

Topic 2: Understanding Numbers Study Guide

General Knowledge

Average: to find the average, add all values included together, then divide the sum (answer) by the total number of values included.

Place Value Chart:

thousands	hundreds	tens	ones	•	tenths	hundredths	thousandths
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Expanded Form: is a way to show a number as the sum of all of its place values. For example, 345 in expanded form is $3 \times 100 + 4 \times 10 + 5 \times 1$.

Scientific Notation: a way of writing really big or really small numbers. They are represented using exponents (tiny number) with a base of 10. If the exponent is positive, you move the decimal that many places to the right and the larger the exponent the larger the number. If the exponent is negative, you move the decimal place that many digits to the left and the exponent the value the smaller the number.

For example $10^5 \Rightarrow$ 10 is the base, 5 is the exponent $\rightarrow 10^5 = 100,000$

$10^{-5} \Rightarrow$ 10 is the base, -5 is the exponent $\rightarrow 10^{-5} = 0.00001$

Factor: the values that multiply to create a new number.

For example, factors of 12 include: 1 and 12, 2 and 6, 3 and 4.

12: (1, 2, 3, 4, 6, 12)

Greatest Common Factor (GCF): the largest factor that two or more numbers have in common.

For example, factors of 4 include 1, 2 and 4. \rightarrow 4: (1, 2, 4)

factors of 12 include: 1 and 12, 2 and 6, 3 and 4. \rightarrow 12: (1, 2, 3, 4, 6, 12)

The largest factor both 4 & 12 have in common is 4.

Multiple: the numbers you say if you count by a certain number.

For example, multiples of 5 include 5, 10, 15, 20, 25...

You can obtain these values by multiplying your number by each counting number starting at 1: $1 \times 5 = \underline{5}$, $2 \times 5 = \underline{10}$, $3 \times 5 = \underline{15}$, $4 \times 5 = \underline{20}$, $5 \times 5 = \underline{25}$...

Least Common Multiple (LCM): the smallest number that is a multiple of two or more values.

For example, multiples of 4 include 4, 8, 12, 16, 20...

multiples of 5 include 5, 10, 15, 20, 25...

The smallest number both 4 and 5 have in common is 20.

**Finding the LCM is very important in adding or subtracting fractions with different denominators.

Prime Number: only has the factors 1 and itself. For example 3 is a prime number because you can only multiply 1×3 to get the answer 3. \rightarrow 3: (1, 3)

Composite Number: has more factors than 1 and itself. For example, 4 is a composite number because its factors include 1, 2, and 4. \rightarrow 4: (1, 2, 4)

Fraction Concepts

Numerator: the top number in a fraction. Represents how many you have out of the total.

Denominator: the bottom number in a fraction. Represents the total value.

Improper Fraction: a fraction where the numerator is larger than the denominator.

Mixed Number: a fraction that contains a whole number beside it. The whole number is written to the left of the fraction.

Converting Mixed Numbers to Improper Fractions: to convert a mixed number to an improper fraction, start at the bottom of the fraction and multiply the denominator and the whole number to the side of the fraction. Lastly, add the numerator; this is the new numerator. Keep the denominator from the original fraction.

Converting Improper Fractions to Mixed Numbers: to convert from an improper fraction to a mixed number, see how many times the denominator goes into the numerator (how many groups the size of the denominator can you make out of the numerator?) This value becomes the whole number you put on the left side of the fraction. Multiply this value by the denominator and remove the product (answer) from the numerator. This value becomes the new numerator. Keep the denominator from the original fraction.

Equivalent Fractions: to create equivalent fractions, multiply or divide the numerator and denominator by the **same** value.

Simplifying Fractions: (also called "lowest terms") creating an equivalent fraction where both numbers are reduced to their smallest form. For example, the numerator and denominator of the fraction $6/18$ can both be divided by 6, giving you $1 (6 \div 6 = 1)$ over $3 (18 \div 6 = 3)$. The simplest form also includes converting an improper fraction to a mixed number.

Adding Fractions with the Same Denominator: if two fractions have the same denominator, you can just add the numerators together. Your final step is to simplify the fraction and put it in lowest terms.

Adding Fractions With Different Denominators: if two fractions do not have the same denominator you need to create equivalent fractions (see above) that have a common denominator (find the LCM, see above). Once you have common denominators, you can add across like explained above.

Multiplying Fractions: multiply the numerators and multiply the denominators. Put the answer into lowest terms (see Simplifying Fractions above).

Dividing Fractions: keep the first fraction as is. Switch the division sign to multiplication sign. Flip the second fraction so the numerator becomes the denominator and the denominator becomes the numerator. You now have a multiplication problem and can follow the steps above by multiplying straight across numerator by numerator; denominator by denominator.

Converting Between Different Types of Numbers

Finding the Percent of a Number: to find the percent of a number (for instance adding taxes to a purchase), convert the percent into a decimal by moving the decimal place 2 digits to the left. Multiply the value you are finding the percent of by the new decimal. If you are adding a percent as a tax, be sure to add the percentage of the number to the original number.

For example, a 5% tax on \$10

First convert 5% to a decimal $\rightarrow 5\%$ (drop the % sign, move decimal place 2 digits left) $\Rightarrow 0.05$

Second, find 5% of \$10 $\rightarrow 0.05 \times 10 \Rightarrow \0.50

Lastly, add taxes to original purchase of \$10 $\rightarrow \$10 + \$0.50 \Rightarrow \$10.50$

Decimal to Fraction: look at what place value the final digit of the decimal is in. That will become the denominator. Write the value of the decimal as a whole number as the numerator. Simplify the fraction (see above).

For example, to turn 0.43 into a fraction.

Look at the final digit, the 3 is in the hundredths place value, so 100 becomes the denominator.

Place the 43 without decimals as the numerator $\Rightarrow \frac{43}{100}$

Fraction to Decimal: divide the numerator by the denominator.

For example, $\frac{43}{100} \Rightarrow 43 \div 100 = 0.43$

Decimal to Percent: multiply the decimal by 100. This is the same as moving the decimal place 2 digits to the right. Put a percent sign (%) at the end.

For example, $0.43 \times 100 = 43\%$

Percent to Decimal: drop the percent sign and divide the number by 100. This is the same as moving the decimal place 2 digits to the left.

For example, $43\% \div 100 = 0.43$

Fraction to Percent: turn the fraction into a decimal by dividing the numerator by the denominator, then multiply by 100

For example, $\frac{43}{100} \Rightarrow 43 \div 100 = 0.43 \rightarrow \text{THEN } 0.43 \times 100 = 43\%$

Percent to Fraction: drop the percent sign and write the percent value as the numerator with 100 as the denominator. Simplify the fraction (see above).

For example, $43\% \div 100 = 0.43 \rightarrow \text{THEN } 0.43 = \frac{43}{100}$

All notes from lessons are available online at prjh-krae.weebly.com

Past PAT exams where your exam is coming from are also available at that link.