GRADE 5: Multiply 3-digit x 3-digit & Divide 4-digit by 1-digit & by Multiple of 10

The goal is for students to develop computational fluency, learning a variety of strategies to use to solve problems. Students will look at the numbers involved in the problem and will then decide on a method that best fits the situation. The following are some of the strategies for solving multiplication/division problems in fifth grade. The majority of these strategies help students develop a strong sense of number and number relationships which are very important life skills.

MULTIPLICATION

LANDMARK MULTIPLES LIKE 10, 100:

- 45 x 10 = 450
- 357 x 20 = 357 x 2 x 10 = 714 x 10 = 7,140
- 231 x 400 = 231 x 4 x 10 = 924 x 100 = 92,400

DIVISION

LANDMARK MULTIPLES LIKE 10, 100:

- 50 ÷ 10 = 5
- 740 ÷ 10 = 74
- 2,400 ÷ 100 = 24

OPEN ARRAYS: Students decompose (break apart) the numbers into easier numbers (landmark numbers) and then compose (put together) the partial products. They will decompose numbers in a variety of ways. Below are two variations for decomposing. Using place value to decompose leads directly to the "traditional" algorithm. The difference between multiplication and division is which "piece" is missing. For multiplication, the answer is the area (inside) the array. For division, the answer is the missing factor (top dimension) of the array.

Solve 246 x 58:

	50	8	
200	10,000	1,600	= 11,600
40	2000	320	= 2320
6	300	48	= 348

Ans. 14,268

	10	10	10	10	10	8	
200	2000	2000	2000	2000	2000	1600	= 11,600
40	400	400	400	400	400	320	= 2320
6	60	60	60	60	60	48	= 348

Ans. 14,268

Solve 2136 ÷ 6:

	300	50	6	
6	1800	300	36	= 356 ANS.

	100	100	100	50	6	
6	600	600	600	300	36	= 356 ANS.

MULTIPLICATION	DIVISION

MULTIPLICATION

CLUSTERS: Decomposing numbers to make simpler simpler problems. Very similar to open arrays without box.

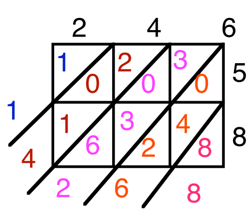
Solve 246 x 58:

246 x 50 = 12,300
246 x 8 = 1,968
14,268

TRADITIONAL ALGORITHM: Uses place value to compute the product. Placement of the digits is key to finding the partial products. Using the open array and decomposing (breaking apart) using place value leads directly to this method.

```
  246
x  58
 1968
 1230
14,268
```

LATTICE: An algorithm dating back to the 1200's relying on basic facts and addition. Create the correct size grid. Solve the individual facts for each box inside the corresponding dimensions. Add up the digits within a diagonal. Does not require number sense.



DIVISION

MODIFIED TRADITIONAL: Long division using the whole dividend for each step.

Solve 2,137 ÷ 6:

```
      356 r 1       | 6's
6 |  2137           |
   - 1800           | 300
      337           |
    - 300           |  50
       37           |
     - 36           |   6
        1           |
```

TRADITIONAL ALGORITHM: Relies on placement of digits to compute the quotient. DMSB (divide, multiply, subtract, bring down).

```
   356
6 |2136
   18
    33
    30
     36
     36
```

SHORT METHOD: A method relying more on mental math than the long division algorithm above. Divide six into 21. That is 3 but there will be three left. Place those 3 with the next digit (place) and divide again. Requires some number sense and is much easier than long division.

```
    3 5 6
6 | 2 1 ³3 ³6
```

These strategies are developed in the following unit(s) in our curriculum:

- Mathematical Thinking, Building on Numbers You Know.