Problem of the Day

School Days 1-90

September, October, November, December, January

Mental Math and Equivalents

Memorizing math facts, definitions, equivalents, figures, etc. allows your "working memory" more brain space to problem solve!

School Day 1

- List the first 12 numbers in the set of Whole Numbers
- List any 20 integers
- List the first four ordinal numbers
- List the prime numbers under 20

Solution Day 1

- List the first 12 numbers in the set of Whole Numbers
  - **0,1,2,3,4,5,6,7,8,9,10,11,12**
- List any 20 integers
  - **+ or – any whole number, i.e. 1, -2, 4, 7, 100, -35, etc.**
- List the first four ordinal numbers
  - **First, second, third, fourth**
- List the prime numbers under 20
  - **1,2,3,5,7,11,13,17,19**

Define "prime number".

School Day 2

- List the squares of 1 - 20
- List the cubes of 1 – 10
- What are the square roots of the following perfect squares - 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, and 144?
- What are the cube roots of 8, 27, 64, and 125?

Solution Day 2

- List the squares of 1 - 20
  - **1,4,9,14,25,36,42,64,81,100,121,144,169,196,225,256, 289,324,361,400**
- List the cubes of 1 – 10
  - **1,8,27,64,125,216,343,512,729,1000**
- What are the square roots of the following perfect squares - 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, and 144?
  - **2,3,4,5,6,7,8,9,10,11,12**
- What are the cube roots of 8, 27, 64, and 125?
  - **2,3,4,5**

Where do the terms square root and cube root come from?

School Day 3

- How do you know that a number is divisible by:
  - 2?
  - 3?
  - 5?
  - 10?
  - 100?

Solution Day 3

- How do you know that a number is divisible by:
  - 2 - **An even number with a 0,2,4,6, or 8 in the Ones place**
  - 3 – **Sum of digits is divisible by 3**
  - 5 – **a 0 or 5 in the Ones place**
  - 10 – **a 0 in the Ones place**
  - 100 - **a 0 in both the Tens and Ones places**

What does "divisible" mean?

School Day 4

- What is the GCF of 24 and 36?
- What is the LCM of 10 and 15?

Solution Day 4

- What is the GCF of 24 and 36? - **12**
- What is the LCM of 10 and 15? – **30**

What is the difference between GCF and LCM?

School Day 5

- List 5 fractions equivalent to ½
- List 3 decimals equivalent to ½
- List a percentage equivalent to ½

Solution Day 5

- List 5 fractions equivalent to ½
  - ◦ **Infinite equivalents; i.e. 2/4, 3/6, 10/20, 50/100, etc.**
- List 3 decimals equivalent to ½
  - ◦ **Infinite equivalents; i.e. 0.5, 0.50, 0.500, etc.**
- List a percentage equivalent to ½
  - ◦ **Most common is 50%, but there are infinite equivalents when you include decimals i.e. 50.0%, 50.00%, etc.**

Why is there an infinite amount of equivalents for any value?

School Day 6

- Simplify or reduce these fractions:
  - 18/24
  - 9/12
  - 5/20
  - 12/40
- Change these improper fractions to mixed numbers:
  - 7/5
  - 8/3
  - 18/4

Solution Day 6

- Simplify or reduce these fractions:
  - 18/24 – **¾**
  - 9/12 – **¾**
  - 5/20 – **¼**
  - 12/40 – **3/10**
- Change these improper fractions to mixed numbers:
  - 7/5 – **1 2/5**
  - 8/3 – **2 ¼**
  - 18/4 – **4 ½**

Why do we have different ways for writing the same values?

School Day 7

- What is one reciprocal of ¾?
- Name two reciprocals of ⅝
- Name a reciprocal of ⅛
- Name a reciprocal of 2
- What is the reciprocal of 1?

Solution Day 7

- What is one reciprocal of ¾?
  - ◦ **Infinite, but most common is 4/3; other equivalents are 8/6, 1 ⅓, 1. 3 etc.**
- Name two reciprocals of ⅝
  - ◦ **Infinite, i.e. 8/5, 16/10, 24/15, 1 3/5, 1.6, etc.**
- Name a reciprocal of ⅛
  - ◦ **Infinite, i.e. 8, 8.0, 8.00, etc.**
- Name a reciprocal of 2
  - ◦ **Infinite, i.e. ½, 2/4, 4/8, 0.5, 0.50, etc.**
- What is the reciprocal of 1?
  - ◦ **1**

Why is "1" its own reciprocal?

School Day 8

- 345.678
- What is the digit in the hundreds place?
- What is the digit in the tenths place?
- What is the digit in the ones place?
- What is the digit in the thousandths place?

Solution Day 8

- 345.678
- What is the digit in the hundreds place?
  - **3**
- What is the digit in the tenths place?
  - **6**
- What is the digit in the ones place?
  - **5**
- What is the digit in the thousandths place?
  - **8**

What is the difference between "tens" and "tenths" places?

School Day 9

- List a decimal and a percent that is equivalent to:
  - ¼
  - ¾
  - ⅓
  - ⅔

Solution Day 9

- List a decimal and a percent that is equivalent to:

- **Infinite solutions, most common examples of a correct solution are:**
  - ¼ - **0.25, 25%**
  - ¾ - **0.75, 75%**
  - ⅓ - **$0.\overline{3}$, 33 ⅓ %, 33.$\overline{3}$%**
  - ⅔ - **$0.\overline{6}$, 66 ⅔ %, 66.$\overline{6}$%**

School Day 10

- What is 10% of 100?
- What is 15% of 200?
- What is 20% of 300?
- What is 50% of 1000?

Solution Day 10

- What is 10% of 100? - **10**
- What is 15% of 200? - **30**
- What is 20% of 300? - **60**
- What is 50% of 1000? - **500**

What is a quick way to find these types of percentages?

School Day 11

- How many inches in a foot?
- How many feet in a yard?
- How many inches in a yard?
- How many feet in a mile?
- How many yards in a mile

Solution Day 11

- How many inches in a foot? – **12"**
- How many feet in a yard? – **3'**
- How many inches in a yard? – **36"**
- How many feet in a mile? – **5280'**
- How many yards in a mile? – **1760 yd**

School Day 12

- How many quarts in a gallon?
- How many ounces in a cup?
- How many cups in a pint?
- How many ounces in a pound?
- How many pounds in a ton?

Solution Day 12

- How many quarts in a gallon? – **4 qt**
- How many ounces in a cup? – **8 oz**
- How many cups in a pint? – **2 c**
- How many ounces in a pound? - **16 oz**
- How many pounds in a ton? – **2000 lb**

School Day 13

- How many meters in a kilometer?
- How many centimeters in a meter?
- How many grams in a kilogram?
- How many millimeters in a meter?
- How many milligrams in a gram?
- How many milliliters in a liter?

Solution Day 13

- How many meters in a kilometer? – **1000m**
- How many centimeters in a meter? – **100 cm**
- How many grams in a kilogram? – **1000 g**
- How many millimeters in a meter? – **1000 mm**
- How many milligrams in a gram? – **1000 mg**
- How many milliliters in a liter? – **1000 ml**

Explain how the metric system is set up.

School Day 14

- How many seconds in a minute?
- How many minutes in an hour?
- How many hours in a day?
- How many days in a week?
- How many days in a year?
- How many months in a year?
- How many weeks in a year?
- How many years in a decade?
- How many years in a century?
- How many years in a millennium?

Solution Day 14

- How many seconds in a minute? – **3600 sec**
- How many minutes in an hour? – **60 min**
- How many hours in a day? – **24 hr**
- How many days in a week? – **7 d**
- How many days in a year? – **365 d**
- How many months in a year? – **12 mo**
- How many weeks in a year? – **52 wk**
- How many years in a decade? – **10 yr**
- How many years in a century? – **100 yr**
- How many years in a millennium? – **1000 yr**

School Day 15

- How many degrees in a circle?
- How many degrees in a right angle?
- What is the boiling point of water in Fahrenheit degrees?
- What is the boiling point of water in Celsius degrees?
- What is the freezing point of water in Fahrenheit degrees?
- What is the freezing point of water in Celsius degrees?
- What is normal body temperature in Fahrenheit degrees?

Solution Day 15

- How many degrees in a circle? - **360⁰**
- How many degrees in a right angle? - **90⁰**
- What is the boiling point of water in Fahrenheit degrees? - **212⁰F**
- What is the boiling point of water in Celsius degrees? - **100⁰C**
- What is the freezing point of water in Fahrenheit degrees? - **32⁰F**
- What is the freezing point of water in Celsius degrees? - **0⁰C**
- What is normal body temperature in Fahrenheit degrees? – **98.6⁰F**

School Day 16

- Draw a sketch and label these 1-Dimensional Figures:
  - Circle
  - Square
  - Rectangle
  - Right Triangle
  - Trapezoid
  - Rhombus
  - Parallelogram
  - Pentagon
  - Hexagon
  - Octagon

Solution Day 16

- Draw a sketch and label these 1-Dimensional Figures:
  - Circle all points equidistance from center
  - Square 4 sides equivalent, 90⁰ angles
  - Rectangle 4 sides, opposite sides equivalent, 90⁰ angles
  - Right Triangle 3 sides, one 90⁰ angle

  - Trapezoid 4 sides
  - Rhombus 4 equivalent sides
  - Parallelogram 4 sides, opposite sides parallel
  - Pentagon 5 sides
  - Hexagon 6 sides

  - Octagon 8 sides

These are examples of correct sketches with a definition.

School Day 17

- Draw a sketch and label these 3-Dimensional Figures:
  - Rectangular Prism
  - Triangular Prism
  - Cube
  - Pyramid
  - Cylinder
  - Cone
  - Sphere

Solution Day 17

- Draw a sketch and label these 3-Dimensional Figures:
  - Rectangular Prism
  - Triangular Prism
  - Cube
  - Pyramid
  - Cylinder
  - Cone
  - Sphere

  Examples of possible sketches
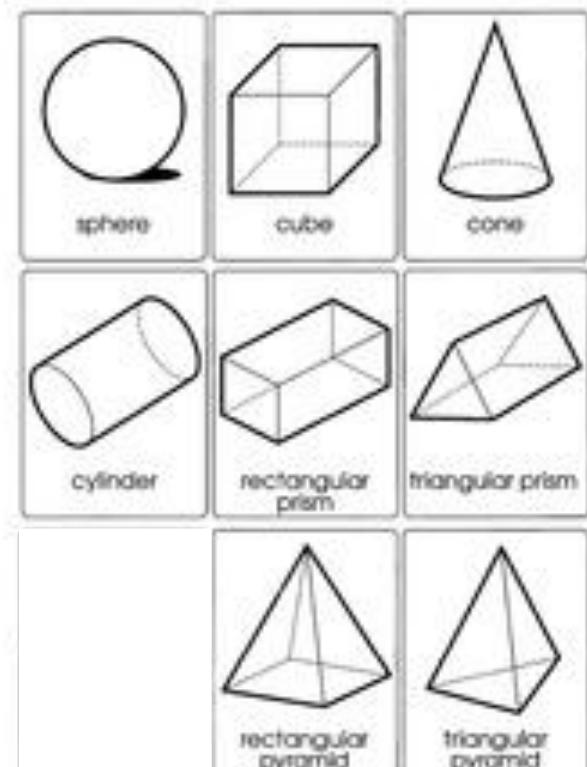
School Day 18

- Draw a sketch and label:
  - Parallel lines
  - Perpendicular lines
  - Intersecting lines
  - Tangent line
  - Point
  - Right Angle

Solution Day 18

- Draw a sketch and label:
  - Parallel lines
  - Perpendicular lines
  - Intersecting lines
  - Tangent line
  - Point
  - Right Angle
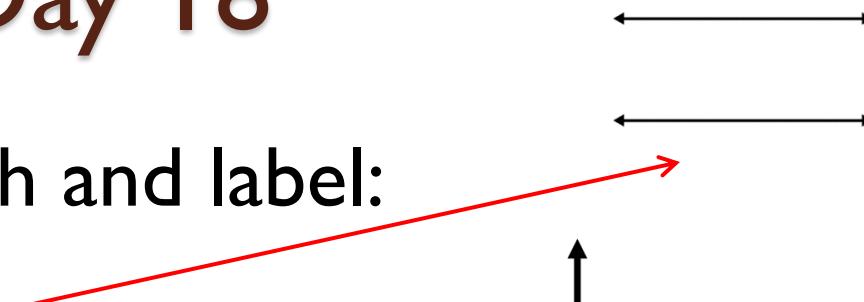
A

Point of Intersection

Right Angle

Angle measures exactly 90°

y

Tangent line

x
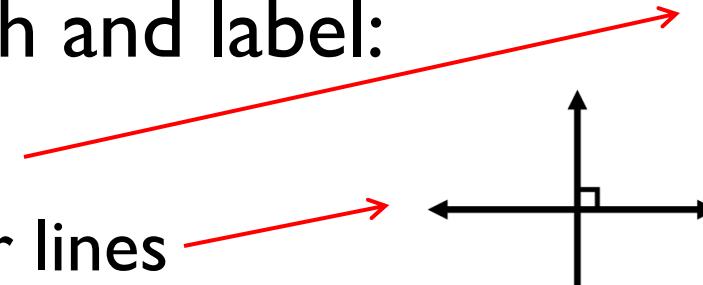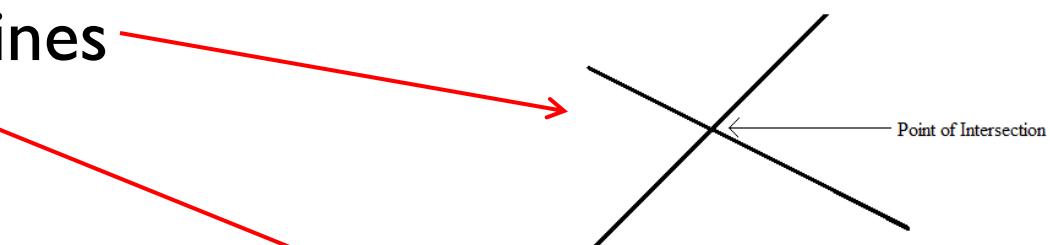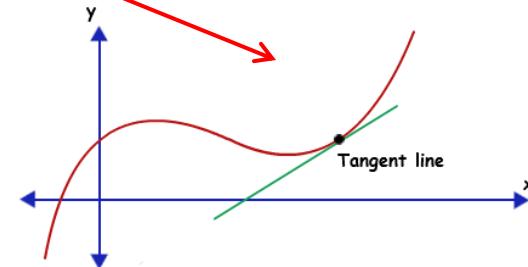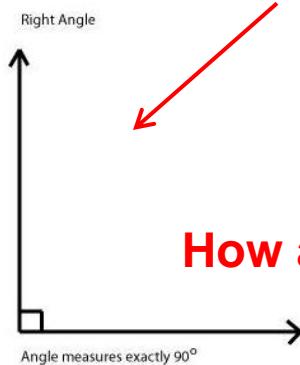
How are intersecting lines and perpendicular lines the same?

School Day 19

What are these abbreviations?

- in., yd., ft., pt., qt., tsp., tbs., c., lb., oz., mi., ", and '

- g, m, L, cm, mm, km, mL, kL, kg, and Ω

- ^{2}, ^{3}, °, Δ, $, ¢, #, %, and ^

- <, >, ≈, ≠, ≤, ≥, =, -, +, ÷, x, •, and ∞

Solution Day 19

What are these abbreviations?

- in., yd., ft., pt., qt., tsp., tbs., c., lb., oz., mi., ″, and ′
  - **inch, yard, foot, pint, quart, teaspoon, tablespoon, cup, pound, ounce, mile, inch, foot**
- g, m, L, cm, mm, km, mL, kL, kg, and Ω
  - **gram, meter, liter, centimeter, millimeter, kilometer, milliliter, kiloliter, kilogram, ohm**
- ², ³, °, Δ, $, ¢, #, %, and ^
  - **Square, cube, degree, delta (change, heat), dollars, cents, number, percent, carat (power)**
- <, >, ≈, ≠, ≤, ≥, =, -, +, ÷, x, •, and ∞
  - **Less than, greater than, almost equal, not equal, less than or equal, greater than or equal, equal, subtract/minus, add/plus, divide, multiply/times, multiply/times, infinity**

School Day 20

- If you do not have your basic math facts completely memorized, you can practice using Flash Cards for addition, subtraction, multiplication or division which are available on these sites:
- http://www.factmonster.com/math/flashcards.html
- http://www.aplusmath.com/Flashcards/multiplication.html
- Check out the website and practice a little bit or a lot!
- **No Solution Slide**

Calculations and Calculators: Whole Numbers

Calculators can assist when computing with whole numbers, especially if the values are very large. They can also help you check your mental or paper and pencil math.

School Day 21

- Two problems are wrong – find then and explain the errors.

4559	1863	1259	58614
+4979	+5683	+4055	+38821
9738	7546	5314	87435

Solution Day 21

- Two problems are wrong – find them and explain the errors.

4559	1863	1259	58614
+4979	+5683	+4055	+38821
9738	7546	5314	87435
NO	**YES**	**YES**	**NO**

School Day 22

- Find and correct the mistakes in regrouping. Explain why regrouping is necessary in subtraction problems.

5703	9800	3864	2932
-2845	-5678	-1584	-1863
3168	4232	2388	1161

Solution Day 22

- Find and correct the mistakes in regrouping. Explain why regrouping is necessary in subtraction problems.

5703	9800	3864	2932
-2845	-5678	-1584	-1863
3168	4232	2388	1161
2835	**4122**	**2280**	**1069**

School Day 23

- Find and correct the mistakes. Discuss why subtraction is the inverse of addition.

4786	8205	10795	543792
-2809	-6593	-8876	-456386
1977	1712	1929	75416

Solution Day 23

- Find and correct the mistakes. Discuss why subtraction is the inverse of addition.

4786	8205	10795	543792
-2809	-6593	-8876	-456386
1977	1712	1929	75416
Correct	**1612**	**1919**	**87406**

School Day 24

- Find the missing digits □ to complete the problems. Explain the strategies you use.

```
  □  □   6  3          7  1  □  4  □
-  3  9  □  9       -  4  8  □     6
   2  8  3  □          6  □  2  7  0
```

Solution Day 24

- Find the missing digits □ to complete the problems. Explain the strategies you use.

```
  6 7 6 3              7 1 1 4 6
- 3 9 2 9            - 4 8 7 6
─────────            ───────────
  2 8 3 4            6 6 2 7 0
```

School Day 25

- A popular event at many field days is a tug-of-war. To balance the teams, the number of students on each side of the rope should be equal. If the number of students on one side of rope is 54, and the number of students on the other side is 36, how many students must be moved? Solve this problem using two different solution strategies and explain why they both work.

Solution Day 25

- A popular event at many field days is a tug-of-war. To balance the teams, the number of students on each side of the rope should be equal. If the number of students on one side of rope is 54, and the number of students on the other side is 36, how many students must be moved? Solve this problem using two different solution strategies and explain why they both work. **9 students**

School Day 26

- Find the mistake in each problem and correct it. Explain why it is incorrect.

296	183	1586	2087
x48	x79	x34	x63
2368	1647	6364	6261
1284	1281	4758	12442
15208	14557	53944	130681

Solution Day 26

- Find the mistake in each problem and correct it. Explain why it is incorrect.

296	183	1586	2087
x48	x79	x34	x63
2368	1647	6364	6261
+1284	+1281	+ 4758	+12442
15208	14557	53944	130681

14208   **14457**   **53924**   **131481**

School Day 27

- Find the missing digits □ to complete the problems. Explain the strategies you use.

$$
\begin{array}{r}
4\ \square\ 8 \\
\times\ \ 9\ \square \\
\hline
1\ 3\ 1\ 4 \\
3\ \square\ 4\ \square\ \square \\
\hline
\square\ 0\ \square\ 3\ 4
\end{array}
$$

$$
\begin{array}{r}
5\ \square\ \square\ 3 \\
\times\ \ \ \square\ 0\ 7 \\
\hline
3\ \square\ 2\ \square\ 1 \\
2\ \square\ 0\ 1\ \square\ 0\ 0 \\
\hline
2\ 8\ \square\ 0\ 7\ \square\ 1
\end{array}
$$

Solution Day 27

- Find the missing digits □ to complete the problems. Explain the strategies you use.

$$
\begin{array}{r}
4\ \mathbf{3}\ 8 \\
\times\ \ 9\ \mathbf{3} \\
\hline
1\ 3\ 1\ 4 \\
+\ 3\ \mathbf{9}\ 4\ \mathbf{2}\ \mathbf{0} \\
\hline
\mathbf{4}\ 0\ \mathbf{7}\ 3\ 4
\end{array}
$$

$$
\begin{array}{r}
5\ \mathbf{6}\ \mathbf{0}\ 3 \\
\times\ \ \ \ \mathbf{5}\ 0\ 7 \\
\hline
3\ \mathbf{9}\ 2\ \mathbf{2}\ 1 \\
+\ 2\ \mathbf{8}\ 0\ 1\ \mathbf{5}\ \mathbf{0}\ \mathbf{0} \\
\hline
2\ 8\ \mathbf{4}\ 0\ 7\ \mathbf{2}\ 1
\end{array}
$$

Why are there two zeros (blue) in this line?

School Day 28

- Divide and find the quotients. Then explain the pattern in each quotient.

91390 divided by 74

78033 divided by 57

45440 divided by 36

614439 divided by 63

Solution Day 28

- Divide and find the quotients. Then explain the pattern in each quotient.

91390 divided by 74   **1235**   **(sum of previous digits)**

78033 divided by 57   **1369**   **(3 times table)**

45440 divided by 36   **4040**   **(subtract 4, add 4)**

614439 divided by 63   **9753**   **(subtract 2)**

School Day 29

- Find and correct the mistakes. Explain the possible errors using mathematical terms.

$$
\begin{array}{r}
597 \text{ R } 2 \\
76)\overline{45380} \\
- 380 \\
\hline
738 \\
-684 \\
\hline
540 \\
- 532 \\
\hline
2
\end{array}
$$

$$
\begin{array}{r}
91 \text{ R } 52 \\
56)\overline{51408} \\
- 504 \\
\hline
108 \\
- 56 \\
\hline
52
\end{array}
$$

Solution Day 29

- Find and correct the mistakes. Explain the possible errors using mathematical terms.

$$
\begin{array}{r}
597 \text{ R } \mathbf{8} \\
76)\overline{45380} \\
-\ 380 \\
\hline
738 \\
-684 \\
\hline
540 \\
-\ 532 \\
\hline
\mathbf{8}
\end{array}
$$

$$
\begin{array}{r}
91\mathbf{8} \\
56)\overline{51408} \\
-\ 504 \\
\hline
10\mathbf{0} \\
-\ 56 \\
\hline
\mathbf{448} \\
\mathbf{-448} \\
\hline
\mathbf{0}
\end{array}
$$

School Day 30

- Check the quotients by multiplying and adding. If it is incorrect, correct it. Explain why multiplication and division are inverse operations.

3487 divided by 75 = 46 R 27

6792 divided by 84 = 80 R 22

92465 divided by 67 = 1390 R 5

Solution Day 30

- Check the quotients by multiplying and adding. If it is incorrect, correct it. Explain why multiplication and division are inverse operations.

3487 divided by 75 = 46 R 27 **Correct**

6792 divided by 84 = 80 R 22 **R 72**

92465 divided by 67 = 1390 R 5 **1380 R5**

School Day 31

- At the Carpenters Union Hall, 125 tradespersons were assembled for a new building project in the city. Thirty-five are only carpenters. Of the tradespersons who are masons, 15, are both carpenters and masons, 27 are both electricians and masons. How many are just masons? How many are carpenters? Do the results make sense?

Solution Day 31

- At the Carpenters Union Hall, 125 tradespersons were assembled for a new building project in the city. Thirty-five are only carpenters. Of the tradespersons who are masons, 15, are both carpenters and masons, 27 are both electricians and masons. How many are just masons? How many are carpenters? Do the results make sense?

48 just masons; 50 carpenters

School Day 32

- There are 112 students who signed up to play basketball in a recreation league. They have 14 sponsors. How many teams of 11 players each can be formed? Solve this problem using a diagram and explain your solution process. Explain any other solution methods.

Solution Day 32

- There are 112 students who signed up to play basketball in a recreation league. They have 14 sponsors. How many teams of 11 players each can be formed? Solve this problem using a diagram and explain your solution process. Explain any other solution methods.

10 Teams

School Day 33

- At Sandy's Salon, the experienced hairdressers always have 5 hair colorings a day. One day 3 more clients walked in each wanting their hair colored. The two newest stylists seldom have the opportunity to do hair coloring and the manager would like to do some coloring to keep her skills sharp. So, if the experienced hair stylists give up two of their hair coloring appointments, then will everybody be able to do three colorings each? How many experienced hair stylists are there? How many hair-coloring appointments are there? What would happen if one of the stylists called off that day – how would that change the solution?

Solution Day 33

- At Sandy's Salon, the experienced hairdressers always have 5 hair colorings a day. One day 3 more clients walked in each wanting their hair colored. The two newest stylists seldom have the opportunity to do hair coloring and the manager would like to do some coloring to keep her skills sharp. So, if the experienced hair stylists give up two of their hair coloring appointments, then will everybody be able to do three colorings each? How many experienced hair stylists are there? How many hair-coloring appointments are there? What would happen if one of the stylists called off that day – how would that change the solution?

- **3 experienced stylists; 18 hair-color appointments**

School Day 34

- As a home care visiting registered nurse you are helping your patient determine how many days of medication he will get out of the bottle of pills prescribed by his doctor. The bottle contains 240 pills. Each dose is one and a half pills. He needs to take his medication two times a day. How many doses are in the bottle and how many days of medication does your patient have?

Solution Day 34

- As a home care visiting registered nurse you are helping your patient determine how many days of medication he will get out of the bottle of pills prescribed by his doctor. The bottle contains 240 pills. Each dose is one and a half pills. He needs to take his medication two times a day. How many doses are in the bottle and how many days of medication does your patient have?   **Total doses – 160; 80 days of meds**

How does the solution change if the dosage is reduced to 1 pill per day, or increased to 2 pills/daily?

School Day 35

- Becky, the lab assistant for Bio-Tech Lab, found that one of the students from the last class accidentally removed the labels from the HCl and the NaCl bottles. But she remembered that the HCl weighs 2 times the weight of the NaCl and both bottles together weigh 39 oz. How much does each chemical weigh?

Solution Day 35

- Becky, the lab assistant for Bio-Tech Lab, found that one of the students from the last class accidentally removed the labels from the HCl and the NaCl bottles. But she remembered that the HCl weighs 2 times the weight of the NaCl and both bottles together weigh 39 oz. How much does each chemical weigh?

NaCl is 13 oz; HCl is 26 oz

What information in this problem helps you to solve the problem or gives a clue to a solution process?

School Day 36

- A magazine article reported that 17,000 people attended a free concert in the park. What number(s) below *cannot* be rounded to 17,000 and explain why.

16,500   16400   17500   17499   16499

Solution Day 36

- A magazine article reported that 17,000 people attended a free concert in the park. What number(s) below *cannot* be rounded to 17,000 and explain why.

16,500	16400	17500	17499	16499
YES	**NO**	**NO**	**YES**	**NO**

School Day 37

- A perfect square is a product of a natural number times itself. An example of a perfect square is 16, the result of 4 x 4. Another is 25, the result of 5 x 5. List the perfect squares starting with 1 and ending with 100.

Solution Day 37

- A perfect square is a product of a natural number times itself. An example of a perfect square is 16, the result of 4 x 4. Another is 25, the result of 5 x 5. List the perfect squares starting with 1 and ending with 100.

1, 4, 9, 16, 25, 36, 42, 64, 81, 100

Explain how perfect squares and powers of two are related.

School Day 38

- Three work crews from Louie Landscaping are planning bushed at the site of a new business complex. Each member of Sandy's crew can plant 3 times as many bushes a day as Brian's crew. Alina's crew can plan ½ as many bushes in a day as Brian's crew. If the total number of bushes planted in a day is 72, how many brushes can each crew plant in a day?

Solution Day 38

- Three work crews from Louie Landscaping are planning bushed at the site of a new business complex. Each member of Sandy's crew can plant 3 times as many bushes a day as Brian's crew. Alina's crew can plan ½ as many bushes in a day as Brian's crew. If the total number of bushes planted in a day is 72, how many brushes can each crew plant in a day?

Sandy – 48; Brian – 16; Alina – 8

What pattern or structure do you find in this problem?

School Day 39

- Baling hay is backbreaking work. Each bale weighs 50 lb. There is room in the barn for 12 wagonloads of hay. If a wagon can hold 5,000 lb of hay and there are already 300 bales in the barn, how many bales need to be made and placed to fill the barn? How many wagonloads are still needed to fill the barn?

Solution Day 39

- Baling hay is backbreaking work. Each bale weighs 50 lb. There is room in the barn for 12 wagonloads of hay. If a wagon can hold 5,000 lb of hay and there are already 300 bales in the barn, how many bales need to be made and placed to fill the barn? How many wagonloads are still needed to fill the barn?

900 bales needed to fill barn; 9 wagon loads

If this were a smaller barn, holding only 10 wagon loads, how does that change the solution?

School Day 40

- At Frank's Fabrications everyone wants to get bolts to finish their fabrications. The supply manager puts out a box of bolts each day. Tracy, who gets to work early, takes half of the bolts, and goes to work. Sam arrives next and he takes half of the bolts in the box. He starts to work. Lauren, who arrives last, goes to the box and takes half of the bolts and leaves the rest. If 50 bolts are left, how many bolts were in the box before Tracy arrived.

Solution Day 40

- At Frank's Fabrications everyone wants to get bolts to finish their fabrications. The supply manager puts out a box of bolts each day. Tracy, who gets to work early, takes half of the bolts, and goes to work. Sam arrives next and he takes half of the bolts in the box. He starts to work. Lauren, who arrives last, goes to the box and takes half of the bolts and leaves the rest. If 50 bolts are left, how many bolts were in the box before Tracy arrived.

400 bolts at start

What pattern or structure is evident here?

School Day 41

- Fred has just become an apprentice steamfitter and found out his hourly pay is half that of Cathy's, who has been on the job for two years. Wanda who has been on the job just a little longer than Cathy is paid three times what Fred gets. If you add up each of the three hourly wages they would equal $72. What is the hourly wage of each steamfitter?

Solution Day 41

- Fred has just become an apprentice steamfitter and found out his hourly pay is half that of Cathy's, who has been on the job for two years. Wanda who has been on the job just a little longer than Cathy is paid three times what Fred gets. If you add up each of the three hourly wages they would equal $72. What is the hourly wage of each steamfitter?

Frank $12; Cathy $24; Wanda $36

What pattern or structure is evident here?

School Day 42

- Mark was a successful auto mechanic. He was so successful that he owned four auto repair garages. One day he wanted to do an inventory of his business to see what he owned. Each of the four garages contained four bays. Each bay contained four toolboxes. Each toolbox contained four socket wrenches and each wrench contained four sockets. What is the total number of items in Mark's business?

Solution Day 42

- Mark was a successful auto mechanic. He was so successful that he owned four auto repair garages. One day he wanted to do an inventory of his business to see what he owned. Each of the four garages contained four bays. Each bay contained four toolboxes. Each toolbox contained four socket wrenches and each wrench contained four sockets. What is the total number of items in Mark's business?

1364 total items

Does the solution make sense?
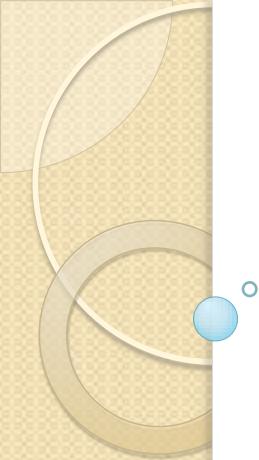
Calculations and Calculators: Decimals

Calculations with decimals increase the complexity of problems because of more digits and place values, rounding rules, and fractional parts. Calculators help make decimal computations easier, but be sure to estimate your solutions using easier numbers so you are sure your answers make sense!

School Day 43

- The first person to swim across the English Channel was Matthew Webb in 1875. Webb's time was 21.25 hours. The second, third, and fourth people and their times were Thomas Burgess, 22.583 hours; Henry Sullivan, 26.83 hours; and Enrico Tiraboschi, 16.55 hours. Arrange the times in order from greatest to the least.

Solution Day 43

- The first person to swim across the English Channel was Matthew Webb in 1875. Webb's time was 21.25 hours. The second, third, and fourth people and their times were Thomas Burgess, 22.583 hours; Henry Sullivan, 26.83 hours; and Enrico Tiraboschi, 16.55 hours. Arrange the times in order from greatest to the least.

- **Sullivan 26.83; Burgess 22.583; Webb 21.25; Tiraboschi 16.55**

Change the decimals to whole numbers and proper fractions. What would these times be in hours and minutes, rather than fractions of an hour?

What is the process to make those conversions?

School Day 44

- Maria is ordering lunch at a fast-food restaurant. She estimates her bill as she is ordering. (All costs include sales tax). Following are her estimates for lunch.
  - Soda, $1.25; estimate $1.00
  - Hamburger Special, $3.39; estimate $3.00
  - Ice Cream, $0.99; estimate $1.00

Maria has only $5.00. Does she have enough money according to her estimate? Does she really have enough? Why or why not?

Solution Day 44

- Maria is ordering lunch at a fast-food restaurant. She estimates her bill as she is ordering. (All costs include sales tax). Following are her estimates for lunch.
  - Soda, $1.25; estimate $1.00
  - Hamburger Special, $3.39; estimate $3.00
  - Ice Cream, $0.99; estimate $1.00
- Maria has only $5.00. Does she have enough money according to her estimate? Does she really have enough?

- **No, $5.63 is the total. She is short 0.63 or 63 cents**

Why or why not? What are the rules for estimation? Do those rules apply in every instance?

School Day 45

- Merchants and store owners are reluctant to round prices down. If canned goods are priced 3 for $1.00 the price of one can is $0.333…but they charge $0.34 for a can if you only buy one. How much do you pay for <u>one</u> item?

  ◦ (a) 2 cans for $1.99
  ◦ (b) 2 cans for $3.00
  ◦ (c) 3 cans for $2.00
  ◦ (d) 8 cans for $5.00

Solution Day 45

- Merchants and store owners are reluctant to round prices down. If canned goods are priced 3 for $1.00 the price of one can is $0.333…but they charge $0.34 for a can if you only buy one. How much do you pay for <u>one</u> item?

  ◦ (a) 2 cans for $1.99   **$1.00 (0.995)**
  ◦ (b) 2 cans for $3.00   **$1.50**
  ◦ (c) 3 cans for $2.00   **$0.67   (0.$\overline{6}$)**
  ◦ (d) 8 cans for $5.00   **$0.63   (0.625)**

"Big Box" stores can charge less for each item, but require that you buy a larger quantity (12 or 16 cans), since that is what comes in the box. What are the pros and cons of this method of buying?

School Day 46

- Add the following decimals, and then change each decimal to the fractional equivalent.

(a) 27.3 + 5.65

(b) 52.0 + 1.345 + 0.54

(c) 0.657 + 2.3 + 86.389

(d) 5.678 + 3 + 19.487

Solution Day 46

- Add the following decimals, and then change one decimal to the fractional equivalent.

(a) 27.3 + 5.65 **= 32.95 = 32 19/20**

(b) 52.0 + 1.345 + 0.54 **= 53.885 = 53 177/200**

(c) 0.657 + 2.3 + 86.389 **= 89.346 = 89 173/500**

(d) 5.678 + 3 + 19.487 **= 28.165 = 28 33/200**

Discuss which you would prefer to calculate with – fractions or decimals?

School Day 47

- Most cash registers provide an itemized receipt. Mary purchases the following items:
  - Potato chips for $1.79
  - Candy bar for $0.59
  - Orange Juice for $2.29
  - Toothpaste for $2.79
  - Milk for $1.29

How much does Mary have to pay for these items?

Solution Day 47

- Most cash registers provide an itemized receipt. Mary purchases the following items:
  - Potato chips for $1.79
  - Candy bar for $0.59
  - Orange Juice for $2.29
  - Toothpaste for $2.79
  - Milk for $1.29

How much does Mary have to pay for these items?

$8.75

Why are these decimal numbers and not fractions? Why are the decimals taken out to the hundredths (2 decimal places)? Are there any prices that are normally taken out to the thousandths (3 decimal places)?

School Day 48

- Subtract the following decimals and then change one decimal to the fractional equivalent.

(a) 1.867 – 0.947

(b) 356.2 – 4.7826

(c) 6 – 2.49

(d) 0.09348 – 0.058

Solution Day 48

- Subtract the following decimals and then change one decimal to the fractional equivalent.

(a) 1.867 – 0.947 **= 0.92 = 23/25**

(b) 356.2 – 4.7826 **= 351.4174 = 351 2087/5000**

(c) 6 – 2.49 **= 3.51 = 3 51/100**

(d) 0.09348 – 0.058 **= 0.03548 = 887/2500**

Discuss instances where computing with fractions would make more sense than using decimals.

School Day 46

- Being able to quickly count change is a valuable skill. Determine the change in the fewest bills and coins. Example: Purchase Price, $13.95; amount paid, $15.00; change, $1.05 (one dollar bill, nickel).

(a) Price - $15.89   Paid - $20.00

(b) Price – $2.59   Paid - $5.00

(c) Price - $23.35   Paid – $30.35

(d) Price – 47.63   Paid – $60.03

Solution Day 46

- Being able to quickly count change is a valuable skill. Determine the change in the fewest bills and coins. Example: Purchase Price, $13.95; amount paid, $15.00; change, $1.05 (one dollar bill, nickel).

(a) Price - $15.89   Paid - $20.00   **$ 4.11**

(b) Price – $2.59   Paid - $5.00   **$2.41**

(c) Price - $23.35   Paid – $30.35   **$7.00**

(d) Price – 47.63   Paid – $60.03   **$12.40**

Explain why in "d" the customer would chose to pay $60.03 instead of just $60. Does this make sense?

School Day 47

- Each product is "correct"; however, a decimal point is missing in one or both factors. You may need to add place holders (zeros). Is there more than one way to do this?

(a) 36 x 54 = 194.4
(b) 78 x 21 = 0.1638
(c) 324 x 65 = 2,106
(d) 7 x 3 = 0.00021

Solution Day 47

(a) 36 x 54 = 194.4   **3.6 x 54 or 36 x 5.4**

(b) 78 x 21 = 0.1638   **0.78 x 0.21**

(c) 324 x 65 = 2,106   **324 x 6.5 or 32.4 x 65**

(d) 7 x 3 = 0.00021   **0.007 x 0.03 or**
0.07 x 0.003 or 7 x 0.00003

Why are sometimes more than one correct answer? Explain the process you used to find the correct decimal placement.

School Day 48

- Which of the problems below are correct? Correct those that are wrong.

(a) 0.256 x 0.56 = 0.14386

(b) 0.54 x 2.4 = 0.1296

(c) 7.024 x 0.86 = 6.0464

(d) 34.7 x 6.7 = 232.49

Solution Day 48

(a) 0.256 x 0.56 = 0.14386   **0.14336**

(b) 0.54 x 2.4 = 0.1296   **1.296**

(c) 7.024 x 0.86 = 6.0464   **6.04064**

(d) 34.7 x 6.7 = 232.49   **Correct**

Explain the errors.

School Day 49

- Check the quotients by multiplying. If it is incorrect, correct it.

(a) 6.825 / 0.91 = 7.8

(b) 0.56468 / 7.6 = 0.743

(c) 0.5154 / 0.006 = 8.59

(d) 0.00306 / 0.36 = 0.085

Solution Day 49

(a) 6.825 / 0.91 = 7.8 **7.5**

(b) 0.56468 / 7.6 = 0.743 **0.0743**

(c) 0.5154 / 0.006 = 8.59 **85.9**

(d) 0.00306 / 0.36 = 0.085 **0.0085**

Explain the errors.

School Day 50

- To compute gas mileage, divide the number of miles driven by the number of gallons used. Sergio drove 300.5 miles on 14.8 gallons of gas. What was Sergio's mileage rounded to the nearest mile per gallon (mpg)?

Solution Day 50

- To compute gas mileage, divide the number of miles driven by the number of gallons used. Sergio drove 300.5 miles on 14.8 gallons of gas. What was Sergio's mileage rounded to the nearest mile per gallon (mpg)?   **20 mpg**

What is the importance of gas mileage in today's financial and political issues? What about the future?

School Day 51

- The average lengths of the three longest bones (all leg bones) in the human body are listed below.

    - Femur – 19.88"
    - Tibia – 16.94"
    - Fibula – 15.94"

- Find the average length of the human leg. What do you need to know about the bones of the body to solve this problem?

Solution Day 51

- Femur – 19.88" Upper Leg

- Tibia – 16.94"

- Fibula – 15.94" Lower Leg

- (16.94 + 15.94)/2 = 16.44

- 19.88 + 16.44 = **36.22"**

What are some factors that would influence these averages? What do you think about the accuracy of this average (an average of averages)?

School Day 52

- A unit price or unit rate is the amount charged per unit. A unit may be single item, a measurement, or some other quantity depending, on the product. You can compare the cost of similar items by comparing unit prices. A lower unit price is usually a better buy. A 35-ounce box of cereal sells for $6.49. A 20-ounce box of the same cereal sells for $3.99. Which is the better buy?

Solution Day 52

- A unit price or unit rate is the amount charged per unit. A unit may be single item, a measurement, or some other quantity depending, on the product. You can compare the cost of similar items by comparing unit prices. A lower unit price is usually a better buy. A 35-ounce box of cereal sells for $6.49. A 20-ounce box of the same cereal sells for $3.99. Which is the better buy?

35 oz box

What would be some instances when a lower unit price might not be the best buy? Do you check unit prices when you purchase items, why or why not?

School Day 53

- A local restaurant pays cashiers $7.75 per hour, with time and a half (1.5 times the hourly wage) for overtime. This restaurant pays overtime for any hours more than 40 worked per week. Casey worked 43.5 hours last week. How much money did Casey earn? Does rounding figure into his pay?

Solution Day 53

- A local restaurant pays cashiers $7.75 per hour, with time and a half (1.5 times the hourly wage) for overtime. This restaurant pays overtime for any hours more than 40 worked per week. Casey worked 43.5 hours last week. How much money did Casey earn? Does rounding figure into his pay?

$350.71

Casey needs to make at least $375 a week to pay his bills, so how many hours does he need to work?

School Day 54

- Eat Rite Supermarket is having a "buy one get one free" sale on the 20-ounce box of Toasties cereal. One box sells for $3.99. Samantha has a coupon that is worth $0.75 off the 35-ounce box of Toasties. This box normally sells for $6.49. Which is the better buy? Why?

Solution Day 54

- Eat Rite Supermarket is having a "buy one get one free" sale on the 20-ounce box of Toasties cereal. One box sells for $3.99. Samantha has a coupon that is worth $0.75 off the 35-ounce box of Toasties. This box normally sells for $6.49. Which is the better buy? Why?

Buy One Get One Free

Should she take advantage of both offers? Why or why not?

School Day 55

- Vinny's Pizza sells a 10-inch pizza for $8.49. The plan pie comes with tomato sauce and cheese. A special combination of any three additional toppings is $2.00 extra. If a fourth, fifth or sixth topping is selected; the cost is $0.45 per topping. What is the cost of a 10-inch pizza with anchovies, onions, peppers, and pepperoni?

Solution Day 55

- Vinny's Pizza sells a 10-inch pizza for $8.49. The plan pie comes with tomato sauce and cheese. A special combination of any three additional toppings is $2.00 extra. If a fourth, fifth or sixth topping is selected; the cost is $0.45 per topping. What is the cost of a 10-inch pizza with anchovies, onions, peppers, and pepperoni?

$10.94

What do you think about the value of a pizza with the 3 toppings special price versus the value of the four or five topping pie for the extra 45 cents each? Do you really get more for the extra money or is there a limit to the amount of toppings a 10-inch pizza can hold?

School Day 56

- Electricians often charge a set amount for each hour they work, plus a service charge. The service charge doesn't vary and is charged regardless of how long a job takes. How much would an electrician charge for doing 4.5 hours of work if the rate is $25 per hour, plus a service charge of $45?

Solution Day 56

- Electricians often charge a set amount for each hour they work, plus a service charge. The service charge doesn't vary and is charged regardless of how long a job takes. How much would an electrician charge for doing 4.5 hours of work if the rate is $25 per hour, plus a service charge of $45?

$157.50

What do you think about the "fairness" of a service charge in addition to the hourly rate? What about a fuel charge, off hours/weekend rate, or adding 20% on to the cost of parts? How does this affect the cost of service? Is there a limit to what the customer will pay?

School Day 57

- Long distance phone calls are based on the rates, calling point, and the time the call was made. A 15-minute long-distance call is calculated in the following manner:

Up to and including the first 10 minutes, the cost is $0.09 per minute. Each additional minute is $0.03. Find the total cost of a 15-minute call and a 30-minute call.

Solution Day 57

Up to and including the first 10 minutes, the cost is $0.09 per minute. Each additional minute is $0.03. Find the total cost of a 15-minute call and a 30-minute call.

- **$1.05 for 10 minute call**
- **$1.50 for 30 minute call**

Is the price double since the time is doubled? If you called long distance frequently what should you do to reduce your costs?

School Day 58

- An operator-assisted long-distance phone call is a call in which an operator "assists," or helps, a person complete the call. Such calls are usually more expensive than calls the caller completes her- or himself. Dana was told that an operator-assisted call costs 1.5 times the cost of a direct dial call to the same city. Find the cost of the direct-dial call if the operator-assisted call costs $5.45 and round your answer to the nearest cent.

Solution Day 58

- An operator-assisted long-distance phone call is a call in which an operator "assists," or helps, a person complete the call. Such calls are usually more expensive than calls the caller completes her- or himself. Dana was told that an operator-assisted call costs 1.5 times the cost of a direct dial call to the same city. Find the cost of the direct-dial call if the operator-assisted call costs $5.45 and round your answer to the nearest cent.

$3.63

How has the use of cell phones changed our calling habits? Do you think it costs more now than it did before the cell phone and all the "calling plans".

Calculations and Calculators: Fractions

When problems use fractional numbers they are more difficult and complicated. Calculators can help with fraction calculations but be sure to estimate your solutions using whole numbers so you are sure your answers make sense!

School Day 59

Complete the Problems and explain the strategies you used.

(a) $\dfrac{3}{7} = \dfrac{\boxed{}}{35}$

$+\ \dfrac{4}{5} = \dfrac{28}{\boxed{}}$

_____

$\dfrac{\boxed{}}{35} = 1\ \dfrac{\boxed{}}{35}$

(b) $\dfrac{5}{6} = \dfrac{10}{\boxed{}}$

$+\ \dfrac{3}{4} = \dfrac{9}{\boxed{}}$

_____

$\dfrac{19}{\boxed{}} = 1\ \dfrac{\boxed{}}{12}$

Solution Day 59

Complete the Problems and explain the strategies you used.

(a)

$$\frac{3}{7} = \frac{15}{35}$$

$$+ \frac{4}{5} = \frac{28}{35}$$

_____

$$\frac{43}{35} = 1 \frac{8}{35}$$

(b)

$$\frac{5}{6} = \frac{10}{12}$$

$$+ \frac{3}{4} = \frac{9}{12}$$

_____

$$\frac{19}{12} = 1 \frac{7}{12}$$

School Day 60

- Jose is starting a running program. He plans to alternate walking and running for a total of two miles today. As his endurance increases, he hopes to gradually walk less and run more. If he walks ½ mile today, runs ¼ mile, walks ¾ mile, runs ¼ mile, and walks ⅛ mile, what is his total distance?

.

Solution Day 60

- Jose is starting a running program. He plans to alternate walking and running for a total of two miles today. As his endurance increases, he hopes to gradually walk less and run more. If he walks ½ mile today, runs ¼ mile, walks ¾ mile, runs ¼ mile, and walks ⅛ mile, what is his total distance?   **1 7/8 mi**

- **Create three other ways using fractional parts of a mile that Jose can alternate walking and running for two miles.**

School Day 61

- The two problems below have at least one error each. Find the errors and correct the problems. Explain why they are incorrect.

(a) $8 \dfrac{7}{12} = 8 \dfrac{7}{12}$

$+ 6 \dfrac{3}{4} = 6 \dfrac{7}{12}$

——————————————

$14 \dfrac{14}{12} = 14 \dfrac{1}{6}$

(b) $7 \dfrac{5}{6} = 7 \dfrac{15}{18}$

$+ 2 \dfrac{1}{9} = 2 \dfrac{3}{18}$

——————————————

$9 \dfrac{18}{18} = 10$

Solution Day 61

- The two problems below have at least one error each. Find the errors and correct the problems. Explain why they are incorrect.

(a) $8 \frac{7}{12} = 8 \frac{7}{12}$

$+ 6 \frac{3}{4} = 6 \frac{9}{12}$

_____

$14 \frac{16}{12} = 15 \frac{1}{3}$

(b) $7 \frac{5}{6} = 7 \frac{15}{18}$

$+ 2 \frac{1}{9} = 2 \frac{2}{18}$

_____

$9 \frac{17}{18}$

School Day 62

- Which of the following four problems below are correct? Correct the ones that are wrong and explain why.

(a) $3 \frac{2}{7} + 2 \frac{3}{8} = 5 \frac{37}{56}$

(b) $7 \frac{3}{10} + 5 \frac{3}{4} = 12 \frac{1}{20}$

(c) $5 \frac{2}{5} + 8 \frac{4}{15} = 13 \frac{2}{3}$

(d) $6 \frac{5}{8} + 2 \frac{7}{12} = 9 \frac{1}{6}$

Solution Day 62

- Which of the following four problems below are correct? Correct the ones that are wrong and explain why.

(a) $3 \frac{2}{7} + 2 \frac{3}{8} = 5 \frac{37}{56}$ **Correct**

(b) $7 \frac{3}{10} + 5 \frac{3}{4} = 12 \frac{1}{20}$ **13 1/20**

(c) $5 \frac{2}{5} + 8 \frac{4}{15} = 13 \frac{2}{3}$ **Correct**

(d) $6 \frac{5}{8} + 2 \frac{7}{12} = 9 \frac{1}{6}$ **9 5/24**

School Day 63

- Find the least common denominator for the subtraction problems below. Complete the problem and explain the concept of common denominator. Do you always have to use the LCD? How does the answer change if you don't?

(a) 2/9 – 1/6 =

(b) 4/5 – 2/3 =

(c) 2/3 – 4/7 =

(d) 7/8 – 9/20 =

Solution Day 63

- Find the least common denominator for the subtraction problems below. Complete the problem and explain the concept of common denominator. Do you always have to use the LCD? How does the answer change if you don't?

(a) 2/9 – 1/6 =   **1/18**   **LCD = 18**

(b) 4/5 – 2/3 =   **2/15**   **LCD = 15**

(c) 2/3 – 4/7 =   **2/21**   **LCD = 21**

(d) 7/8 – 9/20 =   **17/40**   **LCD = 40**

School Day 64

- Good cooks follow recipes carefully.   4 tablespoons of butter equals ¼ cups. 5 ⅓ tablespoons equal ⅓ cup. How much larger is 5 ⅓ tablespoons of butter than 4 tablespoons? Express your answer in terms of cups.

- How would you express 1/8 of a cup of butter in tablespoons? 2/3 a cup?

Solution Day 64

- Good cooks follow recipes carefully. 4 tablespoons of butter equals ¼ cups. 5 ⅓ tablespoons equal ⅓ cup. How much larger is 5 ⅓ tablespoons of butter than 4 tablespoons? Express your answer in terms of cups. **1/12 cup**

- How would you express 1/8 of a cup of butter in tablespoons? **2 TBS**

- 2/3 a cup? **10 2/3 TBS**

Solution Day 65

- Regrouping in subtraction of mixed numbers requires several steps. Complete the problems below and explain the strategies you used.

(a) $14 \frac{2}{\square} = 13 \frac{\square}{9}$

$- 7 \frac{2}{\square} = 7 \frac{6}{\square}$

$\rule{3cm}{0.4pt}$

$6 \ 5/9$

(b) $7 \frac{\square}{\square} = 6 \frac{8}{\square}$

$- 4 \frac{\square}{\square} = 4 \frac{3}{\square}$

$\rule{3cm}{0.4pt}$

$2 \frac{\square}{7}$

School Day 65

- Regrouping in subtraction of mixed numbers requires several steps. Complete the problems below and explain the strategies you used.

(a) $14\dfrac{2}{9} = 13\dfrac{11}{9}$

$-\ 7\dfrac{2}{3} = 7\dfrac{6}{9}$

_____

$6\ 5/9$

(b) $7\dfrac{1}{7} = 6\dfrac{8}{7}$

$-\ 4\dfrac{3}{7} = 4\dfrac{3}{7}$

_____

$2\ \dfrac{5}{7}$

School Day 66

- Eddie is helping his father panel the family room. As they are working with the trim, Eddie's father notes that the final piece of trim is 6 ½' long. The last section of wall they need to trim is 4 ¾'. There are also a few other smaller sections where they could use any trim that is left over. How much trim will they have left after completing the last section of wall?

Solution Day 66

- Eddie is helping his father panel the family room. As they are working with the trim, Eddie's father notes that the final piece of trim is 6 ½' long. The last section of wall they need to trim is 4 ¾'. There are also a few other smaller sections where they could use any trim that is left over. How much trim will they have left after completing the last section of wall? **1 ¾ ft**

- **Explain how to check your solution for accuracy.**

School Day 67

- Erin needs ¼ pound of peat moss for each juniper she plants. How many pounds of peat moss are required for 20 junipers?

Solution Day 67

- Erin needs ¼ pound of peat moss for each juniper she plants. How many pounds of peat moss are required for 20 junipers?   **5 lb**

- **Why would ¼ pound of peat moss per juniper be considered a "unit rate"?**

School Day 68

- At some schools students take a unit test at the end of each math unit. Three tests are taken each quarter, and the test average counts ⅓ of the quarterly average. There are no midterms or final exams. One test is what fraction of the end-of-the year average? Change this fraction to a percent.

Solution Day 68

- At some schools students take a unit test at the end of each math unit. Three tests are taken each quarter, and the test average counts ⅓ of the quarterly average. There are no midterms or final exams. One test is what fraction of the end-of-the year average? Change this fraction a percent.

1/36 of the end-of-year average = 2.7%

- **Does an excellent or poor grade on just one test have much of an effect on a quarter or end-of-year average?**

School Day 69

- Sue plans to use a recipe that yields 15 pounds of fudge. She intends to wrap the fudge she makes in ¾ -pound boxes and give one box to each of her friends and relatives for gifts. How many gifts will she have?

Solution Day 69

- Sue plans to use a recipe that yields 15 pounds of fudge. She intends to wrap the fudge she makes in ¾ -pound boxes and give one box to each of her friends and relatives for gifts. How many gifts will she have? **20 gifts of ¾ lb**

- **How many gifts will she have if she packages the fudge in ½ lb boxes**

School Day 70

- "Reduced calorie" means that the product has at least ⅓ fewer calories than the product normally would have. A bottle of salad dressing has a total of 90 calories per serving, including 80 fat calories per serving. Another bottle of the same brand and flavor is advertised as having ⅓ less fat. It has a total of 45 calories per serving, including 35 fat calories per serving. Could this be advertised as "reduced calorie"? Why or why not?

Solution Day 70

- "Reduced calorie" means that the product has at least ⅓ fewer calories than the product normally would have. A bottle of salad dressing has a total of 90 calories per serving, including 80 fat calories per serving. Another bottle of the same brand and flavor is advertised as having ⅓ less fat. It has a total of 45 calories per serving, including 35 fat calories per serving. Could this be advertised as "reduced calorie"? Why or why not?

- **Yes, because it could have up to 60 calories**

School Day 71

- Which problems below have correct answers? Correct the ones that have the wrong answers. Explain the error.

(a) 4/9   x   3/8 =   1/18

(b) 20   x   1/8 =   2 ½

(c) 5/9   x 3 3/10 = 1 17/18

Solution Day 71

- Which problems below have correct answers? Correct the ones that have the wrong answers. Explain the error.

(a) 4/9   x   3/8 =   1/18   **1/6**

(b) 20   x   1/8 =   2 ½ **Correct**

(c) 5/9   x 3 3/10 = 1 17/18

1 5/6

School Day 72

- Walt is installing a shelf to hold some items in his room. Brackets that are ¼" thick are to be fastened through a ½" sheetrock wall and extend at least 1 ½" into wooden supports behind the wall. He only has 2" nails with which to secure the brackets. Are the nails long enough? What are the shortest nails he can use?

Solution Day 72

- Walt is installing a shelf to hold some items in his room. Brackets that are ¼" thick are to be fastened through a ½" sheetrock wall and extend at least 1 ½" into wooden supports behind the wall. He only has 2" nails with which to secure the brackets. Are the nails long enough? **NO** What are the shortest nails he can use?   **2¼ in nails**

- **If he uses nails that are 3" how much extra length does he have?**

School Day 73

- Which of the following are correct? Find and correct the mistakes in the problems that have a wrong answer. Explain the error.

(a) $17 \frac{2}{3}$ − $4 \frac{5}{12}$ = $11 \frac{1}{3}$

(b) $12 \frac{2}{3}$ − $3 \frac{5}{15}$ = $9 \frac{8}{15}$

(c) $9 \frac{2}{5}$ − $1 \frac{1}{4}$ = $8 \frac{3}{20}$

(d) $7 \frac{4}{5}$ − $3 \frac{3}{10}$ = $4 \frac{1}{10}$

Solution Day 73

- Which of the following are correct? Find and correct the mistakes in the problems that have a wrong answer. Explain the error.

(a) $17 \frac{2}{3}$ − $4 \, 5/12$ = $11 \frac{1}{3}$ **13 ¼**

(b) $12 \frac{2}{3}$ − $3 \, 5/15$ = $9 \, 8/15$ **9 ⅓**

(c) $9 \, 2/5$ − $1 \frac{1}{4}$ = $8 \, 3/20$ **Correct**

(d) $7 \, 4/5$ − $3 \, 3/10$ = $4 \, 1/10$ **4½**
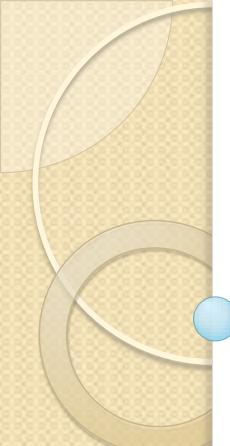
Fraction, Decimal & Percent English & Metric Measurement

Converting between fractions, decimals and percentages is required in many trade areas. Measurements are the mathematical backbone of many programs.

School Day 74

Find the missing numerator or denominator by writing equivalent fractions for the problems below. Write another equivalent number of your choice.

(a) 5/8 = [?] / 24

(b) ¾ = 27 / [?]

(c) ⅔ = 8 / [?]

(d) 7/22 = [?] / 132

Solution Day 74

Find the missing numerator or denominator by writing equivalent fractions for the problems below. Write another equivalent number of your choice.

(a) 5/8 = **15** / 24

(b) ¾ = 27 / **36**

(c) ⅔ = 8 / **12**

(d) 7/22 = **42** / 132

Explain why these fractions are equivalent when they look very different. What is the equivalent written as a percent?

School Day 75

Which of the following fractions equals 3/7? What percent is equivalent to 3/7?

(a) 9/63
(b) 9/10
(c) 21/49
(d) 9/21

Solution Day 75

Which of the following fractions equals 3/7? What percent is equivalent to 3/7?

(a) 9/63 **NO**

(b) 9/10 **NO**

(c) 21/49 **YES**

(d) 9/21 **YES**

3/7 = 0.42857… ≈ 42.86%

Explain how you determined the equality and the mathematical reasoning for your answer.

School Day 76

- Of the fractions below, which are simplified? Simplify the rest.

21/49   13/14   29/37   15/21

19/38   47/63   12/18   2/9

10/45

Solution Day 76

Of the fractions below, which are simplified? Simplify the rest.

21/49	13/14	29/37	15/21
3/7	**YES**	**YES**	**5/7**
19/38	47/63	12/18	2/9
½	**YES**	**⅔**	**YES**
10/45	**2/9**		

Explain the mathematical properties that allow for simplifying.

How would you change each fraction to the decimal and % equivalent?

School Day 77

Which of the following improper fractions are expressed correctly as a mixed number? Be sure to simplify.

(a) 32/7 = 4 3/7

(b) 76/8 = 9 ½

(c) 367/100 = 3 67/100

(d) 41/9 = 4 5/9

Solution Day 77

Which of the following improper fractions are expressed correctly as a mixed number?

(a) 32/7 = 4 3/7   **NO**

(b) 76/8 = 9 ½   **YES**

(c) 367/100 = 3 67/100   **YES**

(d) 41/9 = 4 5/9   **YES**

Explain how to convert between a mixed number and an improper fraction. Why are they equivalent?

School Day 78

Write the numerator in each fraction below. Explain the significance of a numerator as compared to a denominator. Convert each fraction to the equivalent decimal. Explain any relationship between the fractional denominator and the decimal place value.

(a) 9 ¼ = [?] /4

(b) 13 2/5 = [?] / 5

(c) 5 7/8 = [?] / 8

(d) 6 4/9 = [?] / 9

Solution Day 78

Write the numerator in each fraction below. Explain the significance of a numerator as compared to a denominator. Convert each fraction to the equivalent decimal. Explain any relationship between the fractional denominator and the decimal place value.

(a) 9 ¼ = **37** / 4   **9.25**

(b) 13 2/5 = **67** / 5   **13.4**

(c) 5 7/8 = **47** / 8   **5.875**

(d) 6 4/9 = **58** / 9   **6.$\overline{4}$**

School Day 79

- At service stations, pumps measure gasoline in increments of thousandths of gallons. What will the pump read after pumping 18 1/8 gallons? Why is the volume of gas given as a decimal rather than a fraction?

Solution Day 79

- At service stations, pumps measure gasoline in increments of thousandths of gallons. What will the pump read after pumping 18 1/8 gallons? Why is the volume of gas given as a decimal rather than a fraction?

18.125 gal

What would happen to the cost of gasoline if the volume were given as hundredths of a gallon?

As tenths of a gallon?

Who benefits if the gas is measured in thousandths of gallons? Why?

School Day 80

Express each decimal below as a fraction or mixed number. Simplify. Explain why we have two different methods of expressing the same value. Express each as a percentage.

(a) 2.6

(b) 0.75

(c) 14.95

(d) 1.004

Solution Day 80

Express each decimal below as a fraction or mixed number. Simplify. Explain why we have two different methods of expressing the same value. Express each as a percentage.

(a) 2.6 **= 2 3/5 = 260%**

(b) 0.75 **= ¾ = 75%**

(c) 14.95 **= 14 19/20 = 1495%**

(d) 1.004 **= 1 1/250 = 100.4%**

Explain why there would there be a third method when we already have two! When are percentages used?

School Day 81

Joe wants to drill a hole that is large enough to allow a 0.425-inch diameter wire to pass through as tightly as possible. Which of the following drill bits should he use?

(a) 13/32
(b) 7/16
(c) 15/32
(d) 3/8

Solution Day 81

Joe wants to drill a hole that is large enough to allow a 0.425-inch diameter wire to pass through as tightly as possible. Which of the following drill bits should he use?

(a) 13/32

(b) 7/16

(c) 15/32

(d) 3/8

Explain your reasoning. Would it be useful to have these measurements as decimal or percent equivalents? Explain why or why not.

School Day 82

Find the missing value in each proportion below. Explain the connections between proportions and equivalent fractions. When do you use proportions to solve problems?

(a) 6 / _____ = 2/7

(b) 6 / [?] = 3/7

(c) 6 / [?] = 6/7

(d) 6 / [?] = 12/7

[?]

Solution Day 82

Find the missing value in each proportion below. Explain the connections between proportions and equivalent fractions. When do you use proportions to solve problems?

(a) 6 / **21** = 2/7

(b) 6 / **14** = 3/7

(c) 6 / **7** = 6/7

(d) 6 / **3.5** = 12/7

School Day 83

A length is often simplified by expressing it in terms of the largest possible value, using whole numbers for the units of length. The units are missing from the simplified measurements below. Fill in the proper units and explain how you figured it out.

(a) 7 ft. = 2 _____ 1 _____

(b) 37 inches = 1 _____ 1 _____

(c) 6 ft. 15 in. = 2 _____ 1 _____ 3 _____

(d) 10 yd. 14 ft. 15 in = 15 _____ 3 _____

Solution Day 83

A length is often simplified by expressing it in terms of the largest possible value, using whole numbers for the units of length. The units are missing from the simplified measurements below. Fill in the proper units and explain how you figured it out.

(a) 7 ft. = 2 **yd** 1 **ft**

(b) 37 inches = 1 **yd** 1 **in**

(c) 6 ft. 15 in. = 2 **yd** 1 **ft** 3 **in**

(d) 10 yd. 14 ft. 15 in = 15 **yd** 3 **in**

School Day 84

The numbers in the metric measure on the left of the equal sign are correct, but some of the decimal points and/or zeros are incorrect in the measure to the right of the equal sign (**blue color**). Correct the decimal points and zeros. Explain how to convert between units of metric measure.

(a) 2 m = **20 cm**

(b) 3.4 cm = **0.34 mm**

(c) 15 mm = **0.15cm**

(d) 9300 m = **93 km**

Solution Day 84

The numbers in the metric measure on the left of the equal sign are correct, but some of the decimal points and/or zeros are incorrect in the measure to the right of the equal sign (**blue color**). Correct the decimal points and zeros. Explain how to convert between units of metric measure.

(a) 2 m = **20 cm**   **200 cm**

(b) 3.4 cm = **0.34 mm**   **34 mm**

(c) 15 mm = **0.15cm**   **1.5 cm**

(d) 9300 m = **93 km**   **9.3 km**

School Day 85

Three of the four problems below have the same answer. Find these three problems and their common answer. Then find the answer to the remaining problem. What is the rule when computing with measurements? Explain why that rule is necessary.

(a) 3 lb. 15 oz. + 4 lb. 12 oz. =

(b) 13 lb. 13 oz. – 5 lb. 2 oz. =

(c) 3 lb. 15 oz. x 2 =

(d) 34 lb. 12 oz. ÷ 4 =

Solution Day 85

Three of the four problems below have the same answer. **A & B** Find these three problems and their common answer. Then find the answer to the remaining problem. What is the rule when computing with measurements? Explain why that rule is necessary.

(a) 3 lb.15 oz. + 4 lb. 12 oz. = **8 lb 11 oz**

(b) 13 lb.13 oz. – 5 lb. 2 oz. = **8 lb 11 oz**

(c) 3 lb.15 oz. x 2 = **7 lb 14 oz**

(d) 34 lb.12 oz. ÷ 4 = **8 lb 12 oz**

School Day 86

- The heaviest domestic dog is the St. Bernard. It weighs up to 100 kg and stands 70 cm high at the shoulder. Convert these measurements to grams and mm. Explain why are the numbers larger. Using the original kg and cm, express this weight in pounds and the height in inches. (1 kg ≈ 2.2 lbs; 1 cm ≈ 0.39 in) Explain why the weight is a larger number and the height is a smaller number when you make those conversions. Explain why it is important to understand the relative size of a unit when you are using it for measurement.

Solution Day 86

- The heaviest domestic dog is the St. Bernard. It weighs up to 100 kg and stands 70 cm high at the shoulder. Convert these measurements to grams and mm. Explain why are the numbers larger. Using the original kg and cm, express this weight in pounds and the height in inches. (1 kg ≈ 2.2 lbs; 1 cm ≈ 0.39 in) Explain why the weight is a larger number and the height is a smaller number when you make those conversions. Explain why it is important to understand the relative size of a unit when you are using it for measurement.

- **220 lb**

- **27.3 in**

School Day 87

- Most dinosaurs were big, but their brains were small. The weight of a stegosaurus's brain was about 80 grams, which was about 0.004% of the stegosaurus's weight. Find the weight of the stegosaurus in kilograms. Convert the weight of the stegosaurus to pounds (1 kg ≈ 2.2 pounds). What is the weight of the brain in pounds? Is this still 0.004% of the overall weight even though we have changed the unit? Prove your answer.

Solution Day 87

- Most dinosaurs were big, but their brains were small. The weight of a stegosaurus's brain was about 80 grams, which was about 0.004% of the stegosaurus's weight. Find the weight of the stegosaurus in kilograms. Convert the weight of the stegosaurus to pounds (1 kg ≈ 2.2 pounds).

4400 lb What is the weight of the brain in pounds? **0.176 lb** Is this still 0.004% of the overall weight even though we have changed the unit? **YES** Prove your answer.

School Day 88

Each blank below can be filled with one of the following numbers: 1, 4, 8, or 24. Some numbers will be used more than once. Fill in the blanks so that the relationships are correct. What do you need to know to be able to do this problem? Explain how you determined the relationships.

(a) 2 gal. = _____ qt.

(b) 4 qt. = _____ gal. = _____ pt.

(c) 3 c. = _____ c _____ pt. = _____ fl. oz.

(d) 12 fl. Oz. = _____ c. _____ fl. oz.

Solution Day 88

Each blank below can be filled with one of the following numbers: 1, 4, 8, or 24. Some numbers will be used more than once. Fill in the blanks so that the relationships are correct. What do you need to know to be able to do this problem? Explain how you determined the relationships.

(a) 2 gal = **8** qt

(b) 4 qt = **1** gal = **8** pt

(c) 3 c = **1** c **1** pt. = **24** fl oz

(d) 12 fl oz = **1** c **4** fl oz

School Day 89

Fill in the blanks with the correct unit. Explain how you figured out these units and what information did you needed to know. What did you do if you did not have that information in your memory to complete the problem?

(a) 4 c. = 2 _____

(b) 5 pt. 3 c. = 6 _____ 1 c. = 3 _____ 1 c.

(c) 2 qt. = 0.5 _____

(d) 4 gal. = 16 _____ = 512 _____

School Day 89

Fill in the blanks with the correct unit. Explain how you figured out these units and what information did you needed to know. What did you do if you did not have that information in your memory to complete the problem?

(a) 4 c = 2 **pt**

(b) 5 pt 3 c = 6 **pt** 1 c = 3 **qt** 1 c

(c) 2 qt = 0.5 **gal**

(d) 4 gal = 16 **qt** = 512 **fl oz**

School Day 90

- A 12-fluid ounce can of frozen orange juice concentrate is mixed with 3 cans of cold water. How many fluid ounces of OJ will this make? The can has a hole and you can't use it for the water, so how many ounces will you need to measure out? Would a 1-quart pitcher would be large enough to hold the contents? Explain your answer. What if you only had 2 cans of water, how many ounces of the frozen juice concentrate should you use (hint – set up a proportion)? What if you had 1 ½ cans of concentrate, how many ounces of water do you need.

Solution Day 90

- A 12-fluid ounce can of frozen orange juice concentrate is mixed with 3 cans of cold water. How many fluid ounces of OJ will this make? The can has a hole and you can't use it for the water, so how many ounces will you need to measure out? Would a 1-quart pitcher would be large enough to hold the contents? **NO** Explain your answer. What if you only had 2 cans of water, how many ounces of the frozen juice concentrate should you use (hint – set up a proportion)? **36 fl oz of concentrate** What if you had 1 ½ cans of concentrate, how many ounces of water do you need. **54 fl oz of water**