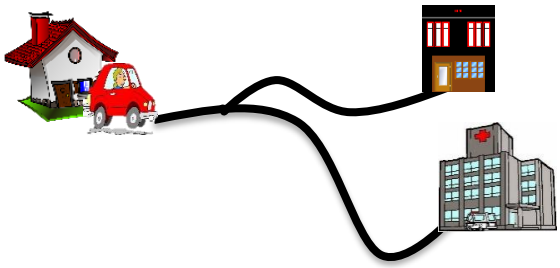
| Metric Length | |
|---|---|
| 10 mm | 1 cm |
| 100 cm | 1 m |
| 1000 m | 1 km |

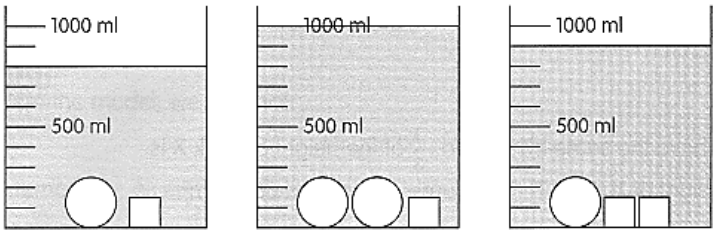
| Metric Mass | |
|---|---|
| 1000 mg | 1 g |
| 1000 g | 1 kg |

| Metric Capacity | |
|---|---|
| 1000 mL | 1 L |

**Kinder & First Grade: solve <u>at least</u> 3 problems.**
**Second & Third Grade: solve <u>at least 6</u> problems.**
**Fourth Grade and above: solve <u>at least 12</u> problems.**

| *Problems* | | *Answer* |
|---|---|---|
| 1. | Order the following three lines according to their lengths from the shortest to the longest.<br>  <br> | *BAC* |
| 2. | Look at the picture below.<br>  <br><br>Fill in the blank:<br>a. How many yards away is the library from Anita's house?<br>b. If Anita decides to go to the library then to the post office, how far, in yards, does she travel? | *a. 73 yards*<br>*b. 131 yards* |
| 3. | Look at the two lines A and B drawn below.<br>  <br><br>How many inches longer is line A than line B? | *3 [inches]* |

| | | |
|---|---|---|
| 4. | Look at the diagram below.<br>  <br><br>The weight of each  is _____ oz. | *5 [oz.]* |
| 5. | A small watering can has 4 cups of water. A bucket contains 5 times as much water as the small watering can. How many cups of water are in **both** containers? | *24 [cups]* |
| 6. | Ciara is 3 feet and 6 inches tall and her sister, Jessica, is 50 inches tall. What is the difference in their height? Express your answer in inches. | *8 [inches]* |
| 7. | A pitcher contains 2 quarts of water. The water in 3 such pitchers is poured into a bucket. Lisa took 8 such buckets and poured the water into a tank. How many gallons of water is in the tank?<br>  <br>3 pitchers = 6 quarts of water were poured in to a bucket.<br>8 buckets: 8 x 6 quarts of water = 48 quarts of water = **12 gallons.** | *12 [gallons]* |
| 8. | An ant is in a well and it wants to get out. The well is 6 m deep. Each day, the ant climbs up 4 m, but at night it slides back down 2 m. How many days will it take the ant reach the top of the well? | *2 [days)* |
| 9. | Warren weighs 94 lb. He is half as heavy as Uncle Mike. Uncle Mike weighs 4 times as much as his niece, Tina. How much does Tina weigh?<br>Uncle Mike is 94 x 2 = 188 lb. Tina: 188 lb./ 4 = **47 lb.** | *47 [lb.]* |
| 10. |  <br>The Golden Gate Bridge of San Francisco is 4,200 feet long. San Francisco's Transbay Bridge is 2,310 feet long. If Jenna walked both bridges both ways, about how many miles would Jenna have walked?<br>1 mile = 5280 feet<br>Jenna would have walked: (4,200 x 2) + (2,310 x 2) = 13,020 feet.<br>Convert feet to miles: 13,020÷5280=2.465mi,2.47 → about **2.5 miles.** | *2.5 [miles], or 2 ½ [miles].* |
| 11. | Mr. Toll works at an office that is located 13.2 miles away from his house. He goes to work 5 days a week, Monday to Friday. On Saturday and Sunday, he goes to volunteer for a couple hours at a nearby hospital. The distance from his office to the hospital is 18 miles. The distance from the intersection to the hospital is 6.75 miles. Last week Mr. Toll drive his car only to and from his work and to and from the hospital. What was the total distance he drove last week assuming there are no other routes other than the one shown in the figure above?<br>  <br>The distance from home to work is 13.2 miles. The distance from intersection to the office is 18 – 6.75 = 11.25 miles. The distance from home to the hospital is: (13.2 - 11.25) + 6.75 = 8.70 miles.<br>He drove a total distance of (5 x 13.2 x 2) + (2 x 8.70 x 2) = 132 + 34.80 = **166.8 miles** last week. | *166.8 [miles]* |

| | | |
|---|---|---|
| 12. | Charles Lindbergh was the first person to fly across the Atlantic Ocean alone. He flew 3,610 miles in 33.5 hours. How many miles per hour did he fly?<br>3,610 miles/33.5 hours = **107.76 miles per hour.** | *107.76 [miles per hour]* |
| 13. | Elizabeth estimates the distance between two cities on a map using her thumb, from knuckle to thumb tip. The distance is 7 thumb units. Joey uses his thumb to measure the same distance and comes up with 6 thumb units. Elizabeth's thumb unit measures 15 miles what does Joey's thumb unit measure?<br>The distance of the two cities: 7 x 15 = 105 miles. Joey's thumb unit: 105 miles ÷ 6 = **17.5 miles** | *17.5 [miles]* |
| 14. | A tablespoon is half of a fluid ounce, a cup is 8 fluid ounces, and a gallon is 16 cups. How many tablespoons are in a gallon?<br>1 $gallon$=16 $cups$=16×8 $oz$=128 $oz$=128×2 $tbsps$=$\mathbf{256\ tbsps}$ | *256 [tablespoons]* |
| 15. | Peter had a 12:00 pm appointment that was 60 miles from his house. He drove from his home at an average rate of 40 mph and arrived 15 minutes late. At what time did Peter leave home for the appointment?<br>60 / 40 = 1h 30 min of driving he was 15 min late, so he came to the appointment at 12:15 pm. Thus, he left his home at 10:45 am | *10:45 am* |
| 16. | Locks of Love is a non-profit organization that provides wigs to people who have lost their hair due to chemotherapy. Eliza cut off 18 inches of her hair for "Locks of Love." It took her 2.5 years to grow it back. How much did her hair grow each month?<br>2.5 years = 30 months 18 $inches/30\ months$ = 6 $inches/10\ months$ = $\mathbf{0.6\ inches\ per\ month}$ | *0.6 [inches]* |
| 17. | A firefighter is climbing a ladder that is leaning against the top of a 144-foot building. The base of the ladder is 60 feet from the building. If the firefighter climbs at the rate of 9 feet per second, how long until he reaches the top of the building?<br>Length of the ladder: $\sqrt{144 \times 144 + 3600} = 156\ ft.$<br>The amount of time to reach the top of the building: $156 \div 9 = \mathbf{17\frac{1}{3}\ seconds}$ | *17 1/3 [seconds]* |
| 18. | The beakers below contain the same amount of water. They contain some cubes and balls. Find the volume of a cube and a ball together.<br>  <br><br>If you subtract the volume that is shown on the first beaker from the second beaker, you'll have the volume of the ball: 100 – 800 = 200 ml<br>If you subtract the volume that is shown on the first beaker from the third one, you'll get the volume of the cube: 900 – 800 = 100 ml.<br>Thus, the volume of the ball and cube together is **300 ml.** | *300 [ml]* |

*Solution is available on 4/13/2017 at* www.mathinaction.org