

5.1 READING DECIMALS; ROUNDING TO THE NEAREST NUMBER, TENTH OR HUNDREDTH

GRADE 5 MATH – CONTENT SUMMARY

(2016 STANDARDS)

Teachers – is this guide helpful? Let me know at maria@solpass.org

Each **place** in a number is **ten times** the value of the place to its right.

A **decimal point** separates the whole number from the places less than one.

To read decimals,

- read the **whole number** to the left of the decimal point;
- read the decimal point as “**and**”;
- read the **digits** to the right of the decimal point just as you would read a whole number; and
- say the name of the **place value** of the digit in the **smallest** place.

Decimals less than one have a **leading zero** before the decimal point.

0.115 can be read as “zero and one hundred fifteen thousandths”, or just “one hundred fifteen thousandths”.

ROUNDING DECIMALS

Round 4.847

- to the nearest whole number. Answer 5
- to the tenths place Answer 4.8
- to the hundredths place Answer 4.85

5.2 EQUIVALENT FRACTIONS AND DECIMALS; ORDERING LEAST TO GREATEST

Represent fractions with denominators of 3, 8 or factors of 100 as decimals: $\frac{3}{5} = \frac{6}{10}$ or 0.6

Some fractions equal **repeating decimals**: $\frac{2}{3} = 0.666\dots$ or $0.\bar{6}$

Note that repeating decimals can be written with a **line over** the repeating digit or with an **ellipsis** (three dots).

Proper fraction – numerator less than denominator - $1/2$, $7/8$

Improper fraction – numerator equal or greater than denominator – $12/7$, $4/4$.

Improper fractions can be written as **mixed numbers** - $3\frac{5}{8}$, $2\frac{1}{4}$

Use the **symbols >, <, =, and ≠ to compare decimals** through thousandths, fractions (proper or improper fractions), and/or mixed numbers, having denominators of 12 or less.

Put the following in order from **least to greatest**: $1/2$, 0.3, $3/8$, 0.7

Answer: 0.3, $3/8$, $1/2$, 0.7

5.3 PRIME AND COMPOSITE NUMBERS; EVEN AND ODD NUMBERS

A **prime number** is a number other than one that has **exactly two different factors**, one and the number itself.

Other numbers are **composite** numbers. The number 1 is neither prime nor composite.

Prime factorization of a number – represent a number as the product of prime numbers.

What is the prime factorization of 24? $2 \times 2 \times 2 \times 3$ of 9? 2×3

Odd and **Even** numbers: **Even** numbers can be **divided by 2** without a leftover. Some rules for odd and even numbers:

- An **odd** number does not have two as a factor and is **not divisible by two**.
- An **even** number has two as a factor and is divisible by two.
- The **sum of two even** numbers is **even**.
- The **sum of two odd** numbers is **even**.

EVEN NUMBERS to 30									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

PRIME NUMBERS to 30									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

- The **sum of an even number and an odd number is odd.**
- **Even** numbers have an **even number** or **zero** in the **ones** place.
- **Odd** numbers have an **odd** number in the **ones** place.
- The **product of two even** numbers is **even.**
- The **product of two odd** numbers is **odd.**
- The **product** of an **even** number and an **odd** number is **even.**

5.4 ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION OF WHOLE NUMBERS

In doing word problems, focus on what **makes sense** rather than on key words like “in all” which can be misleading.

There are many problem types (numerous examples are given in this standard).

Problem $25 \times 96 = 2,400$ can be presented a number of ways.

25 boxes of crayons and each box contains 96 crayons, how many in all?

There are 2,400 crayons, evenly split into 25 boxes. How many crayons per box?

There are 2,400 crayons. With 96 per box, how many boxes are there?

Division problems can treat **remainder** differently.

Some require **discarding** the remainder (splitting 9 pencils among 2 friends)

Some require **splitting** the remainder (3 friends share 2 candy bars)

Some require **rounding up** (how many cars needed for 6 people)

Some require **rounding** (with a bag of 29 candies, about how many pieces will each of the six children get)

Familiarity with **properties** (don't need to know names) can help solve problems.

- **Commutative** property of **addition**: $a + b = b + a$
- **Commutative** property of **multiplication**: $a \cdot b = b \cdot a$
- **Associative** property of **addition**: $(a + b) + c = a + (b + c)$
- **Associative** property of **multiplication**: $(ab)c = a(bc)$
- **Distributive** property (over addition/subtraction): $a(b + c) = ab + ac$ and $a(b - c) = ab - ac$

Example of **distributive property**: $3(15) = 3(5 + 10) = (3 \times 5) + (3 \times 10) = 15 + 30 = 45$

$$9 \times 13 = 9(10 + 3) = (9 \times 10) + (9 \times 3) = 90 + 27 = 117$$

5.5 COMPUTING WITH DECIMALS

DIVIDING DECIMALS

Multiplying Decimals

2.56×0.2

no. of decimal places

2.56 → ②

0.2 → ①

0.512 → ③

① Ignore the decimal point and multiply

② Count from the right and put the point

$$\begin{array}{r} 4.3 \\ 2 \overline{) 8.6} \\ \underline{-8} \\ 06 \\ \underline{-6} \\ 0 \end{array}$$

$$\begin{array}{r} 5.5 \\ 6 \overline{) 33.0} \\ \underline{30} \\ 30 \\ \underline{30} \\ 0 \end{array}$$

Terms used in division are **dividend** \div **divisor** = **quotient** or

$$\frac{\text{quotient}}{\text{divisor}} \overline{) \text{dividend}}$$

$$\frac{\text{dividend}}{\text{divisor}} = \text{quotient}$$

5.6 COMPUTING WITH FRACTIONS

ADDING FRACTIONS

$$\frac{2}{15} + \frac{3}{5} \left(\frac{3}{3} \right)$$

the original fractions: $\frac{1}{3} + \frac{1}{2}$

$$= \frac{2}{15} + \frac{9}{15}$$

with a common denominator: $\frac{2}{6} + \frac{3}{6}$

$$= \frac{11}{15}$$

result: $\frac{5}{6}$

Same denominator

Fractions in **simplest form**: divide numerator and denominator by **greatest common factor**

Example: $\frac{3}{15}$ (divide numerator and denominator by 3) = $\frac{1}{5}$ in simplest form

Multiply whole number and fraction

$$4 \times \frac{1}{2} = \frac{4}{1} \times \frac{1}{2} = \frac{4}{2} = \frac{2}{1} = 2$$

SUBTRACTING FRACTIONS

$$\frac{3}{5} - \frac{2}{15}$$

the original fractions: $\frac{1}{2} - \frac{1}{3}$

$$= \frac{9}{15} - \frac{2}{15}$$

with a common denominator: $\frac{3}{6} - \frac{2}{6}$

$$= \frac{7}{15}$$

result: $\frac{1}{6}$

Same denominator

5.7 ORDER OF OPERATIONS

Order of operation – PEMDAS

P - parenthesis ();

E – exponents

MD – multiply and/or divide, left to right

AS – add and/or subtract, left to right

Example: $12 - 2 \times 5 = 2$ but $(12 - 2) \times 5 = 50$

length (*l*) 6 ft

width (*w*) 5 ft

Perimeter = $2w + 2l$
 $10 + 12 = 24$

Area = $w \times l$
 $5 \times 6 = 30 \text{ sq ft.}$

5.8 PERIMETER, AREA, VOLUME

Perimeter – distance around a two-dimensional (plane) figure

$$2 \times \text{length} + 2 \times \text{width}$$

Area – Number of square units needed to cover the a surface or plane figure

$$\text{length} \times \text{width}$$

AREA OF RIGHT TRIANGLE IS HALF THE AREA OF RECTANGLE

height (*h*) 5 ft

base (*b*) 6 ft

Area = $\frac{1}{2} b \times h = 15 \text{ sq.ft}$

Area of right triangle – half the area of rectangle

note that two sides of right angle are called **base** and **height**

$$\text{Area} = \frac{1}{2} \text{base} \times \text{height}$$

Volume of a three-dimensional figure like a rectangular prism

$$\text{length} \times \text{width} \times \text{height}$$

measured in **cubic units** like ft^3

RECTANGULAR PRISM

length 10 ft

width 4 ft

height 6 ft

Area = length \times width \times height
 $10 \times 4 \times 6 = 240 \text{ ft}^3$

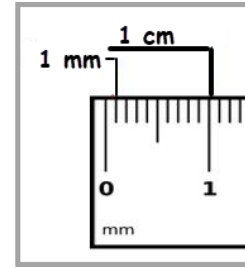
5.9 METRIC UNITS FOR LENGTH, MASS AND LIQUID VOLUME

Measuring Length – kilometer (you might walk one in 10 minutes) = **1000 meters**

meter (approx. width of a door) = **100 centimeters** or **1000 millimeters**

centimeter (approx.. length of a fingernail) = **10 millimeters**

millimeter (the length of a dash -)



Measuring Weight and Mass –

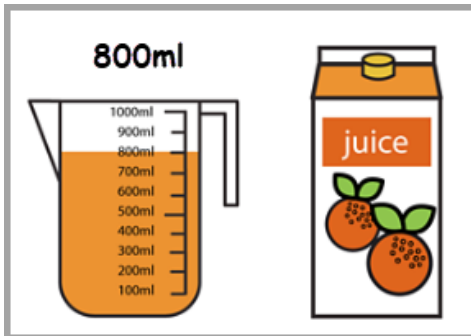
Mass is the **amount of matter** in an object.

Kilogram (a book might be 1 kilogram (kl) = **1000 grams**

Gram (a paperclip might be 1 gram)

Weight – accounts for **pull of gravity** on an object , so on the moon with

less gravity, weight and mass will differ, but on Earth the terms often mean the same thing.



Volume (of liquid) –

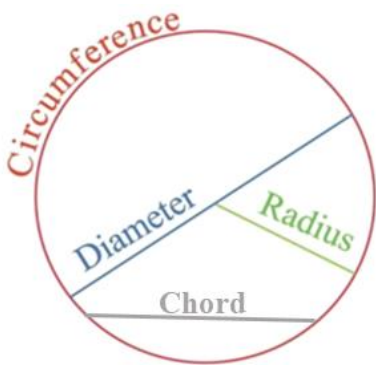
Liter (you might drink a ½ liter of cola) = **1000 milliliters**

Milliliter (ml) about 20 drops

Questions: How many **meters** in **8 kilometers**? Answer: 8,000

If a paperclip weighs a **gram**, how many paperclips in a box that weighs a **kilogram**. Answer: 1000

If you walked ½ **kilometer**, how many meters did you walk? Answer: 500



5.10 - DIAMETER, RADIUS, CHORD, AND CIRCUMFERENCE OF A CIRCLE

Chord – connects any **2 points** on a circle. Diameter is the longest chord.

Diameter – A **chord** that goes through the **center** of the circle.

Radius – A line segment that goes from the **center** of the circle to any point on the circle. It is half the length of the diameter.

Circumference is the “**perimeter**” of the circle. It is about 3 times the length of the diameter (6 times the radius).

5.11 ELAPSED TIME IN HOURS AND MINUTES WITHIN A 24-HOUR PERIOD

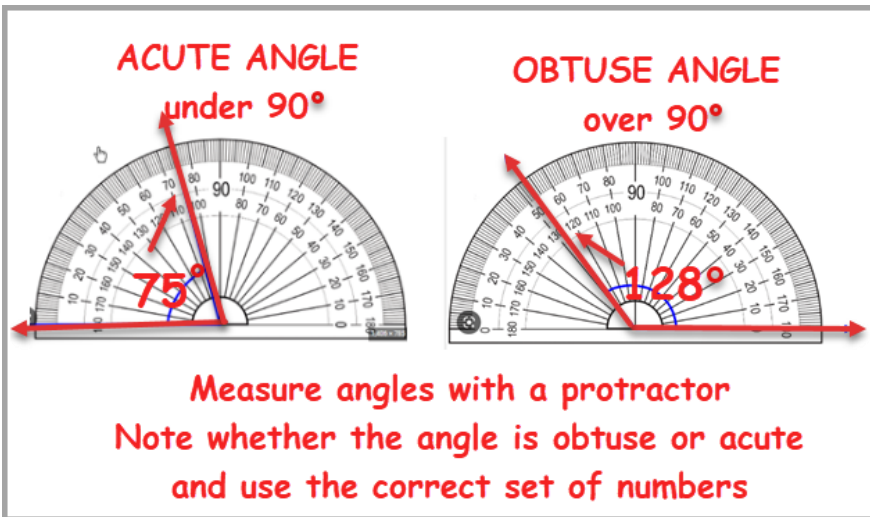
Determine time in hours and minutes-

Find **elapsed time** when given beginning and ending time

Find **ending time** when given beginning and elapsed time

Find **beginning time** when given ending time and elapsed time

5.12 RIGHT, ACUTE, OBTUSE, AND STRAIGHT ANGLES



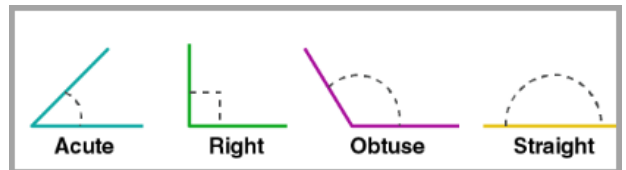
Angles are measured in **degrees**. . There are **360** degrees in a circle.

A **right angle** measures exactly **90 degrees**

An **acute angle** 0 - 90 degrees.

An **obtuse angle**: 90 – 180 degrees

A **straight angle** measures exactly **180 degrees**



5.13 TRIANGLES: RIGHT, ACUTE, OR OBTUSE AND EQUILATERAL, SCALENE, OR ISOSCELES

A **right triangle** has one right angle.

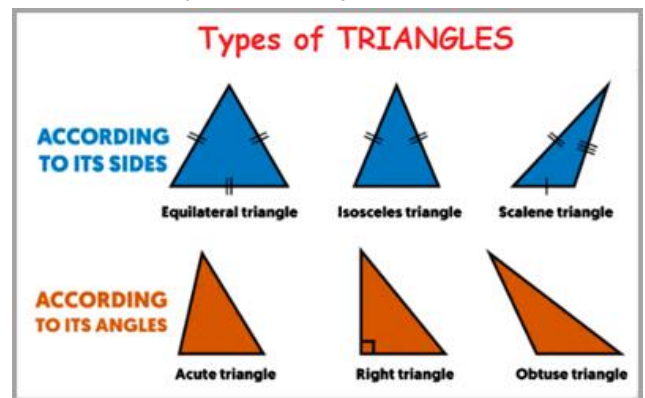
An **obtuse triangle** has **one obtuse** angle.

An **acute triangle** has **three acute** angles.

A **scalene triangle** has **no congruent sides**.

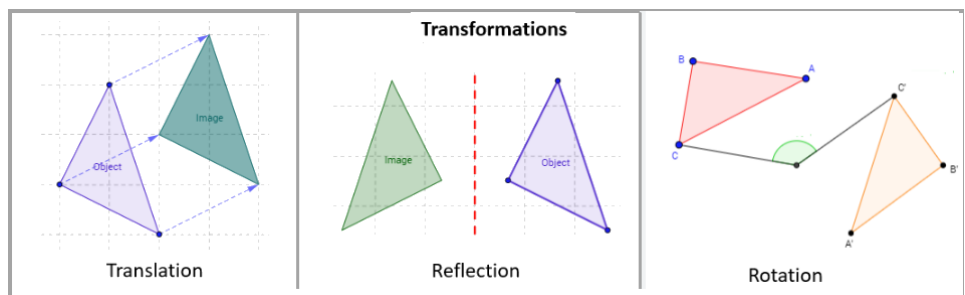
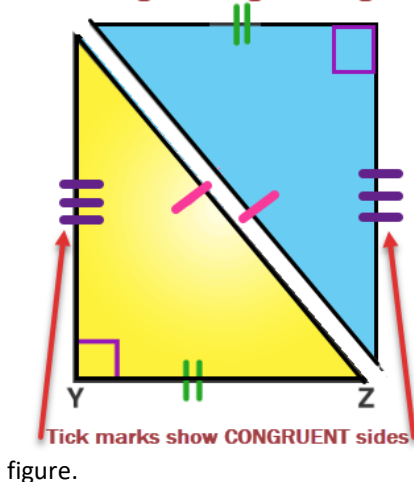
An **isosceles triangle** has at least **two congruent sides**.

An **equilateral triangle** has **three congruent sides**. All angles of an equilateral triangle are congruent and measure 60 degrees.



5.14 TRANSFORMATIONS: TRANSLATION, REFLECTION, AND ROTATION; COMBINING AND SUBDIVIDING POLYGONS

A **rectangle** can be divided into **two congruent right triangles**



Congruent figures have the **same size and shape**.

Translation – An image **slides** to a different position without turning or changing size

Reflection – An image is **reflected** or **flipped** over a line of reflection.

Rotation- Formed by **rotating** the preimage about a point called the center of rotation.

The resulting figure of a **translation, reflection, or rotation** is **congruent** to the original figure.

5.15 PROBABILITY AND THE FUNDAMENTAL COUNTING PRINCIPLE

Probability is the measure of **likelihood** that an event will occur.

Probability is quantified as a number between **zero and one**. **Zero** means “impossible”. **One** means “certain”.

If a bag has 4 candies, and 3 are red, the probability of blindly choosing a red candy is $\frac{3}{4}$. The probability of choosing a candy that is not red is $\frac{1}{4}$.

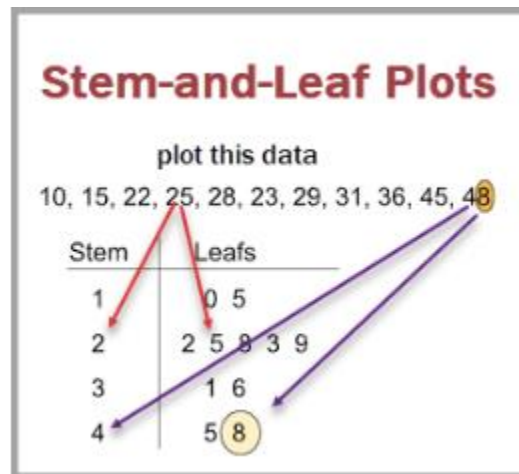
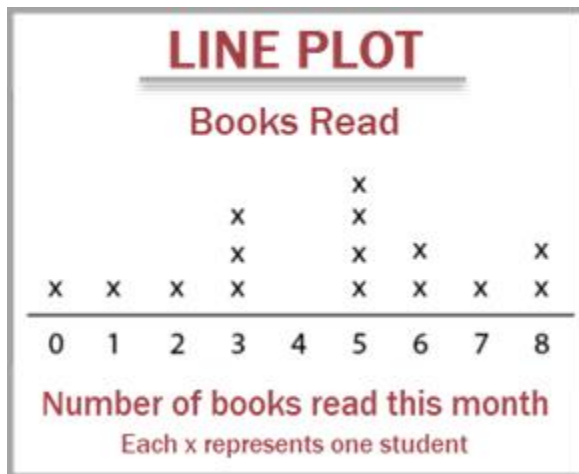
The **fundamental counting principle** is a rule used to count the total number of **possible outcomes** in a situation.

How many different outfit combinations can be made of 2 shirts and 3 pants. Answer: $2 \times 3 = 6$

What if we added socks. How many combinations can be made of 2 shirts, 3 pants and 4 pairs of socks. Answer: $2 \times 3 \times 4 = 24$



5.16 PLOTTING DATA – LINE PLOTS AND STEM-AND-LEAF PLOTS



Different data requires **different types of graphs**.

In the above Line Plot, how many students read 5 books? Answer – 4

In the above stem-and-leaf plot, how many numbers over 40 are plotted? Answer – 2 (45, 48)

5.17 MEAN, MEDIAN, MODE AND RANGE

Mean, median and **mode** can be considered as **measure of center**, or middle of a data set, or they can be seen as **types of averages**.

Mean represents **FAIR SHARE**, and is often referred to this way.

Find the mean by **adding all the data points** and then **dividing** by the **number** of data points.

What is the **mean** or **fair share** of (2, 6, 9, 3) ? Answer – 5 Why? $2 + 6 + 9 + 3 = 20$. $20 / 4 = 5$

Median – the **middle value** of an ordered data set.

If there is an **odd number** of data points, the median is the **middle value**.

If there is an **even number** of data points, the median is the arithmetic average (**mean**) of the **two middle values**.

Mode – piece of data that occurs **most often**.

There may be **no mode** if each piece of data occurs only once. Or there could be **more than one mode** as in this case (1, 3, 3, 5, 5, 7, 8, 9) where there are two modes, 3 and 5.

Range – the **spread** of the data

the distance between the **greatest and smallest values**

subtract the **smallest** from the **largest** number

(2, 8, 11) Range is 9 ($11 - 2 = 9$)

5.18 PATTERNS

Patterns at this level may include addition, subtraction, or multiplication, or division. What comes next in each of these patterns?

2, 4, 8, 16, ...

Answer 32

32, 30, 28, 26, ...

Answer 24

1, 2, 4, 7, 11, 16, ...

Answer 22

Patterns sometime shown as **input-output table**:

What is the rule in this table?

Answer – divide by 5

What is the missing output?

Answer - 3

In	Out
5	1
10	2
15	?
20	4
25	5

5.19 VARIABLES

A **variable** is a **symbol** that can stand for an unknown number

“Add 3 to the number” can be represented by the **expression** $x + 3$

Equations also use variables - $y + 7 = 10$ ($y = 3$)

Write an equation to represent: “John eats the same number of candies every day. How many candies does John eat a day if he eats 14 in a week.”. Using the variable c for the number of candies per day - $7c = 14$ ($c = 2$)

MEAN - FAIR SHARE

1, 3, 8, 10, 13

$$1 + 3 + 8 + 10 + 13 = 35 \quad 35 / 5 = 7$$

MEDIAN (middle number)

1, 3, 7, 10, 13

odd number of data points
choose middle number

Be sure to first
put the
numbers in
order first
(least to
greatest)

1, 3, 6, 7, 8, 10, 13

even number of data points
find mean of middle 2 numbers

$$(6 + 8 = 14; \quad 14 / 2 = 7)$$

MODE (most frequent)

1, 3, 5, 6, 8, 8 mode 8

1, 3, 5, 7, 10 no mode

1, 3, 3, 6, 8, 8 modes 3 and 8

RANGE (spread)

2, 3, 5, 6, 15, 16

smallest

$$16 - 2 = 14$$

largest