Grade 8 - 2019 Math Final
Mr. Martínez's STUDY GUIDE

I know that the amount of "stuff" you have to review for the exam can be overwhelming. This is why I decided to write this guide! I am hoping that using this guide will help you "focus" and hone-in on what you need to know to succeed on your exam.

IMPORTANT: You are going to need a calculator, as you may not be able to use your phone. If you have difficulty securing one for the exam, let me know before Wednesday and I'll help you (my pleasure!).

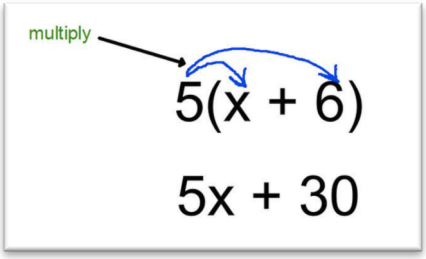
What Does the Exam Look Like?

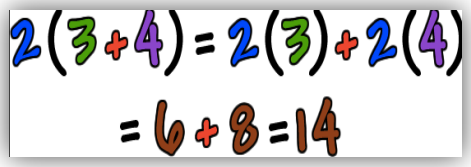
This year's exam will consist of **50 questions**. In preparation for the upcoming two years of middle-school math, the exam will follow the following format:

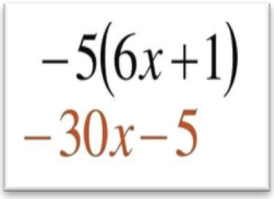
- **45 Multiple-Choice** questions (calculator use allowed)
- **5 Non-Calculator questions** (Do not worry! They are very similar to the non-calculator questions we have done in class)

What do I know to Study???
(Glad you asked…)

1. The distributive property: Remember that ***the number outside the bracket multiplies EVERY SINGLE term inside the bracket (the signs matter too!)***

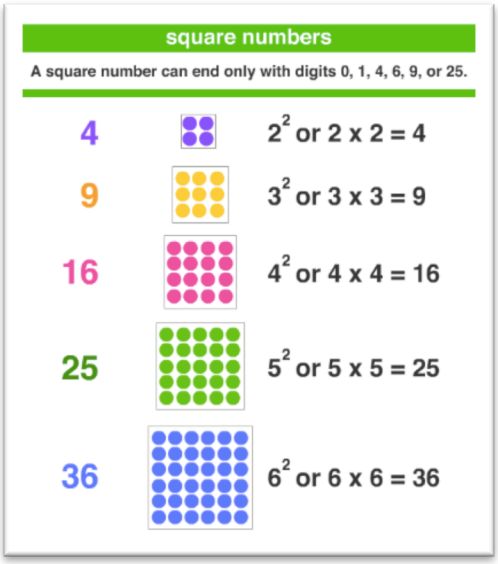




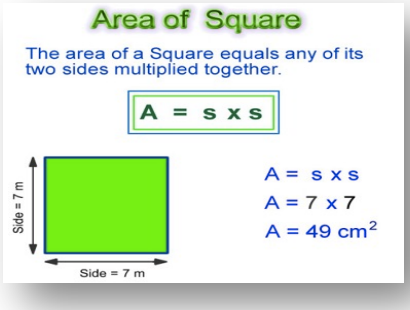


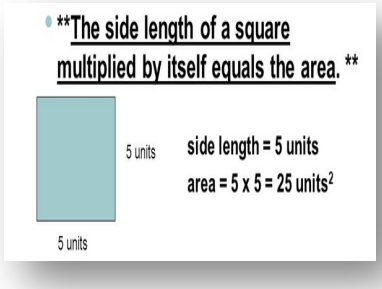
2. Know the perfect square numbers up to 196 (which is 14^2). Remember that:

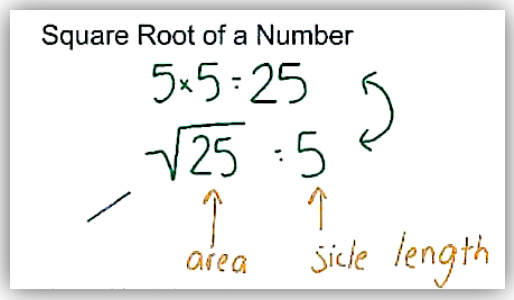
$$\mathbf{8^2 \ = \ 8 \times 8 \text{ and NOT } 8 \times 2}$$



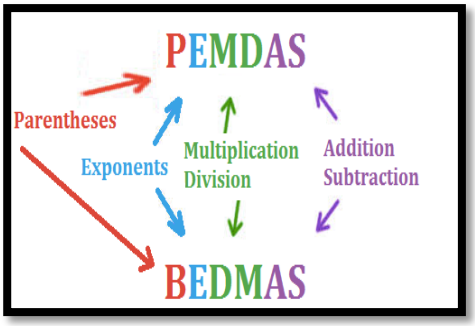
Also, it is important to remember the relationship between the area of a square (a perfect square number), and its side length:

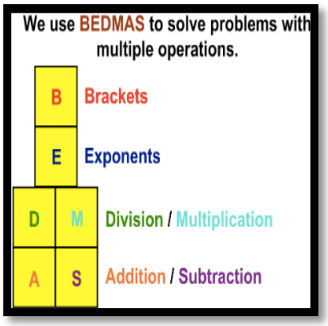




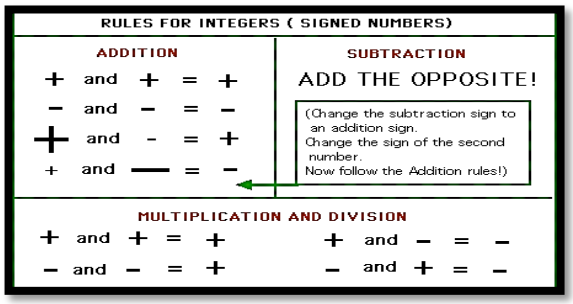


3. ANY TIME you see ***MORE THAN ONE OPERATION, you MUST USE THE ORDER OF OPERATIONS:***



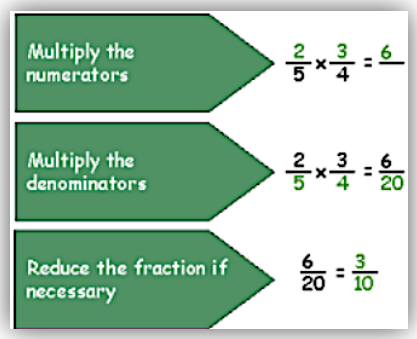


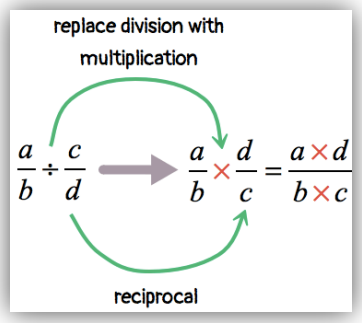
4. Know the rules of signs for the addition, subtraction, multiplication and division of integers (REMEMBER: to subtract, ADD THE OPPOSITE):



5. Know how to multiply and divide fractions.

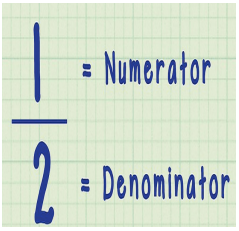
- **WHEN DIVIDING BY A WHOLE NUMBER:** Write a denominator of 1.
- **WHEN WORKING WITH MIXED NUMBERS:** Convert to improper fractions.
- ***To get a FRACTION OF A NUMBER (which could be a fraction), you must MULTIPLY both numbers!***

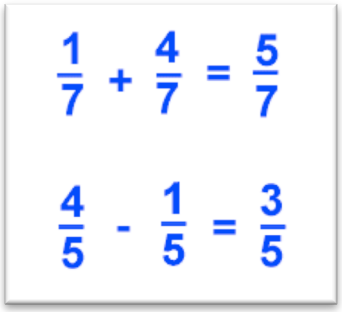




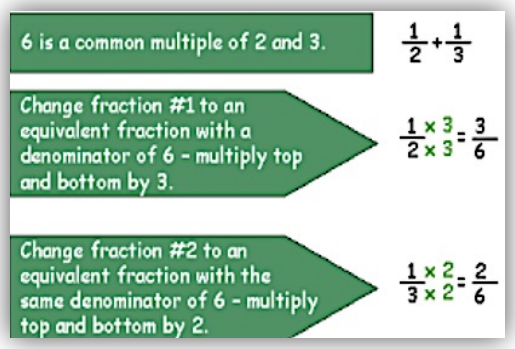
6. Adding and subtracting FRACTIONS:

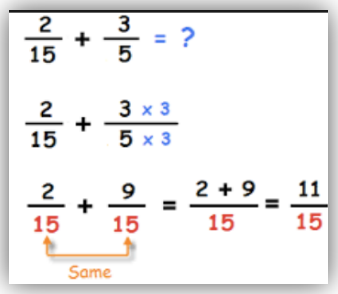
- Fractions with like denominator: ***LEAVE the DENOMINATOR as if, and add or subtract the NUMERATOR:***





- Fractions with unlike denominators:
  - ***Your goal is to multiply one or both fractions by a number that would make both fractions end up with the same denominator.***
  - Remember that the "like" denominator is the **COMMON DENOMINATOR.**





7. Know that:

- 1 m = 100 cm
- 1 km = 1000 m
- 1 km = 10000 cm

8. To calculate percentages:

- **Method 1:**
  - Convert the % you want to get to a decimal (by dividing by 100).
  - Multiply the converted decimal by the number which percent you want to find.

Example: 15% of 47 -------→ (0.15) x 47 = 7.05

- **Method 2:**
  - Set up a ratio, and cross-multiply:

$$\frac{47}{100} = \frac{x}{15} \text{ ---------} \rightarrow x = \frac{47 \times 15}{100}$$

- **Method 3 (useful when not using a calculator):**
  - Get the 10% by bringing in a decimal place (dividing by 10):

    10% of 52 = 5.2

    10% of 43.2 = 4.32
  - Half the number is 50%. Using the 10% and the 50%, you can figure out many other percentages:

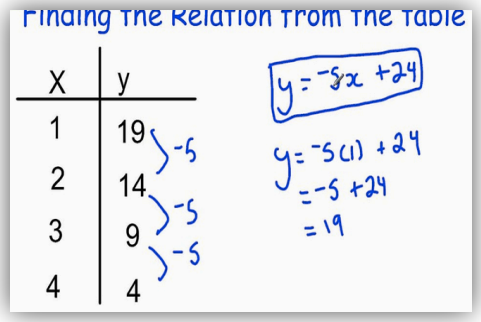
    10% + 10% + 50% = 70% (for example)

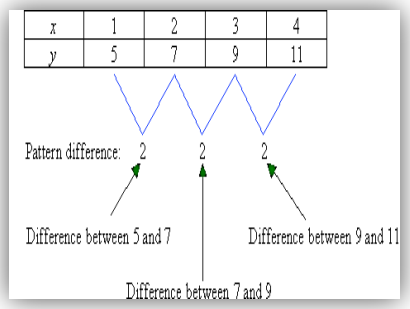
9. Be able to determine ***the top, front, bottom, left and right views of figures made up of cubes.***

10. Also: Be comfortable rotating said figures, and determining its views after the rotation. Pay attention to where the axis of rotation is, the direction of rotation, and how many degrees the figure is rotated. (You can always use a pencil as the axis of rotation, and there will be cubes available for you to use).

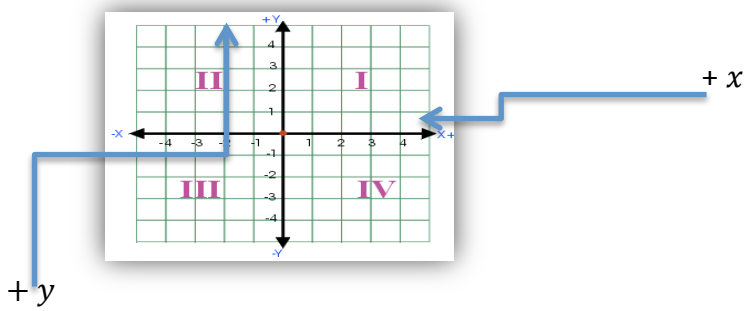
11. Linear relations:

- Linear relations are of the form $y = ax + b$, where a is the coefficient and b is the constant.
- A relation is linear when (on the table of values), ***x increases or decreases by a constant value, AND y increases or decreases by a constant value.***
- An **ORDERED PAIR** is always (x, y).
- You will be **expected to find either *x* or *y*** when given the other one. That is, if given a relation and asked to find y, all you have to do is substitute in the value of x given to you. The vice versa scenario is also possible (given y, find x).
- Also, make sure you area capable of finding the relation from a given table.





12. Remember the CARTESIAN plane (remember where the $x-axis$ and the $y-axis$ are).



13. Probability:

- Remember that the events you will be dealing with are "independent" events, which means that the outcomes of the first do not determine the outcomes of the second event. For example, a coin is tossed first, and then you roll a 6-sided die. The coin landing in heads or tails does not determine which number you will get once you roll the die.
- Remember:
  - ***The easiest way to get the total amount of outcomes is to MULTIPLY the probability of each event***. For example:

    You have a 6-sided die you roll (first event). Then, you roll the same die (second event). If you want to know the probability of rolling a 1 first and a 1 second:

    Probability of rolling a 1 (first event) = $\frac{1}{6}$

    Probability of rolling a 2 (second event) = $\frac{1}{6}$

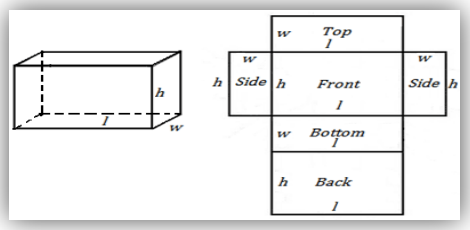
    So the probability of rolling a 1,1 is: $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$ (1 out of 36)

14. PRISMS vs. PYRAMIDS

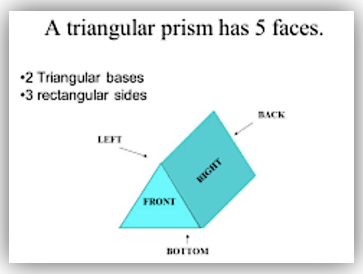
- **Prisms** are named after their bases, and have faces that are not all triangular. These faces meet at "corners" (vertices).
- **Pyramids are also named after their bases,** but **all faces are triangular and meet at one vertex only.**

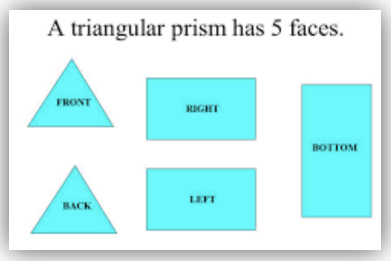
15. AREA OF PRISMS

- Regardless of what type of prism it is, the area of a prism is EQUAL TO THE SUM (ADDITION) of the INDIVIDUAL AREAS OF EACH OF ITS FACES.
  - **A Rectangular Prism (6 faces):** Its surface area is the sum of the area of the 6 individual rectangular faces.

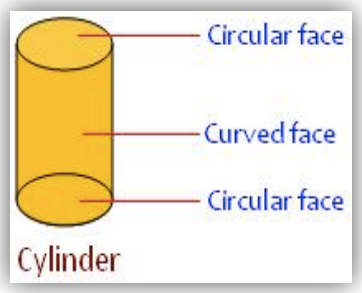


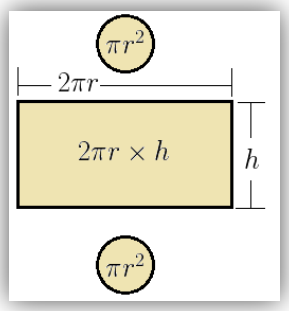
- **A Triangular Prism (5 faces):** Its surface area is the sum of the area of 2 identical triangles AND the area of 3 rectangles.





- **A Cylinder**: Cylinders have two surfaces:
  2 circles (or one if the cylinder is open) AND
  1 "curved" surface, which is a rectangle that "wraps around" the circle





Notice that "curved face" is a rectangle. As you may remember, the area of a rectangle is (base x height). The base of the rectangle "wraps" around the circles, which means that this base IS equal to the circumference (that's where the $2\pi r$ comes from).

15. VOLUME

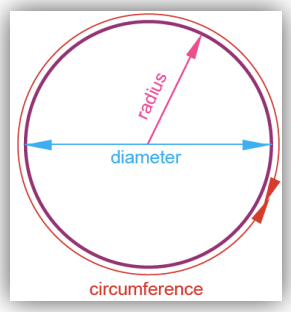
- Volume is much simpler, which is good news!
- No matter what type of prism you are dealing with, the volume is:

Volume = Area of BASE x height of prism

That is:

- If the prism is a **RECTANGULAR** prism, then find the area of the rectangular base, and multiply it by the height of the prism.
- If the prism is a **TRIANGULAR** prism, then find the area of the triangular base and multiply it by the height of the prism.
- If the prism is a **cylinder**, then get the area of the **CIRCULAR** base, and then multiply it by the height.

16. Know the parts of a circle:



17. Know the difference (and how to obtain) between a **part-to-part ratio** and a **part-to-whole** ratio.

18. ***For any number lines***, pay attention to the ***OPERATION*** that's being represented.

19. Misrepresentation of data: Remember that any graph that DOES NOT start at 0 is misrepresenting data.

20. Know the advantages and/or the uses of bar graphs and circle graphs.

21. Know how to solve equations (whichever method works for you it's OK). Remember that you can always substitute in each of the possible answers into the equation if you forget how to work this type of problem out.

22. UNIT RATES: Since unit rates are rates that express unit, divide the first number by the second (unit) number. For example:

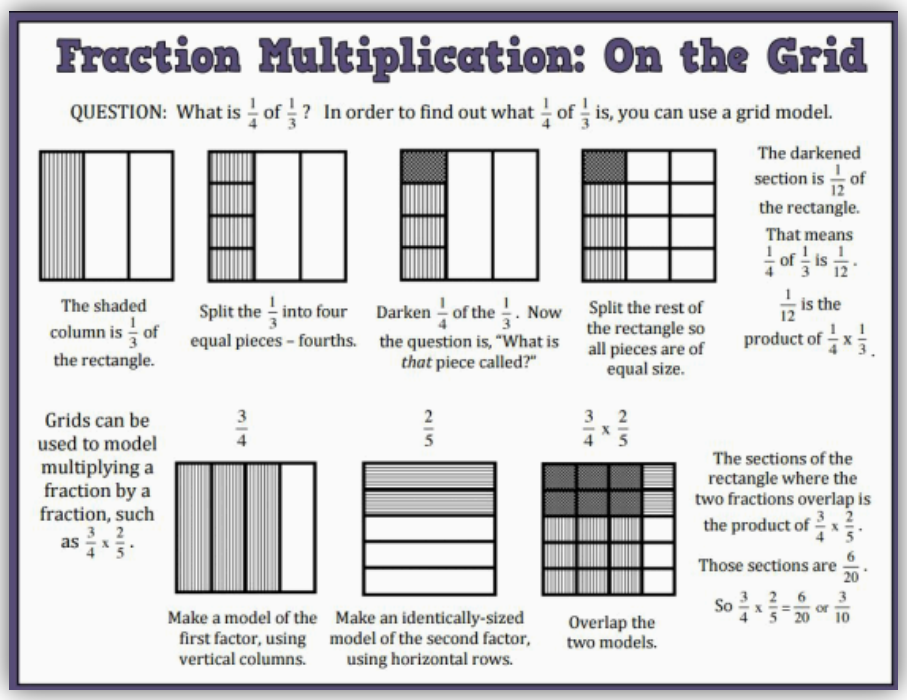
240 km in 6.5 hours -----→ 240 km/6.5 hours = 36.92 km/hour
That reads 36.92 km per hour (UNIT RATE)

23. Transformations on the Cartesian plane:

- **Rotations: The figure is rotated about a point**. It can be rotated clockwise or counter clockwise. The most commonly angles for rotation are 90°, 180°, 270°.

- **Reflections:** "Mirror images." **The image appears inverted.** Images are reflected on horizontal lines, vertical lines or diagonal lines.
- **Translations:** The image **DOES NOT CHANGE**, as it only moves up, down, to the right or to the left. That is, the image will appear moved.

24. Know how to use the **RECTANGULAR AREA MODEL to multiply fractions:**

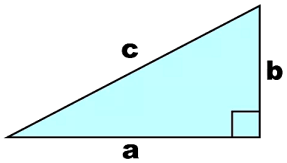


25. A **PYTHAGOREAN TRIPLET** is a group of 3 numbers that represent the side lengths of a TRUE RIGHT TRIANGLE (a triangle with a 90 degrees angle). They are related to each other as follows:

$$a^2 + b^2 = c^2$$

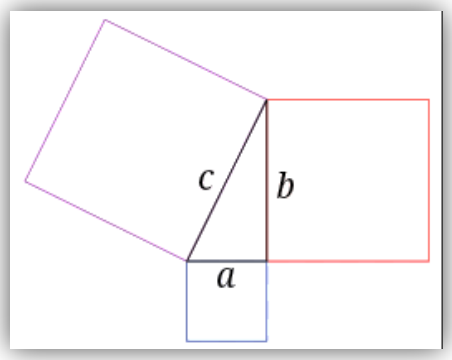
where ***a*** and ***b*** are legs, and **c** is the HYPOTENUSE (the longest side, always straight across from the right angle).

- **When given two out of the three lengths, and it is specified that they form a right triangle, you can use the above formula to determine the missing side length.**



$a^2 + b^2 = c^2$

- The Pythagorean theorem also explains that, for any true right triangles, ***the area of a square formed by hypotenuse is equal to the SUM of the area of the squares formed by the two other legs:***



Area of square C =
Area of square A + Area of square B

- Although you will be given a formula sheet, it would be useful for you to know how to find a, b and/or c:

$$\boldsymbol{c}\ (\boldsymbol{hypotenuse}) = \sqrt{\boldsymbol{a^2 + b^2}}$$

$$\boldsymbol{a} = \sqrt{\boldsymbol{c^2 - b^2}}$$

$$\boldsymbol{b} = \sqrt{\boldsymbol{c^2 - a^2}}$$