
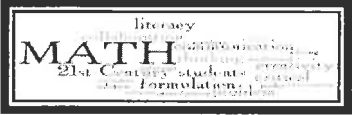


Welcome to Parent University
Alta Loma School District
October 22nd, 2015



*"Understanding and Helping
with Math Homework"*


Presented by Phil Suttner
3rd Grade, Stork Elementary

8 Mathematical Practices

1. Make sense of problems & persevere in solving them	2. Reason abstractly & quantitatively	3. Construct viable arguments & critique the reasoning of others	4. Model with mathematics
5. Use appropriate tools strategically	6. Attend to precision	7. Look for & make use of structure	8. Look for & express regularity in repeated reasoning

Why does this matter? Because it's what our students need

For every 100 ninth graders...





65 graduate from high school
37 enter college
24 are still enrolled in sophomore year
12 graduate with a degree in six years

... and only *SIX* get a good job after graduation



EngageNY.org

 **College and Career Readiness** 

The new standards will get students ready for success in college and the workforce:


- College readiness means that graduates have the skills they need to do well in college.
- "College" doesn't just mean a four-year degree. It can mean any program that leads to a degree or certificate.
- Being "ready" means that students graduate from high schools with key skills in English and mathematics.
- Career readiness means that high school graduates are qualified for and able to do well in long-term careers.
- "Career" doesn't just mean a job. It means a profession that lets graduates succeed at a job they enjoy and earn a competitive wage.

EngageNY.org

Math Test Question: The Old Way

7.G04
Determine the surface area of prisms and cylinders, using a calculator and a variety of methods.

14 The figure shows a cylinder. The figure is not to scale.



What is the total surface area of the cylinder? Round your answer to the nearest hundredth.

Give your work.

Answer: _____

15 The question asks you to find the surface area of a cylinder. How many faces does a cylinder have? Round your answer to the nearest hundredth.

Give your work.

Answer: _____

Math Test Question: The New Way

6.G.1
Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

6.RP.1
Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."

Counting-Up Subtraction

When children use counting-up subtraction, they practice a variety of skills related to number sense and algebraic reasoning. For example:

- Exploring the relationship between addition and subtraction
- Using benchmark numbers (10s, 25, 50, 75, 100s)
- Adding a set of distances to get a total

Many children find counting up much easier than taking away.

Counting-Up Subtraction

Solve: $471 - 293$

We begin by thinking:

- *What is a good benchmark number to start with for this problem?*

Since we are finding the distance between 293 and 471, a first benchmark number could be 300.

Counting-Up Subtraction

Solve: $471 - 293$

We first count up the distance from the starting number (293) to reach the first benchmark number (300). →

$$\begin{array}{r} 293 \\ + \quad 7 \\ \hline 300 \end{array}$$

That distance is 7.

Counting-Up Subtraction

Solve: $471 - 293$

From 300, our next benchmark number could be 400.

So we count up the distance from 300 to 400. →

$$\begin{array}{r} 293 \\ + \quad 7 \\ \hline 300 \\ + 100 \\ \hline 400 \end{array}$$

That distance is 100.

Counting-Up Subtraction

Solve: $471 - 293$

We can count up the distance from 400 to 471 in one step. →

$$\begin{array}{r} 293 \\ + \quad 7 \\ \hline 300 \\ + 100 \\ \hline 400 \\ + 71 \\ \hline 471 \end{array}$$

Counting-Up Subtraction

Solve: $471 - 293$

We circle all of the distances we counted up between the starting number (293) and the final number (471).

Now we add the circled numbers.

$$7 + 100 + 71 = 178$$

293
+ 7
300
+ 100
400
+ 71
471

Counting-Up Subtraction

Solve: $471 - 293$

The distance between 293 and 471 is 178.

7
+ 100
+ 71
178

This method is like counting up to make change.

Estimating and Friendly Numbers

- ▶ $323 - 197$
- ▶ 1) Estimate: round to nearest ten, hundred, or use friendly numbers... $325 - 200$ or $330 - 200$ or $300 - 200$.
- ▶ 2) Add three to each side... $326 - 200$.
- ▶ 3) Count up $200 + 100 = 300$
 $300 + 26 = 326$
 $100 + 26 = 126$
- ▶ 4) $323 - 197 = 126$; which is reasonable because it is close to the estimate.

Partial Sums

	287
	+ 625
Add the hundreds <small>(200 + 600)</small> →	800
Add the tens <small>(80 + 20)</small> →	100
Add the ones <small>(7 + 5)</small> →	+ 12
Add the partial sums <small>(800 + 100 + 12)</small> →	912

Partial Sums

	345
	+ 679
Add the hundreds <small>(300 + 600)</small> →	900
Add the tens <small>(40 + 70)</small> →	110
Add the ones <small>(5 + 9)</small> →	+ 14
Add the partial sums <small>(900 + 110 + 14)</small> →	1024

Counting Up/Hill Method

38 - 14 = **24**

1. Place the smaller number at the bottom of the hill and the larger at the top.
2. Start with 14, add to the next friendly number. $(14+6=20)$
3. Start with 20, add to the next friendly number. $(20+10=30)$
4. Start with 30, add to get 38. $(30+8=38)$

Record the numbers added at each interval: $(6+10+8=24)$

Break Apart

1. The first step is to break apart the number by place value. If a trade is required, the trade is carried out first.

2. To make the 1 in the ones column larger than the 5, borrow 1 ten from the 30 in the tens column. The 1 becomes an 11 and the 30 in the tens column becomes 20.

3. To make the 20 in the tens column larger than the 80 in the tens column, borrow 100 hundred from the 800. The 20 in the tens column becomes 120 and the 800 in the hundreds column becomes 700.

4. Now subtract column by column in any order and add the differences.

$$\begin{array}{r} 831 \\ -485 \\ \hline \end{array}$$

$$\begin{array}{r} 700 \quad \nearrow 120 \\ 800 \quad \begin{array}{r} -20 \\ 30 \end{array} \quad \nearrow 11 \\ -400 \quad 80 \quad 5 \end{array}$$

$$300 + 40 + 6 =$$

$$346$$

Break Apart

1. The first step is to break apart the number by place value. If a trade is required, the trade is carried out first.

2. To make the 7 in the ones column larger than the 8, borrow 1 ten from the 20 in the tens column. The 1 becomes an 17 and the 20 in the tens column becomes 10.

3. To make the 10 in the tens column larger than the 70 in the tens column, borrow 100 hundred from the 400. The 10 in the tens column becomes 110 and the 400 in the hundreds column becomes 300.

4. Now subtract column by column in any order and add the differences.

$$\begin{array}{r} 427 \\ -378 \\ \hline \end{array}$$

$$\begin{array}{r} 300 \quad \nearrow 110 \\ 400 \quad \begin{array}{r} -10 \\ 20 \end{array} \quad \nearrow 17 \\ -300 \quad 70 \quad 8 \end{array}$$

$$0 + 40 + 9 =$$

$$49$$

Partial Product

When multiplying by "Partial Products," you must first multiply parts of these numbers, then you add all of the results to find the answer.

Multiply 20 X 60 (tens by tens)

Multiply 7 X 60 (ones by tens)

Multiply 20 x 4 (tens by ones)

Multiply 7 X 4 (ones by ones)

Add the results

$$\begin{array}{r} 27 \quad (20+7) \\ \times 64 \quad (60+4) \\ \hline 1,200 \\ 420 \\ 80 \\ + 28 \\ \hline 1,728 \end{array}$$

Partial Product

When multiplying by "Partial Products," you must first multiply parts of these numbers, then you add all of the results to find the answer.

	48 (40+8)
	X 53 (50+3)
Multiply 40 x 50 (tens by tens)	2,000
Multiply 50 x 8 (tens by ones)	400
Multiply 3 x 40 (ones by tens)	120
Multiply 8 x 3 (ones by ones)	+ 24
Add the results	2,544

Partial Quotient

Start "Partial Quotient" division by estimating your answer. Check by multiplying and subtraction. The better your estimate, the fewer the steps you will have.

	97 R3									
1. Estimate how many 9's are in 876. (90)	<table style="border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">9</td> <td style="padding-right: 5px;">) 876</td> <td style="border-left: 1px solid black; padding-left: 5px;"></td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">Subtract</td> <td style="padding-right: 5px;">- 810</td> <td style="border-left: 1px solid black; padding-left: 5px;">90 x 9 = 810 (1st estimate)</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;"></td> <td style="padding-right: 5px;">66</td> <td style="border-left: 1px solid black; padding-left: 5px;"></td> </tr> </table>	9) 876		Subtract	- 810	90 x 9 = 810 (1 st estimate)		66	
9) 876									
Subtract	- 810	90 x 9 = 810 (1 st estimate)								
	66									
2. Estimate how many 9's are in 66. (7)	<table style="border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">Subtract</td> <td style="padding-right: 5px;">- 63</td> <td style="border-left: 1px solid black; padding-left: 5px;">7 x 9 = 63 (2nd estimate)</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;"></td> <td style="padding-right: 5px;">3</td> <td style="border-left: 1px solid black; padding-left: 5px;">97 (Add the estimates)</td> </tr> </table>	Subtract	- 63	7 x 9 = 63 (2 nd estimate)		3	97 (Add the estimates)			
Subtract	- 63	7 x 9 = 63 (2 nd estimate)								
	3	97 (Add the estimates)								
3. Because 3 is less than 9, you have finished dividing and you now need to add the estimates to get your answer and the 3 left over is your remainder.										

Partial Quotient

Start "Partial Quotient" division by estimating your answer. Check by multiplying and subtraction. The better your estimate, the fewer the steps you will have.

	49 R3									
1. Estimate how many 8's are in 395. (40)	<table style="border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">8</td> <td style="padding-right: 5px;">) 395</td> <td style="border-left: 1px solid black; padding-left: 5px;"></td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">Subtract</td> <td style="padding-right: 5px;">- 320</td> <td style="border-left: 1px solid black; padding-left: 5px;">40 x 8 = 320 (1st estimate)</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;"></td> <td style="padding-right: 5px;">75</td> <td style="border-left: 1px solid black; padding-left: 5px;"></td> </tr> </table>	8) 395		Subtract	- 320	40 x 8 = 320 (1 st estimate)		75	
8) 395									
Subtract	- 320	40 x 8 = 320 (1 st estimate)								
	75									
2. Estimate how many 8's are in 75. (9)	<table style="border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">Subtract</td> <td style="padding-right: 5px;">- 72</td> <td style="border-left: 1px solid black; padding-left: 5px;">9 x 8 = 72 (2nd estimate)</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;"></td> <td style="padding-right: 5px;">3</td> <td style="border-left: 1px solid black; padding-left: 5px;">49 (Add the estimates)</td> </tr> </table>	Subtract	- 72	9 x 8 = 72 (2 nd estimate)		3	49 (Add the estimates)			
Subtract	- 72	9 x 8 = 72 (2 nd estimate)								
	3	49 (Add the estimates)								
3. Because 3 is less than 8, you have finished dividing and you now need to add the estimates to get your answer and the 3 left over is your remainder.										

PARTIAL QUOTIENTS DIVISION

Discuss benchmark numbers...

- X 1
- X 10
- X 100

$$8 \overline{) 177}$$

Start by setting up the problem like this. It looks just like the traditional long division method, except for the long line that is drawn to the right of the divisor. (Just like in the Hangman Game.)

Write on the side

- $8 \times 1 = 8$
- $8 \times 10 = 80$
- $8 \times 100 = 800$

$$8 \overline{) 177} \begin{array}{l} 10 \\ 80 \end{array}$$

Ask - How many [8s] are in 177? There are at least 10, so that will be the first partial quotient.

Multiply 10×8 , write the produce under the dividend in the problem. Then subtract!

- $8 \times 1 = 8$
- $8 \times 10 = 80$
- $8 \times 100 = 800$

$$8 \overline{) 177} \begin{array}{l} 10 \\ - 80 \\ \hline 97 \end{array}$$

Subtract 177 minus 80.

Now check, is 97 less than your divisor, 8? If yes, then you have finished dividing. If not.....

8 x 1 = 8
8 x 10 = 80
8 x 100 = 800

$$\begin{array}{r} 8 \overline{) 177} \\ \underline{80} \\ 97 \\ \underline{80} \\ 17 \end{array}$$

Start the process over again. Ask - how many [8s] are in 97?
Again, there are at least 10.

8 x 1 = 8
8 x 10 = 80
8 x 100 = 800

$$\begin{array}{r} 8 \overline{) 177} \\ \underline{80} \\ 97 \\ \underline{80} \\ 17 \end{array}$$

Subtract 97 minus 80.
Now check, is 17 less than your divisor, 8? If yes, then you have finished dividing. If not.....

8 x 1 = 8
8 x 10 = 80
8 x 100 = 800

$$\begin{array}{r} 8 \overline{) 177} \\ \underline{80} \\ 97 \\ \underline{80} \\ 17 \\ \underline{16} \\ 1 \end{array}$$

Start the process again. Ask - how many [8s] are in 17. There are at least 2.
Subtract 17 minus 16.

$8 \times 1 = 8$
 $8 \times 10 = 80$
 $8 \times 100 = 800$

$$\begin{array}{r}
 22 \text{ R}1 \\
 8 \overline{) 177} \\
 \underline{80} \\
 97 \\
 \underline{80} \\
 17 \\
 \underline{16} \\
 1 \\
 22
 \end{array}$$

Since the 1 is less than 8, you are finished dividing.

Now add up the partial quotients - 10 plus 10 plus 2.

Write the answer above with the remainder.

You are finished.

PARTIAL QUOTIENTS DIVISION

Now, let's try to solve the same problem using basic multiplication facts!

$$8 \overline{) 177}$$

Start by setting up the problem like this. It looks just like the traditional long division method, except for the long line that is drawn to the right of the divisor. (Just like in the Hangman Game.)

Now, let's try to solve the same problem using basic multiplication facts!

$$\begin{array}{r}
 8 \overline{) 177} \\
 \underline{160} \\
 20
 \end{array}$$

Ask - How many [8s] are in 17? There are at least 2, so 2 will be the first partial quotient.

Multiply 2×8 , write the product under the dividend in the problem.

Now, you will notice that there is an empty space under the last 7 in the dividend. We will place a "0" to occupy the empty space and add a "0" to the 2 in the partial quotient column. Then subtract!

$$8 \overline{) 177} \begin{array}{l} 20 \\ 2 \end{array}$$

$8 \times 1 = 8$
 $8 \times 10 = 80$
 $8 \times 100 = 800$

Start the process over again. Ask - how many [8s] are in 17?

Again, there are at least 2.

$$8 \overline{) 177} \begin{array}{l} 20 \\ 2 \\ 1 \end{array}$$

$8 \times 1 = 8$
 $8 \times 10 = 80$
 $8 \times 100 = 800$

Subtract 17 minus 16.

Now check, is 1 less than your divisor, 8? If yes, then you have finished dividing. If not.....keep going.

$$8 \overline{) 177} \begin{array}{l} 22 \text{ R. } 1 \\ 20 \\ 2 \\ 22 \end{array}$$

$8 \times 1 = 8$
 $8 \times 10 = 80$
 $8 \times 100 = 800$

1 is less than your divisor, 8, so you are finished dividing.

Now, add up the partial quotients, 20 and 2 and write their sum with the remainder at the top of the problem.


$8 \times 1 = 8$
 $8 \times 10 = 80$
 $8 \times 100 = 800$

22	R1	
8	177	
	- 80	10
	- 97	
	- 80	10
	- 17	
	- 16	2
	- 1	22

Since the 1 is less than 8, you are finished dividing.
 Now add up the partial quotients - 10 plus 10 plus 2.
 Write the answer above with the remainder.
 You are finished.

AREA MODEL FOR MULTIPLICATION

The Stork cafeteria has twenty eight tables. If 24 students are sitting at each table, how many students are sitting in the Stork cafeteria?



$$\begin{array}{r} 28 \\ \times 24 \\ \hline \end{array}$$

Then we can break apart our numbers by place value: tens and ones.

$$\begin{array}{r} 24 \\ \times 28 \\ \hline \end{array}$$

20	4	
20	8	

First, let's make our window. We have two digits in both numbers, so we should have 2 rows and 2 columns in our window.

Row x Column
What is 20×7 ?
140!

What is 4×7 ?
28!

Remember! The area model for the product of two numbers is made up of four squares.

Now we can multiply to find the product for each square. We multiply each row by each column.

What is 20×7 ?
140!

What is 4×7 ?
28!

400	80	20
160	32	8

Next step:
Add up the squares in the same column OR row.

400	80	20
160	32	8

$$\begin{array}{r} 400 \quad 80 \\ + 160 \quad + 32 \\ \hline 560 \quad + 112 \end{array}$$

$$\begin{array}{r} 560 \\ + 112 \\ \hline 672 \end{array}$$

We found our answer!

672!


400	80	20
160	32	8

$$\begin{array}{r} 400 \quad 80 \\ + 160 \quad + 32 \\ \hline 560 \quad + 112 \end{array}$$

$$\begin{array}{r} 560 \\ + 112 \\ \hline 672 \end{array}$$

Number Talks (Sherry Parrish)

What does Number Talks look like?
 Students are near each other so they can communicate with each other (central meeting place).
 Students are mentally solving problems.
 Students are given thinking time.
 Thumbs up show when they are ready.
 Teacher is recording students' thinking.



The teacher asks questions:
 Who would like to share their thinking?
 Who did it another way?
 How many people solved it the same way as Billy?
 Does anyone have any questions for Billy?
 Billy, can you tell us where you got that 5?
 How did you figure that out?
 What was the first thing your eyes saw, or your brain did?

CGI: Cognitively Guided Instruction in Math

Types of Word Problems

	"Result unknown"	"Change unknown"	"Start unknown"
Join	<p>How much more money did the children on Monday spend than on Tuesday? How many apples did they buy?</p> $2 + 4 = ?$	<p>How much money did the children on Monday spend? How much money did they spend on Tuesday?</p> $2 + 4 = ?$	<p>How much more money did the children on Monday spend than on Tuesday? How much money did they buy on Monday?</p> $2 - 4 = ?$
Separate	<p>How much money did the children spend on Monday? How many apples did they buy?</p> $6 - 2 = ?$	<p>How much money did the children spend on Monday? How much money did they spend on Tuesday?</p> $6 - 2 = ?$	<p>How much more money did the children on Monday spend than on Tuesday? How much money did they buy on Monday?</p> $6 - 2 = ?$
Part-Part-Whole	<p>How much more money did the children on Monday spend than on Tuesday? How much money did they buy on Monday?</p> $2 + 4 = ?$	<p>How much money did the children on Monday spend? How much money did they spend on Tuesday?</p> $2 + 4 = ?$	<p>How much more money did the children on Monday spend than on Tuesday? How much money did they buy on Monday?</p> $2 - 4 = ?$
Compare	<p>How much more money did the children on Monday spend than on Tuesday? How much money did they buy on Monday?</p> $6 - 4 = ?$ $4 - 2 = ?$	<p>How much money did the children on Monday spend? How much money did they spend on Tuesday?</p> $4 + 2 = ?$	<p>How much more money did the children on Monday spend than on Tuesday? How much money did they buy on Monday?</p> $2 + 2 = ?$ $4 - 2 = ?$

Online Resources


Four excellent resources for homework help:

- 1) Big Chalk- www.bigchalk.com
- 2) Math Forum- www.mathforum.org/dr.math
- 3) Tutor.com- www.tutor.com
- 4) Khan Academy- www.khanacademy.org

Other useful sites:

- 5) California Department of Education- <http://www.cde.ca.gov>
- 6) California Learning Resource Network- <http://www.clrn.org>
- 7) National Council of Teachers of Mathematics- <http://www.nctm.org>
- 8) California Mathematics Council- <http://www.cmc-math.org>

Remember- you can also access Pearson Envision and Big Ideas from ALSD website (



- Thank you for attending
- We realize the changes in math have been challenging for students, parents, and educators...but the end results will benefit all of our students' futures.
- Please take a handout with you as you leave.
- I am happy to answer follow up questions: psuttner@alsd.k12.ca.us
