Mathematics

Parent Handbook

Grade 5

Place Value and Decimal Operations



**Objectives Related to Common Core Standards:**

1. Understand the place value system
* Understand how the value of a digit in one place compares to the value in a place to its right or left
* Explain patterns of zeros when multiplying a number by powers of 10.
* Use exponents to denote powers of 10
* Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10
* Read and write decimals to thousandths
* Compare decimals to thousandths
* Round decimals to any place
1. Perform operations with multi-digit whole numbers and with decimals to the hundredths.
* Add decimals to hundredths
* Subtract decimals to hundredths
* Multiply decimals to hundredths
* Divide decimals to hundredths
* Explain strategies used to perform decimal operations

**Vocabulary:**

digits

value

standard form

expanded form

word form

equivalent decimals

Commutative Property of Addition

Associative Property of Addition

compatible numbers

rounding

exponents

base

power

**Mathematical Properties:**

1. Commutative Property of Addition:
* The order of the addends does not affect the sum. They can be reordered and the same sum will be acquired.

a + b + c = d or b + a + c = d

5 + 2 + 8 = 15 or 2 + 8 + 5 = 15

Students are encouraged to reorder numbers to make addition easier.

1. Associative Property of Addition:
* This property allows for groupings of addends to be changed.

(a + b) + c = (a + c ) + b

**Models Used:**

1. Whole Number Place Value:

The place value chart below shows all the whole number place values which students will focus on in fifth grade.



3 forms are used:

**Standard form**: 423,180,000,000

**Expanded form**: 4 x 100,000,000,000 + 2 x 10,000,000,000 + 3 x 1,000,000,000 + 1 x 100,000,000 + 8 x 10,000,000

**Word Form**: four hundred twenty three billion, one hundred eighty million

1. Decimal Place Values:

Students are responsible to know decimal place value to the thousandths.



Reading Decimals: Read the decimal portion as if it were a whole number, appending the place value name of the rightmost digit in the number.

**Standard form**: 0.053

**Expanded form**: 5 x 1/100 + 3 X 1/1000

**Word form**: fifty three thousandths

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 3 | 4 | 2 | 2 | 3 |
|  | 3 | 4 | 2 | 3 | 2 |

1. Comparing Decimals:

Students start at the leftmost digit and compare until they find a digit that is different. Place value charts can be used to help in this comparison

34.223 < 34.232

4. Showing movement of numbers with multiplication and division of base ten multiples.

* Our number system is a base-ten system. This means each place value is 10 times as great as the place value immediately to its right and 1/10 as great as the place value immediately to its left.

0.4 x 10 = 4



* 1. x 10 = 24.3
	2. x 100 = 243

2.44 x 1000 = 2430

The chart shows how the digits move to the left of the decimal point when multiplied by a power of 10.



745 ÷ 10 = 74.5

745 ÷ 100 = 7.45

745 ÷ 1000= .745

The chart shows how the digits move to the right of the decimal point when divided by a power of 10.

1. Exponents:
* Exponents are used in terms of powers of 10. The chart shows how these place values are decomposed into multiplication expressions and then exponents.
* The exponent reminds students how many zeros/place values the number must contain.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1,000,000 | 100,000 | 10,000 | 1000 | 100 | 10 |
| (10 x 10 x 10) x (10 x 10 x 10) | 10x 10 x (10 x 10 x 10) | 10 x (10 x 10 x 10) | (10 x 10 x 10) | 10 x 10 | 10 x 1 |
| 106 | 105 | 104 | 103 | 102 | 101 |

 53 x 10³ = 53 x 1000= 53, 000

1. Rounding decimals and whole numbers:
* Underline the place value to be rounded to. Look at the number after the underlined place. If it is less than 5, round down. Otherwise, round up.
* To round up, add 1 to the underlined digits. To round down, don’t change the underlined digit.
* Write the rounded number. For whole numbers, change all the digits after the rounded place to 0. For decimals, drop all digits after the rounded place.

43, 875 rounded 0.4739 rounded to the

to the nearest thousand nearest hundredth

43,875 0.4739

 8 › 5 so round up 3 < 5 so round down

Change the 3 to 4 don’t change the 7

43, 875 rounds to 44,000 0.4739 rounds to 0.47

1. Adding Decimals:
* When adding decimals, align the decimal points of all addends. Tack on zero to any unfilled place value and add bringing down the decimal point.

0.3 + 0.82 = 0.30

 +0.82

 1.12

1. Subtracting Decimals:
* When subtracting decimals, align the decimal points of all subtrahends. Tack on zero to any unfilled decimal place value. Subtract, not forgetting to regroup when necessary and bring down the decimal point. Don’t forget that the first number is always the top number in the subtraction equation.

12.36 - 5.256= 12.360

 - 5.256

 7 .104

1. Multiplying Decimals:
* Decimals by Whole Numbers
	+ May be shown as repeated addition:

3 x 4.5 = 4.5 + 4.5 + 4.5 = 13.5

This shows why the number of decimal places in the product is the same as the number of decimal places in the factor.

* + Area Model

2 x 0.43 =0.86

Factor

 0.8 + 0.06 = 0.86

6 hundredths

8 tenths

2

 4 tenths + 3 hundredths

Factor

product

* Multiplying a Decimal by a Decimal

Decimal multiplication is done the same as whole number multiplication. The most difficult part for students is placing the decimal point in the product. Two techniques are used.

* Area Model
	+ The use of a hundreds chart allows students a hands on way to see where a decimal point is places. The students color in the first factor vertically in one color, then color in the next factor horizontally in another color. The intersection of the two colors is the product.

0.2 x 0.3 = 0.06

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | x |  |  |  |  |  |  |  |  |
| x | x |  |  |  |  |  |  |  |  |
| x | x |  |  |  |  |  |  |  |  |
| x | x |  |  |  |  |  |  |  |  |
| x | x |  |  |  |  |  |  |  |  |
| x | x |  |  |  |  |  |  |  |  |
| x | x |  |  |  |  |  |  |  |  |
| x | x |  |  |  |  |  |  |  |  |
| x | x |  |  |  |  |  |  |  |  |
| x | x |  |  |  |  |  |  |  |  |

\*\* It is important that students make sense of the fact that the product of two decimals less than one is less that either factor. We have found “part of a part”.

* Counting Decimal Places

4.2 1 decimal place

 x 5.4 + 1 decimal place

 22.68 2 decimal places

1. Dividing Decimals
* Dividing a Decimal by a Whole Number
	+ To divide a decimal by a whole number, the same process is followed as dividing by whole numbers. The decimal point is just brought up to the quotient.
	+ Zeros can be tacked on the end of the decimal to get a more precise answer rather than reporting the quotient with a remainder.

24.67 ÷ 4 =

 6.1675

4 24.6700

 -24

 0 6

 - 4

 2 7

* 24

 30

* 28

 2 0

* 2 0

 0

* Dividing a Decimal by a Decimal
	+ When dividing a decimal by a decimal, students are asked to take a more complex problem and turn it into a simpler one. This is done by multiplying the divisor and dividend by a power of 10, so that the divisor is a whole number.

Dividend divisor

56.64 ÷ 2.4 =

2.4 x 10 = 24

56.64 x 10 = 566.4

Therefore, the new problem is 566.4 ÷ 24 =

In this case, now the decimal point is just brought up to the quotient in the same place value.

 23.6

24 566.4

 - 48

 86

* 72

1 4 4

* 1 4 4

 0

Visual Models for Word Problems

 -Bar Diagrams/Tape Diagrams

Addition/Subtraction

|  |  |  |  |
| --- | --- | --- | --- |
| Add To 72 ResultStart Change | Result UnknownKim has 23 dolls. Her father gives her 18 more dolls. Now how many dolls does she have? **?** | Change UnknownDebbie has saved $57. How much more money does she need in order to have $112? 112 | Start UnknownTom has some money in his savings account. He then deposited $ 45 into the same account. Then he had $92 in all. How much did he have in his savings account to start? 92 |
| Take From 56 StartChange Result | Result UnknownSteven had 122 peanuts. He ate 71 of them. How many peanuts are left? 122 | Change UnknownCarrie had 45 CDs. She gave some to JO. Then Carrie had 27 left. How many did she give to Jo? 45 | Start UnknownAlan had some marbles. He lost 12 of them. Then he had 32 left. How many did he have to begin with? ? |
| Put Together/Take Apart 282 TotalAddend addend | **Total Unknown**A kennel had 14 cats and 16 dogs. How many dogs and cats are in the kennel? ? | **One Addend Unknown**Jim has 18 wheat crackers and some rye crackers. He has 63 crackers in all. How many rye crackers does he have? 63 | **Both Addends Unknown**Some adults and children are on a bus. There are 31 people on the bus. How many adults could be on the bus?  31 |
| ComparisonLarger AmountSmaller DifferenceAmount | DifferenceAlex has 47 toy cars. Keisha has 12 toy cars. How many more cars does Alex have? | Smaller Amount UnknownFran spent $26 less than Alice spent. Alice spent $84. How much did Fran spend? | Larger Amount UnknownBarney has 23 old coins. Steve has 16 more old coins than Barney. How many old coins does Steve have? |

Multiplication and Division

|  |  |  |  |
| --- | --- | --- | --- |
| Joining Equal GroupsProduct 84 Number  of groupsGroup size | Unknown ProductKim has 4 photo albums. Each album has 85 pictures. How many photos are in her 4 albums? **?** | Group size UnknownPam put the same number of apples in each of 4 bags. She ended up with 52 apples in bags. How many apples did she put in each bag? 52 | Number of Groups UnknownFred bought some books. Each book cost $16. He spent $80 on books. How many books did he buy? 80  **?** |
| Separating Equal GroupsDividend 138 Number of groupsGroup size | Unknown DividendKim had some cards. She put them into piles of 35 and was able to make 4 piles. How many cards did she start with? **?** | Group Size UnknownBryan got 45 pigeons. He put them in 5 pens with the same number of pigeons in each pen. How many pigeons are in each pen? | Number of Groups UnknownA total of 108 children signed up for soccer. The coach put them into 18 person teams. How many teams were made? 108 **?** |
| Comparison 78 Multiplier  Smaller  amount  | Larger Amount UnknownAlex has 17 toy cars. Keisha has 3 times as many. How many cars does Keisha have? **?** | Smaller Amount UnknownBarney has 24 old coins. This is 3 times as many coins as Steve has. How many old coins does Steve have? 24 | Multiplier UnknownAnn’s teacher is 39 years old. Ann is 13 years old. How many times as old as Ann is Ann’s teacher? 39 |