Math Strategies We Use in 6th Grade

This booklet will show you some of the strategies I have learned to be more successful at solving problems. As I become a stronger mathematician, I learn how and why problems can be solved in different ways. The more I learn and use these different strategies, the more efficient and accurate I will become.

In 6th grade, I draw from the strategies I was taught in 5th grade to deepen my understand and begin to use the standard algorithm in much of my work.

Addition, Subtraction, & Multiplication

In 6th grade, my understanding of addition, subtraction, and multiplication extends to using the standard algorithm to solve problems with multi-digit decimals and fractions.

Decimals

Add: 37.68 + 5.2 + 125

37.68
5.20
+125.00
167.88

Subtract: 17 − 8.297

17.000
−8.297
8.703

When multiplying decimals, I can use the area model, partial product, or the standard algorithm. In 6th grade, the area model is also called the generic rectangle.

area model/ generic rectangle

	2	+ 0.3	+ 0.05
1	2	0.3	0.05
+ 0.4	0.8	0.12	0.020

partial product

2.35
× 1.4
0.020
0.12
0.8
0.05
0.3
2.0
3.290

standard algorithm

2.35
× 1.4
0.940
2.35
3.29

Here are some example of students using different strategies:

Finding Unit Rate

You can buy 12 oranges for $6. What is the cost per orange?

$\frac{\$6}{12 \text{ oranges}} \overset{\div 12}{=} \frac{?}{1 \text{ orange}}$ (÷12)

cost	$6	$1	$0.50
oranges	12	2	1

$12\overline{)6.0}$ → 0.5, −60, 0

Simplifying Expressions

$$3(2x + y) - x$$

$$3 \cdot 2x + 3 \cdot y - x$$

$$6x + 3y - x$$

$$5x + 3y$$

Solving Equations

$$3x^2 + 5x$$

$$3 \cdot 7^2 + 5 \cdot 7$$

$$3 \cdot 7 \cdot 7 + 5 \cdot 7$$

$$147 + 35$$

$$182$$

$$\frac{1}{3}x = 24$$

$$x = 24 \cdot 3 = 72$$

End of the Year Expectations

- Fluently divide multi-digit whole numbers using the standard algorithm.
- Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm.
- Divide fractions by fractions using models and equations.
- Solve expressions, equations, and inequalities with one variable and whole number exponents using order of operations.

Fractions

I need to find common denominators when adding or subtracting.

I can use the Giant One.

$\frac{2}{3} \cdot \boxed{\frac{2}{2}} = \frac{4}{6}$

I can build a ratio table

3	6	9	12	**15**	18
5	10	**15**	20	25	30

Addition

$\frac{1}{5} + \frac{2}{3}$

$\frac{1}{5} + \frac{2}{3} \Rightarrow \frac{1}{5} \cdot \boxed{\frac{3}{3}} + \frac{2}{3} \cdot \boxed{\frac{5}{5}} \Rightarrow \frac{3}{15} + \frac{10}{15} = \frac{13}{15}$

$8\frac{3}{4} + 4\frac{2}{5}$

$8\frac{3}{4} = 8 + \frac{3}{4} \cdot \boxed{\frac{5}{5}} = 8\frac{15}{20}$

$+4\frac{2}{5} = 4 + \frac{2}{5} \cdot \boxed{\frac{4}{4}} = +4\frac{8}{20}$

$12\frac{23}{20} = 13\frac{3}{20}$

Subtraction

$\frac{5}{6} - \frac{1}{4}$

$\frac{5}{6} - \frac{1}{4} \Rightarrow \frac{5}{6} \cdot \boxed{\frac{2}{2}} - \frac{1}{4} \cdot \boxed{\frac{3}{3}} \Rightarrow \frac{10}{12} - \frac{3}{12} = \frac{7}{12}$

$2\frac{1}{6} - 1\frac{4}{5} \Rightarrow \frac{13}{6} - \frac{9}{5}$

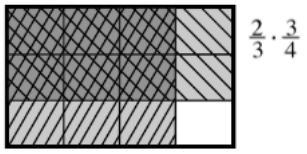
$\Rightarrow \frac{13}{6} \cdot \boxed{\frac{5}{5}} - \frac{9}{5} \cdot \boxed{\frac{6}{6}}$

$\Rightarrow \frac{65}{30} - \frac{54}{30} = \frac{11}{30}$

Multiplication

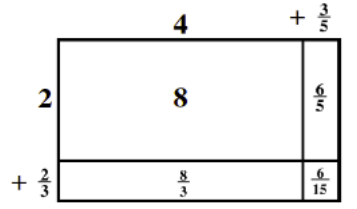
When multiplying fractions, I can use an area model or the standard algorithm.

area model/generic rectangle to algorithm



$\frac{2}{3} \cdot \frac{3}{4}$

$\frac{2}{3} \cdot \frac{3}{4} = \frac{6}{12}$



$2\frac{2}{3} \cdot 4\frac{3}{5} = 8 + \frac{6}{5} + \frac{8}{3} + \frac{6}{15} = 12\frac{4}{15}$

Division

I can divide using the standard algorithm for whole numbers.

Partial Quotient

$$
\begin{array}{r}
4 \\
60 \\
200 \\
\hline
32 \;\big|\; 8456 \\
-6400 \\
\hline
2056 \\
-1920 \\
\hline
136 \\
-128 \\
\hline
8
\end{array}
$$

Standard Algorithm

$$
\begin{array}{r}
264 \\
\hline
32 \;\big|\; 8456 \\
-64 \\
\hline
205 \\
-192 \\
\hline
136 \\
-128 \\
\hline
8
\end{array}
$$

Decimals

I can use the standard algorithm or multiplication and place value strategies to solve problems involving division with decimals.

$$4.2 \div 0.35 = (4.2 \times 100) \div (0.35 \times 100) = 420 \div 35 = 12$$

$$1.2\overline{)27.42} \Rightarrow 12.\overline{)274.2} \Rightarrow 12\overline{)274.20}$$

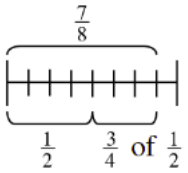
$$
\begin{array}{r}
22.85 \\
\hline
12\overline{)274.20} \\
\underline{24} \\
34 \\
\underline{24} \\
102 \\
\underline{96} \\
60 \\
\underline{60} \\
0
\end{array}
$$

Fractions

I can use visual models and the "giant one" strategy when dividing fractions by fractions.

Number Line

I ask myself how many $\frac{1}{2}$ are in $\frac{7}{8}$



$$\frac{7}{8} \div \frac{1}{2} = 1\frac{3}{4}$$

Area Model

$$\frac{1}{2} \div \frac{1}{8} = 4$$

Common Denominator

$$\frac{2}{5} \div \frac{3}{10} = \frac{4}{10} \div \frac{3}{10}$$
$$= 4 \div 3$$
$$= \frac{4}{3} = 1\frac{1}{3}$$

Giant One

$$\frac{3}{4} \div \frac{2}{5} = \frac{\frac{3}{4}}{\frac{2}{5}} \cdot \boxed{\frac{\frac{5}{2}}{\frac{5}{2}}} = \frac{\frac{3}{4}\cdot\frac{5}{2}}{1} = \frac{3}{4}\cdot\frac{5}{2} = \frac{15}{8} = 1\frac{7}{8}$$