Power and Exponents

Standard: 5.NBT.2

I CAN explain __________ in the ________ of ________ of the ________ when ________ a ________ by ________ of ________, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.

I CAN use whole-number _____ to denote powers of 10.

Essential Question: What strategies can be used to multiply whole numbers?

- Prime factorization
- Powers of 10
- Exponents

Investigate the Math: Is there a more efficient way to represent repeated multiplication of the same whole number?

Example: $2 \times 2 \times 2 \times 2 \times 2$

Base - a number that is multiplied by itself a certain number of times.

Exponent - a number that tells how many times a given number is used as a factor (tells how many times to multiply the base together)

Power - an exponent is called a power.

Example: $2 \times 2 \times 2 \times 2 \times 2$
Exponents

Powers of 10

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000</td>
<td>1,000</td>
<td>100</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>10 x 10 x 10 x 10</td>
<td>10 x 10 x 10</td>
<td>10 x 10</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>$10^5$</td>
<td>$10^4$</td>
<td>$10^3$</td>
<td>$10^2$</td>
<td>$10^1$</td>
</tr>
</tbody>
</table>
Independent Practice

0. $10 \times 10 = 10^2$
1. $8 \times 8 \times 8 \times 8 = 8^4$

Multiple Choice:

Select True or False for each question.

A. $2 \times 2 = 4\quad$ O True
B. $5 \times 5 = 25\quad$ O False
C. $2 \times 2 \times 2 = 8\quad$ O True
D. $2 \times 3 \times 3 = 21\quad$ O True

Short Answer: Why is standard form of $8^2$ not equal to 16? Explain your answer.

The standard form of $8^2$ does not equal 16 because $8 \times 8 = 64$. I know this because 8 is the base that is being repeatedly multiplied and 2 is the exponent that tells me how many times to multiply 8 together.
Prime → a number with 1 set of factors, it can only be multiplied by 1 and itself.

Composite → has more than 2 factors.

Ex.:

1. 24
   \[ \Rightarrow 2 \times 2 \times 2 \times 3 \]

2. 72
   \[ \Rightarrow 2 \times 2 \times 2 \times 3 \times 3 \]

3. 280
   \[ \Rightarrow 2 \times 2 \times 2 \times 5 \times 7 \]
**Prime** - A set of factors it can only be multiplied by 1 and itself.

Ex: 2, 3, 5, 7

\[
\begin{align*}
2 \times 1 & \quad 3 \times 1 & \quad 5 \times 1 & \quad 7 \times 1
\end{align*}
\]

2 is the only even prime number, all other numbers are odd but not all prime numbers are odd.

**Composite** - More than 2 factors

Ex: 21

\[
\begin{align*}
21 \times 1 & \quad 3 \times 7
\end{align*}
\]

**Prime Factorization** - A composite number broken down to prime factors (factor tree)

Ex: 40

\[
\begin{align*}
40 & \quad 2 \times 2 \times 2 \times 5
\end{align*}
\]

\[
\begin{align*}
5 & \quad 2 \times 4
\end{align*}
\]

\[
\begin{align*}
2 & \quad 2 \times 9
\end{align*}
\]

\[
\begin{align*}
9 & \quad 3 \times 3
\end{align*}
\]
Base - the factor that is being repeatedly multiplied.

Exponents - the number that tells you how many times the base is multiplied together.

\[ \text{Ex: } 5^4 \rightarrow \text{exponent} \]

\[ \text{Base} \]
Estimating Products

Standard: 5.NBT.5

I CAN fluently multiply multi-digit whole numbers using the standard algorithm.

Terms:
- **Product** — Answer to a multiplication problem. \( \text{Ex: } 2 \times 3 = 6 \) — **Product**
- **Factor** — The numbers multiplied to find a product. \( \text{Ex: } 2 \times 3 = 6 \) — **Factor**
- **Compatible numbers** — Numbers in a problem that are easy to compute mentally.

**Overestimate** — When the product is greater than the actual numbers used.

**Underestimate** — When the product is less than the actual numbers used.

Steps:

Sample Problem: 14 × 17 = ?
- **Round** the first digit of the factors so that there is one number followed by zero(es).
- Ex. 14 -> 10
- 17 -> 20
- Solve the estimate to find the place value of the product.
- 10 × 20 = 200; the answer is in the hundreds

How can you use compatible numbers to estimate products?

Estimate 24 × 39.
- It is easy to find 25 × 40, since \( \frac{25}{25} \) and \( \frac{40}{40} \) are compatible numbers. Remember that 25 × 4 = 100, so 25 × 40 = 1,000 is a good estimate.
- Both numbers used to estimate were greater than the actual numbers. So 1,000 is an overestimate.
Math in My World

Example: A pet store has 12 gecko lizards for sale. Each gecko lizard costs $92. About how much money would the store make if it sells all 12 gecko lizards?

Estimate the product of 92 and 12. (3 DIFFERENT WAYS TO SOLVE)

1. One Way is ROUND ON FACTOR.
   
   $92 - 90$
   
   $x12 - 10$
   
   $\$920$

   - By rounding one factor, the estimate is $\$920$.

2. Another way is to ROUND BOTH FACTORS.

   $92 - 90$
   
   $x12 - 10$
   
   $\$900$

   - By rounding both factors, the estimate is $\$900$.

3. The last way is to USE compatible NUMBERS.

   $92 - 100$
   
   $x12 - 10$
   
   $\$1000$

   - By using compatible numbers, the estimate is $\$1000$.

Guided Practice:

1. Round both factors.

   $42 - 30$
   
   $x18 - 20$
   
   $600$

2. Use compatible numbers.

   $98 - 100$
   
   $x83 - 80$
   
   $8000$
### Additional Practice

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$525 \times 31$</td>
<td>$500 \times 30 = 1500$</td>
</tr>
<tr>
<td>2.</td>
<td>$7 \times 6.789$</td>
<td>$7 \times 7000 = 49000$</td>
</tr>
<tr>
<td>3.</td>
<td>$75 \times 28$</td>
<td>$80 \times 30 = 2400$</td>
</tr>
</tbody>
</table>

1. **Answer: 1500**
   - Overestimate or Underestimate?

2. **Answer: 49000**
   - Overestimate or Underestimate?

3. **Answer: 2400**
   - Overestimate or Underestimate?

---

**Multiple Choice:** Lance has 12 boxes of comic books. Each box has 28 comic books in it. Using rounding to estimate, about how many comic books does Lance have? (3 points)

A. 350  
B. 325  
C. 300  
D. 250

Is this an overestimate or underestimate, justify your answer.

Lanie underestimated his amount of comic books because the estimated product is less than the actual product.
Short Answer: Tickets for a concert cost $29.00. The greatest number of tickets one person can buy is 9. If 28 people each buy 9 tickets for $29.00 per ticket, give a reasonable estimate for the total cost of tickets. Is your estimate an overestimate or underestimate? Justify your answer.

\[
\begin{align*}
28 \times 9 &= 252 \\
30 \times 10 &= 300 \\
\frac{29 \times 300}{30} &= \frac{8,700}{30} \\
\end{align*}
\]

The estimated cost of tickets is an overestimate. This is because all of the my estimates were greater value than the actual value. So $9,000 is an overestimate.

Front End Estimation

\[
\begin{align*}
\sqrt{29} &= 200 \\
\sqrt{799} &= 4000 \\
\end{align*}
\]

*5 or above give it a shove.  
*4 or below let it go.
Multiplying One digit Numbers

Standard: 5.NBT.5

I CAN fluently multiply multi-digit numbers.

Essential Question: What strategies can be used to multiply whole numbers?

- Exponents
- Powers of 10
- Distributive Property (array model)
- Estimating

Product: the result of a multiplication problem (the answer).

Factors: the numbers multiplied together to get the product. ex: \( 2 \times 3 \)

Step 1
Think about 3 groups of 24.

Step 2
Multiply the ones.

\[
\begin{array}{c}
24 \\
\times 3
\end{array}
\]

Think: \( 4 \times 3 = 12 \)

Step 3
Regroup 12 ones as 1 ten and 2 ones. Write down the ones. Carry the tens.

Step 4
Then multiply the bottom ones times the tens. Add in the one ten you carried over.

\[
\begin{array}{c}
24 \\
\times 3
\end{array}
\]

Think: \( 6 \times 1 = 6 \) tens

\[
\begin{array}{c}
72 \\
\end{array}
\]

Step 5
Your final answer is 72.
Example:
One of the largest soccer stadiums in the world is in Brazil. There are 78,838 seats in the Estadio do Maracana stadium. Suppose that all the seats in this stadium are sold out for the first 7 games of the season. How many tickets have been sold for the first 7 games?

Step 1: Set up the problem you can use to solve.

\[
78,838 \\
\times 7
\]

Step 2: Multiply the ones.

\[
78,838 \\
\times 7 \\
\underline{6}
\]

Step 3: Multiply the tens.

\[
78,838 \\
\times 7 \\
\underline{66}
\]

Step 4: Multiply the hundreds.

\[
78,838 \\
\times 7 \\
\underline{866}
\]

Step 5: Multiply the thousands.

\[
78,838 \\
\times 7 \\
\underline{1,866}
\]

Step 6: Multiply the ten thousands.

\[
78,838 \\
\times 7 \\
551,866
\]

Solution: For the first 7 games, 551,866 tickets have been sold.
Math Talk: Describe each step for finding $416 \times 3$?

The steps to find $416 \times 3$ are:

Step 1: Multiply the ones place, $6 \times 3 = 18$.
I put down 18 and regroup 1 ten.

Step 2: Multiply the ones place times the tens $3 \times 10$ plus 1.

Step 3: Multiply the hundreds which is $3 \times 400$.

Step 4: My final product is 1,248.

Multiple Choice: A man set a world record by holding nine eggs in one hand. Each egg weighed about 57 grams. What was the total weight of all the eggs?

A. 513 grams
B. 456 grams
C. 540 grams
D. 570 grams

Ezra planted 8 tomato plants. When he counted today, each plant had 37 green tomatoes. How many tomatoes were on the 8 plants?

A. 246
B. 266
C. 296
D. 306
Extended Response: Megan has a bookshelf with 7 shelves.

A. If there are 17 books on each shelf, what is the total number of books on the bookshelf? Show and explain your work.

\[ 17 \times 7 = 119 \text{ books} \]

Explain:
The steps to solving \( 17 \times 7 \) are:

Step 1: Multiply the ones place \( 7 \times 7 \) put down 9 ones and regroup 4 tens.

Step 2: Multiply the ones place by tens \( 7 \times 10 \) plus 4 tens.

Step 3: My final product is 119 books.

B. Jerry looked at the books on Megan's shelves and estimated there were 170 books on the shelves. Is his estimate an overestimate or an underestimate? Justify your answer.

Jerry Overestimated

Justify:
He said there were about 170 books and Megan has 119 books. I know that this is an overestimate because 170 is greater than 119.
Powers of 10

Steps
1. Multiply the Basic Facts
2. Count the Zeros and add on to the Product of the Basic Fact.
   - Look at the exponent number and write that many zeros in the product of the basic fact.

ex:

\[
10^2 = 100 \\
10^4 = 10,000 \\
10^{10} = 1,000,000,000,000
\]

ex:

\[
4 \times 10^4 = 40,000 \\
21 \times 10^3 = 21,000
\]

ex: 57 \times 100 = 5,700

123 \times 10 = 1,230

50 \times 1,000 = 50,000
Multiplication Patterns

Standard: 5.NBT.2

I CAN explain patterns in a number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.

I CAN use whole-number ________ to denote ________ of ________.

You can use place value to compare values of numbers.

1. Write the numbers in a place-value chart.
2. Look at the position of the digit in each number.
3. Use ________ to compare the values.

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The 4 in the 400 is in the ________ place.
The 4 in the 4,000 is in the ________ place.

400 x ________ = 4,000
Multiply by ________ to change the value of 400 to 4,000.

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The 2 in 20 is in the ________ place.
The 2 in the 200 is in the ________ place.

20 x ________ = 200
Multiply by ________ to change the value of 20 to 200.
Getting the Idea:

A **power of 10** is a value represented by multiplying 10 by itself a certain number of times.

- You can write a power of 10 in exponential form.

<table>
<thead>
<tr>
<th>Using Multiplication</th>
<th>Exponential Form</th>
<th>Word Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>$10^1$</td>
<td>10 to the first power</td>
</tr>
<tr>
<td>10 x 10</td>
<td>$10^2$</td>
<td>10 to the second power</td>
</tr>
<tr>
<td>10 x 10 x 10</td>
<td>$10^3$</td>
<td>10 to the third power</td>
</tr>
<tr>
<td>10 x 10 x 10 x 10</td>
<td>$10^4$</td>
<td>10 to the fourth power</td>
</tr>
</tbody>
</table>

Powers of 10

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Ones</th>
<th>Thousands</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>hundreds</td>
<td>tens</td>
<td>ones</td>
<td>hundreds</td>
</tr>
<tr>
<td>100,000</td>
<td>10,000</td>
<td>1,000</td>
<td>100</td>
</tr>
<tr>
<td>10 x 10 x 10 x 10</td>
<td>10 x 10 x 10 x 10</td>
<td>10 x 10 x 10</td>
<td>10 x 10</td>
</tr>
<tr>
<td>10 x 10</td>
<td>10 x 10</td>
<td>10 x 10</td>
<td>10 x 10</td>
</tr>
<tr>
<td>10⁴</td>
<td>10³</td>
<td>10²</td>
<td>10¹</td>
</tr>
</tbody>
</table>

- You can use a pattern to multiply whole numbers by powers of 10. Write as many zeros after the whole number in the product as the value of the exponent.

\[
\begin{align*}
4 \times 10^5 &= 4 \times 1 = 4 & 0 & \text{ zeros} \\
4 \times 10^1 &= 4 \times 10 = 40 & 1 & \text{ zero} \\
4 \times 10^2 &= 4 \times 10 \times 10 = 400 & 2 & \text{ zeros} \\
4 \times 10^3 &= 4 \times 10 \times 10 \times 10 = 4,000 & 3 & \text{ zeros} \\
10^0, \text{ or 10 to the zero power,} &= 1 & 15 & \text{ equal to 1}
\end{align*}
\]
Distributive Property

Standard: 5.NBT.5

I CAN fluently multiply multi-digit whole numbers.

Essential Question: What strategies can be used to multiply whole numbers?

- Powers of 10
- Distributive property
- Exponents

Distributive Property: Multiply a sum (or a difference) by a number is the same as multiplying each number in the sum (or difference) by that number and adding (or subtracting) the products.

- The Distributive Property helps you break apart numbers so they are easier to multiply.

Example:

\[6 \times 13 = 78\]

\[6 \times 10 + 6 \times 3\]

Array:

\[\begin{array}{c}
\text{a} \\
\text{b} \\
\text{c}
\end{array}\]

\[a \times b + c\]

Array (rectangle array area model):

\[\begin{array}{c}
\text{b} \\
\text{c}
\end{array}\]

\[a \times b + a \times c\]

Example:

\[6 \times (10 + 3) = 6 \times 10 + 6 \times 3\]

\[6 \times 10 + 6 \times 3\]

Array (rectangle array area model):

\[\begin{array}{c}
\text{10} \\
\text{3}
\end{array}\]

\[6 \times 10 + 6 \times 3\]
Steps to Distributive Property

Step 1: Break apart a multi-digit number.

Step 2: Multiply each part by the smaller number.

Step 3: Add the two products.

5 \times 43

\[ \begin{array}{c}
50 \\
3 \\
\hline
6 \\
\end{array} \]

\[ \begin{array}{c}
40 \\
3 \\
\hline
4 \\
\end{array} \]

5 + 12

Guided Practice:

1. \( 53 \times 6 \) = 318

\[ \begin{array}{c}
50 \\
3 \\
\hline
6 \\
\end{array} \]

\[ \begin{array}{c}
40 \\
3 \\
\hline
4 \\
\end{array} \]

600 + 18

2. \( 4 \times 28 \) = 112

\[ \begin{array}{c}
20 \\
8 \\
\hline
4 \\
\end{array} \]

\[ \begin{array}{c}
40 \\
0 \\
\hline
4 \\
\end{array} \]

80 + 32

3. \( 7 \times 41 \) = 32

\[ \begin{array}{c}
40 \\
1 \\
\hline
7 \\
\end{array} \]

\[ \begin{array}{c}
40 \\
0 \\
\hline
7 \\
\end{array} \]

280 + 42

280 + 42 = 32
Talk Math: Explain how to use distributive property to find a product mentally?

I would use the distributive property to find a product mentally by breaking apart the problem by place value, then multiplying and adding together.

Practice:

1. \[5 \times 607 = \]
   \[
   \begin{array}{c}
   7000 \\
   300 \\
   35
   \end{array}
   = 3035
   \]
   \[
   (5 \times 1000) + (5 \times 30) + (5 \times 7)
   \]

2. \[341 \times 32 = \]
   \[
   2
   \]
   \[
   9000 \\
   1200 \\
   80
   \]
   \[
   30
   \]
   \[
   \frac{9,000}{10,912}
   \]

3. Use the Distributive Property to rewrite the numeric expression:
   \[307 \times 13.
   \]
   A. \[(300 \times 10) + (7 \times 3)\]
   B. \[(300 \times 13) + (70 \times 13)\]
   C. \[(300 \times 13) + (7 \times 13)\]
   D. \[(3 \times 100) + (7 \times 13)\]

Extended response: Hannah said that she used the Distributive Property to solve \[4 \times 444.\] Is her answer shown below correct? Justify your answer?

Hannah's Work:

\[4 \times 444 = 4 \times (400 + 40 + 4) =
\]
\[
(4 \times 400) + (4 \times 40) + (4 \times 4) =
\]
\[
1,600 + 160 + 16 = 1,776
\]

Work

Hannah used distributive property correctly. I know this because I use an array model to solve for \(4 \times 444\) and I got the same answer as Hannah.
Multiplication Properties

Standard: 5.NBT.6

I CAN use strategies based on place value, the relationship between and/or the relationship between

Factors: The numbers we are multiplying

For Example: 2 x 3

Product: The to a multiplication problem.

The answer to 2 x 3 = 6

Commutative Properties: The order of factors can be changed, but the product stays the same. Ex: 2 x 3 = 3 x 2

9 x 3 = 3 x 9
56 x 11 = 11 x 56
4 x 8 = 8 x 4
5 x 9 = 9 x 5

Associative Property: You can group the factors. The product stays the same. Ex: (2 x 5) x 3 = 2 x (3 x 5)

What do the PARENTHESES mean?

- It means you have to multiply the numbers in the parentheses first.

3 x (4 x 2) = (2 x 4) x 2
4 x (1 x 7) = (4 x 1) x 7
5 x (7 x 2) = (5 x 7) x 2
(2 x 2) x 5 = 2 x (8 x 5)
Identity Property - When you _______ number by _________, the ________ is that ________.

EX: 23,487 X 1 = 23,487

234 X 1 = _______

1 ______ X 2,567 = 2,567

98,765 X ______ = 98,765

Zero Property - When any number is ________ with 0, the ________ is ________.

EX: 98,756,432 X 0 = 0

7,547,598,375 X ______ = 0

758,375,937 X 0 = _______

(____) X 75,879,705 = 0

Practice: Rewrite each equation with the correct answer, and write the name of the property.

1. 9 X 3 = 3 X ______

2. 3 X (4 X 2) = (____ X 4) X 2

3. 234 X 1 = _______

4. 56 X ________ = 11 X 56

5. 7,547,598,375 X ______ = 0

6. ________ X 8 = 8 X 4

7. 5 X (7 X 2) = (5 X 7) X _______

10. (2 X ________) X 5 = 2 X (8 X 5)

11. ________ X 2,567 = 2,567
**Multiple Choice:** Which multiplication property tells you that the following is true?

\[ 7 \times (2 \times 10) = (7 \times 2) \times 10 \]

A. Zero Property of Multiplication  
B. Identity Property of Multiplication  
C. Associative Property of Multiplication  
D. Commutative Property of Multiplication

**Short Answer:** Haley said that she would always know her 0 and 1 multiplication facts. Explain why Haley would say this. (2 points)

Haley said that she would always know her 0 and 1 multiplication facts because there are properties that tell you about them. There is identity property and zero property. Identity property is when you multiply a factor by 1, the product is the other factor. Zero property is when any factor is multiplied with zero, the product will be zero. Haley said she will always know her 0 and 1 multiplication facts.
Multiplying by 2 Digit Numbers

Standard: 5.NBT.5

I CAN: multiply multi-digit numbers.

Essential Question: What strategies can be used to multiply whole numbers?

Strategies that can be used to multiply whole numbers are:
- using powers of 10
- using distributive property (array model)
- using exponents
- using estimation

Product: the result of a multiplication problem (answer).
Factors: the numbers multiplied together to get the product.

How do you use standard algorithms to multiply two digit numbers?

I use standard algorithms to multiply two digit numbers by starting with the ones place and moving to the tens place when multiplying.

Steps to multiplying by two digit numbers:

The first step is to make sure the place values are lined up.

\[
\begin{array}{c}
26 \\
\times 12 \\
\hline
11 \\
26 \\
\hline
52
\end{array}
\]

Begin with multiplying the bottom factor's one's place with the top factors one's place.

Think, 2 x 6 equals 12.

Because there is still the tens place to multiply, you must carry the 1.

Next, multiply the 2 and the other 2. Then, remember to add your carry of 1.

Think, 2x2=4+1=5

\[
\begin{array}{c}
26 \\
\times 12 \\
\hline
1 \\
26 \\
\hline
52
\end{array}
\]
Investigate Math (Guided Practice)
Jamen reads 25 pages of a book or magazine everyday for a year. How many pages does he read in 365 days? Show your work. (from My Math)

Estimate

365 x 25 =

400 x 25 = 10,000

Work

\[
\begin{array}{c}
365 \\
\times 25 \\
\hline
9,125 \\
\hline
\end{array}
\]

Jamen reads 4,125 pages of his book in 1 year or 365 days.

A farmer plants 162 corn plants in a row. If there are 74 rows in a field, how many corn plants are in all? (from My Math)

Estimate

162 x 72 =

200 x 70 = 14,000

Work

\[
\begin{array}{c}
162 \\
\times 74 \\
\hline
648 \\
\hline
11,918 \\
\hline
\end{array}
\]

There are 11,918 corn plants in the farmer's field.
Domestic cats can run up to 44 feet per second on land. At this rate how many feet could a cat run in 12 seconds? (from my math)

A cat could run 528 feet per second in 12 seconds.

Practice:

\[ \frac{44}{12} \times \frac{5115}{5115} \]

\[ \frac{32}{13} \times \frac{416}{416} \]

Challenge Questions:

\[ \frac{534}{32} \times \frac{1858}{118912} \]

\[ \frac{3}{99} \times \frac{5392}{533808} \]
Practice NGA Question

1. Hanne correctly used place value and partial products to multiply 3.059 by 26. Is each step a step that Hanne could have taken in her work? Select yes or no.

A. Multiply 3.059 by 6.  ○ Yes  ○ No
B. Multiply 3.059 by 8.  ○ Yes  ○ No
C. Multiply 3.059 by 2.  ○ Yes  ○ No

2. Some college students had a goal of earning $25,000 last year at work. The amount of money each earned is shown. For each amount in the table, indicate an "X" whether the total earnings met or did not meet the goal.

<table>
<thead>
<tr>
<th>Total Earnings</th>
<th>Met Goal</th>
<th>Did Not Meet Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>$478 per week for 52 weeks</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>$563 per week for 48 weeks</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>$559 per week for 45 weeks</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>$602 per week for 37 weeks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Mr. Wargo can rent a car for $134 dollars a day. He needs to rent the car for 18 days. How much will Mr. Wargo spend? Explain how you solved your answer. (4 points)
4. Elephants can eat up to 575 pounds of vegetation and drink up to 40 gallons of water each day.
A. How much vegetation could an elephant eat in a year? (Hint: 1 Year = 365 days)

\[
\begin{align*}
575 \times 365 &= 209,875 \\
209,875 &\text{ pounds of vegetation in 1 year.}
\end{align*}
\]

B. Describe the steps you used to solve the problem.

I solved the problem by multiplying each plant value. (explain)

5. In Science class, Jim and his partner checked each other’s vital signs: pulse, respiration rate, and temperature. Chloe’s vital signs are shown in the table.

<table>
<thead>
<tr>
<th>Vital signs</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse (heart rate)</td>
<td>92 beats per minute</td>
</tr>
<tr>
<td>Respiration rate</td>
<td>15 breaths per minute</td>
</tr>
<tr>
<td>Temperature</td>
<td>98.7 degrees F</td>
</tr>
</tbody>
</table>

Jim said that if his vital signs remained the same throughout one day, he would take about 26,000 breaths in that day. Is Jim correct? Justify your answer.
(Hints: 1 hour=60 minutes, 1 day=24 hours)

\[
\begin{align*}
\frac{1}{24} \times \frac{1}{60} &= \frac{1}{1440} \\
\frac{1}{1440} \times 1400 &= 1 \\
\frac{21,600}{1400} &= 15 \\
21,600 &\text{ breaths in a day}
\end{align*}
\]