Teacher: French **Class: Math 2**	**Name:**

Directions:

The attached summer homework is made of 3 components to help you explore (i) some of the big questions you'll work with this year, (ii) the types of questions you'll work with in Math 3, and (iii) ACT preparation:

1. BIG QUESTION: Why is it important to question the work / logic of others?
2. MATH 2: What will Math 3 look like?
3. ACT: What strategies can I use to be more successful on the ACT?

These sections involve some traditional math as well as some other relevant topics. Complete the reading for each section (examples or online research), and then answer each question. Plan on **each section taking 1 – 2 hours** to complete.

So in total **this assignment will take you between 3 and 6 hours**.

Why should you do this?

We will have a discussion about **sections 1 and 2** during class on the first several days. Within the first two weeks of class we will take a mastery test similar to **section 3.**

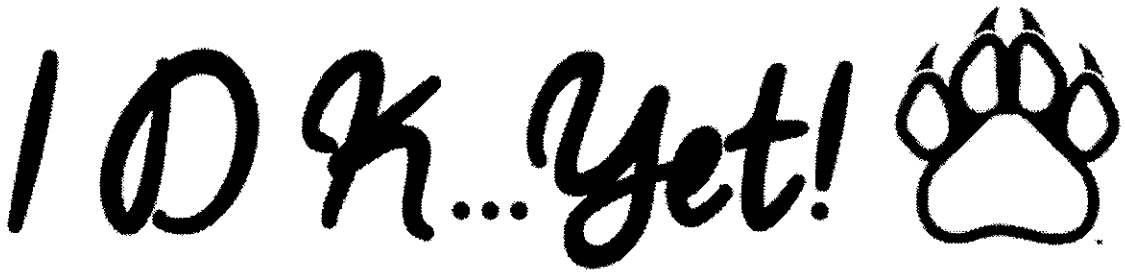
Failure to complete any section of this assignment will result in being isolated from class discussion on the first day of class. While everyone else will be discussing their response to sections 1 and 1, you'll complete the work on your own, silently, for the entirety of the class.

Resources Available:

Within each section, several examples or websites are listed to aid you. These are your primary resources.

If these resources are not sufficient, you may email Mr. French at chfrench@goldercollegeprep.org with your question. Please include your name, what you've tried, your detailed question, and your phone number.

Last, Mr. French will be offering 8 study groups at Golder over the summer from noon – 3pm on the following dates: July 6th – 9th and July 20th – 23rd. You may attend as many or as few sessions as you'd like for any amount of time.



SUMMER CALENDAR

The space below is a calendar of your summer. Insert all vacations / work commitments you may have. Then, within the remaining time, write when you plan to have each section of the summer homework completed. You should allow yourself at least 1 – 2 hours per section.

Also, notice when Mr. French will be at Golder for Math 2 study groups [M2SG]. All study sessions will be from noon – 3pm. You can attend for as much of this time as you'd like.

S	M	T	W	TH	F	S
14 - JUNE Q4 RCPU	15	16	17	18	19	20
S	M	T	W	TH	F	S
21	22	23	24	25	26	27
S	M	T				
28	29	30	1 - JULY	2	3	4
5	6 M2SG	7 M2SG	8 M2SG	9 M2SG	10	11
12	13	14	15	16	17	18
19	20 M2SG	21 M2SG	22 M2SG	23 M2SG	24	25
						S
26	27	28	29	30	31	1 - AUG

2	3	4	5	6	7	8
S	M	T	W	TH	F	S
9	10	11	12	13	14	15
S	M	T	W	TH	F	S
16	17	18	19	20	21	22
S	M	T	W	TH	F	S
23	24 9TH start	25 9TH start	26 10TH/11TH start	27 10TH/11TH start	28	29

SECTION 1 - Why is it important to question the work / logic of others?
In this section, you'll be preparing for class discussions in Math 3. Below are some common scenarios that can happen during a classroom discussion. After reading each situation,

(i) State what the student(s) did that was a poor decision.
(ii) State the consequences of their decision [in the story and beyond].
(iii) Explain what the student should do instead.

STORY #1

During class, Charlie and his group are given 5min to discuss their answer for a homework question before sharing out with the class. Since Charlie did his homework, he eagerly explains the solution and asks his group , "Do you get it?" Everyone nods his or her head, so he says, "Alright, then let's talk about the next problem."

After the 5min are up, the teacher calls on one of Charlie's group mates to explain the solution. His groupmate gives the first step, pauses for a couple of seconds, and then says "I don't remember what to do after that."

(i) State what Charlie did that was a poor decision.

(ii) State the consequences of Charlie's decision [in the story and beyond].

(iii) Explain what Charlie should do instead.

STORY #2

The teacher has called one of your good friends, Claire, to solve a problem at the board. Claire struggles through the problem, but manages to finish. You aren't sure why the last two steps of the problems work, but you know that the teacher will make Claire answer if you ask. Since you don't want to put your friend "on the spot", you sit silently and decide that you'll just ask Claire during office hours.

(i) State what you did that was a poor decision.

(ii) State the consequences of your decision [in the story and beyond].

(iii) Explain what you should do instead.

STORY #3

Jack is presenting a question from the do now at the board. When he finishes, George and Valerie raise their hands to ask questions. Jack calls on George, and answers his question. He then calls on Valerie who quickly says, "Oh, I figured it out. Nevermind." Jack sets down the dry-erase marker and returns to his seat.

(i) State what Jack did that was a poor decision.

(ii) State the consequences of Jack's decision [in the story and beyond].

(iii) Explain what Jack should do instead.

IDK...Yet!

After reading and analyzing the previous scenarios, what are your biggest concerns and questions about class discussion? You may write your responses in paragraph form as separate, bulleted sentences / questions.

SECTION 2 – What will Math 3 look like?

In short Math 2 will reinforce some familiar topics within new scenarios while simultaneously exposing you to new content. Below are some examples of the types of questions you'll work with. In general, you'll receive several problems each day to prepare for class as homework. The entirety of the next class will be discussion around your thoughts on the homework. So you'll need to make sure you adequately complete the homework each night to prepare for discussion. Let's practice this now!

Answer the following questions, making sure to explain yourself in full sentences

Name: _____

Question 1 Walking the Line

The ***average*** of two numbers p and q is $\frac{1}{2}(p+q)$.

First, draw a number line and label it from zero to 10.

Choose two points on that line (mark them) and then evaluate $\frac{1}{2}(p+q)$ by substituting the values of those two points for p & q.

Using what you've just done, draw a new number line (do **not** label it!) & choose two new points to be p and q. Then, mark the new point where you would find $\frac{1}{2}(p+q)$.

Explain how you determined the location of the new point from the previous question.

Now, let's say you have three distinct points p, q, and r on a number line. Write an expression to represent the *average* of these values.

Draw a final number line (label this one from zero to 20), and label three points p, q, and r. Then, mark where you *think* the **average** would be located on this line.

Finally, calculate the average of your three values p, q, and r using the expression you wrote above and mark this point on the number line you just drew. How does this point compare to where your guess is located

Be prepared to discuss how the average of p, q, and r compares to the average of p and q.

Name: _____

Question 2: Equivalence & *U*

$$\frac{2u-6}{u-3}$$

Evaluate the expression above when $u = 5$, $u = -3$, and $u = \frac{1}{8}$. You should notice a pattern in your answers—if not, go back and check your work! (#Uwrong)

Now simplify the expression above to make this pattern even easier to notice! Hint: It involves *factoring* the numerator!

Explain how your simplified expression relates to the answers you got in the first part of this problem.

What is (almost) always true about the original expression $\frac{2u-6}{u-3}$?

There is actually one value for u that is an exception to the answer to the previous question. Determine that value and explain why it is an exception.

Name: _____

Question 3: Going the Distance

Instead of walking along two sides of a rectangular field, Janely took a shortcut along the diagonal, thus saving distance equal to half the length of the longer side. Find the length of the long side of the field given that the length of the short side is 156 meters.

Draw a picture to represent this situation. Make sure to label all of the known distances and unknown distances.

Write an expression to represent the length of the distance she would walk along the sides of the rectangle, instead of cutting across the diagonal.

Write an expression to represent the distance she would *save* by walking along the diagonal? (Remember that she saves "half the length of the longer side" in this case!)

Now write an expression to represent the length of the distance she would walk along the diagonal (in terms of the length of the longer side).

Finally, use what you have done to solve the problem!

Name: _____

Question 4: Counting to a Billion

How long would it take you to count to one billion, reciting the numbers out loud one after another? Write a quick guess.

Explain your guess from above. What information did you use to decide how long it would take to count to one billion?

Now, let's use math and logic to come up with a thoughtful answer. First, think about how long it takes to say **each** number individually. Does it take the same amount of time to say each number? Explain why or why not.

Now, consider how many numbers there are between one and one billion. Using the time or times you decided it takes to say each number, determine how long it should take to say *all* the numbers in order.

Finally, take a look at the units you used in your answer. Is your solution in seconds, minutes, hours, or something else? Would your answer make sense to other people? If not, convert your number into a more manageable answer that would make more sense to others. (Example: If I tell you I'll see you in 86,400 seconds, then you probably wouldn't immediately understand what I mean. If I tell you I'll see you *tomorrow*, which is 86,400 seconds away from now, then you'd get it right away.)

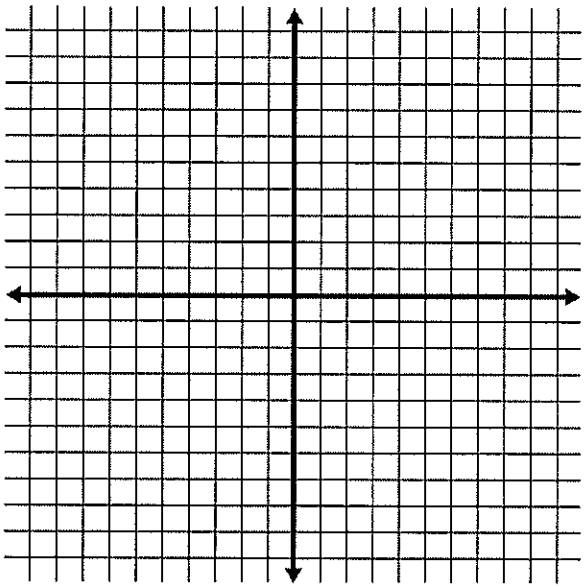
Name: _____

Question 5: Doppelgängers

A **solution** to a linear equation is a point (x, y) that makes the equation *true* when you plug in the values of x and y. For example, the point $(-2, 3)$ is a solution of the equation $6x - 3y = -21$, because substituting -2 for x and 3 for y gives you $-21 = -21$. On the other hand, the point $(5, -1)$ is *not* a solution to the equation, because substituting 5 for x and -1 for y gives you $33 = -21$.

Consider the equations $2x + 3y = 6$ and $4x + 6y = 12$.

Graph both lines on the coordinate plane shown below.



Now, substitute the coordinates (0, 2) into both equations. Then, substitute the coordinates $\left(-4, \frac{14}{3}\right)$ into both equations. What do you find? Explain how this relates to the graph you completed above.

Remember that a system of linear equations involves two or more linear equations. Such systems can have *one solution, no solution, or infinite solutions.* Explain which of these cases applies to the system above.

SECTION 3 - What strategies can I use to be more successful on the ACT?
Below are some common strategies for success on the math section of the ACT. Apply the strategies to answer every question on the attached practice ACT. Notice, this is only the first half of a test. **SHOW ALL WORK in the space provided. Failure to show work will result in the assignment being considered incomplete.**

1. Figures
The provided pictures are usually, but not always, drawn to scale. If you have no idea how big the angle labeled x is, take a guess. Does it look less than 45°? Does that rectangle look smaller than the other one? It probably is...

2. Signal Words
Look out for words that are CAPITALIZED or in *italics.* Frequently these words reverse the meaning of the question, like NOT, *cannot*, and EXCEPT. Don't miss a question because you found a value for x when it said "is NOT a value of x".

3. Ladder of Difficulty / Pacing
The harder questions tend to be toward the end of the test. Pace yourself accordingly. This means applying the roadmap strategy or an alternative strategy. If you're unsure what is the right pace for you, talk to Mr. French.

4. Preview the Question
See a long word problem? Don't skip it; just skip to the question itself. It is generally at the end of the paragraph. You can then use the question to skim for the important information in the problem. Also, make sure your final answer matches with the question (did you find x when it asked for 2x?).

5. Test-the-Test, Eliminate and Guess
[illegible] solve a question, make sure the answer choices fit all the conditions of the problem. Also, look out for answers like "cannot be determined" or "none of these" on these higher-level questions; they are frequently the wrong answer!

6. Plug and Chug
You probably know what this means. But, notice that the answer choices are arranged in order. So, you should "plug in" C first. If it's too big, head for A and B. If it's too small, try D and E. This could really save some time. *Don't forget to use parentheses for negatives and fraction bars.*

7. Take Notes
In most cases, staring at a problem won't help you solve it. Write down the facts that you've gathered from reading the problem. If the problem talks about a shape, draw it. Even if you don't solve the problem the first time, when you go back with your extra time you can start with the facts / picture instead of being forced to reread the problem.

MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

DO YOUR FIGURING HERE.

1. Danica is trying to encourage her classmates to donate books for the fund-raiser and book-drive for the local library. Danica will donate $35.00, plus $0.07 for each book donated by her classmates. Which of the following equations gives Danica's donation, d dollars, if b books are donated by her classmates?

   A. $d = 35 + 0.07b$
   B. $d = 35 + 0.7b$
   C. $d = 35 + 7b$
   D. $d = 35.07b$
   E. $d = 42b$

2. If $\frac{z}{-4} = -16$, then $z = ?$

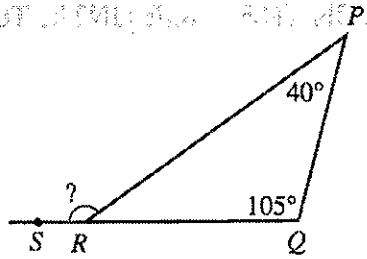
   F. -64
   G. -12
   H. -4
   K. 64

3. $4b^8 \cdot 5b^3$ is equivalent to:

   A. $9b^5$
   B. $9b^{11}$
   C. $9b^{24}$
   D. $20b^{11}$
   E. $20b^{24}$

4. In the figure below, $\angle QPR$ measures 40°, $\angle PQR$ measures 105°, and points Q, R, and S are collinear. What is the measure of $\angle PRS$?

   F. 105°
   G. 125°
   H. 130°
   J. 140°
   K. 145°



5. The sum of 2 numbers is 90. The smaller number is 50 less than the larger number. What is the larger number?

   A. 20
   B. 40
   C. 45
   D. 70
   E. 80

DO YOUR FIGURING HERE.

6. $|7-5| - |1-8| = ?$

   F. −9
   G. −5
   H. 5
   J. 9
   K. 21

7. What is the value of $x^2 + 2 + y^2 - 3$ when $x = 3$ and $y = -3$?

   A. −5
   B. −1
   C. 1
   D. 11
   E. 17

8. What is the sum of the 4 binomials listed below?

   $$x^2 + 2x,\ 3x + 5,\ x^2 + 1,\ 6x - 4$$

   F. $x^2 + 11x + 2$
   G. $2x^2 + 11x + 2$
   H. $2x^2 + 11x + 10$
   J. $x^4 + 11x^3 + 2$
   K. $2x^4 + 11x^3 + 10$

9. Bert's Building Supply receives shipments of only 2 kinds of lawn mowers: Tough Cuts and Easy Pushes. Today's shipment contains 96 lawn mowers with twice as many Tough Cuts as Easy Pushes. How many of these 96 are Tough Cuts?

   A. 16
   B. 32
   C. 47
   D. 48
   E. 64

DO YOUR FIGURING HERE.

10. Adina plays in a bowling league. Her bowling scores for last week are listed below. What is the median of Adina's bowling scores for last week?

142, 186, 201, 191, 116, 201, 175

F. $158\frac{1}{2}$

G. $180\frac{1}{2}$

H. 186

J. 191

K. 201

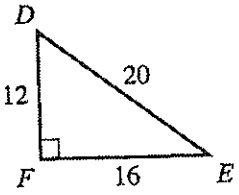
11. The table below shows Shannon's height, in inches, on her birthday from the day she was born (birth) to age 5. What was the average rate of change in Shannon's height, in inches per year, from birth to age 5 ?

Age (years)	Height (inches)
Birth	20
1	27
2	32
3	38
4	43
5	50

A. 2
B. 5
D. 7
E. 14

12. The side lengths, in centimeters, of right triangle $\triangle DEF$ are given in the figure below. What is the area, in square centimeters, of $\triangle DEF$?

F. 48
G. 96
H. 120
J. 160
K. 192



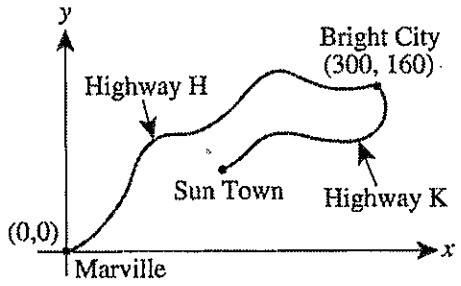
13. Christopher bought 4 cans of soup for a total of $3.36, which included sales tax of $0.16. At the same per-can cost, what is the cost before the sales tax is added for 6 cans of the same soup?

A. $0.80
B. $0.84
C. $4.80
D. $5.04
E. $6.40

DO YOUR FIGURING HERE.

Use the following information to answer questions 14–16.

A map of the locations of Marville, Sun Town, and Bright City is shown in the standard (x,y) coordinate plane below, where coordinates for x and y are given in miles. The coordinates of Marville and Bright City are given, and Sun Town is located along a straight line exactly halfway between Marville and Bright City. Highway H from Marville to Bright City is 390 miles long. Highway K from Sun Town to Bright City is 200 miles long.



14. What are the coordinates of Sun Town?

F. (80, 150)
G. (140, 140)
H. (150, 80)
J. (195, 100)
K. (230, 70)

15. The straight-line distance, in miles, from Marville to Bright City *must* be:

A. less than 140.
B. between 140 and 300.
C. between 300 and 390.
D. between 390 and 460.
E. more than 460.

16. Chelsea's car travels an average of 32 miles per gallon of gas used, and she pays an average of $2.25 per gallon of gas. Chelsea will drive her car along Highway H from Marville to Bright City. To the nearest $1, what will be the total cost of gas that her car uses for the drive?

F. $ 5.00
G. $13.00
H. $14.00
J. $27.00
K. $32.00

DO YOUR FIGURING HERE.

17. Let $0 < a < b < c < d$ be true for integers a, b, c, and d. Which of the following expressions has the greatest value?

A. $\frac{d}{a}$

B. $\frac{c}{b}$

C. $\frac{a}{b}$

D. $\frac{d}{c}$

E. $\frac{a}{d}$

18. Maurice earns \$12.50 per hour for the first 40 hours he works each week. For each hour beyond 40 that he works in 1 week, Maurice earns \$18.75 per hour. Last week Maurice earned \$931.25. How many hours did Maurice work last week?

F. 23
G. 30
H. 55
J. 63
K. 76

4 identical apartments. Each apartment's living space consists of 4 rectangular rooms: a bathroom 8 feet by 10 feet, a kitchen 10 feet by 12 feet, a bedroom 12 feet by 12 feet, and a living room 12 feet by 14 feet. What is the area, to the nearest 1,000 square feet, of living space in the 3-story apartment building?

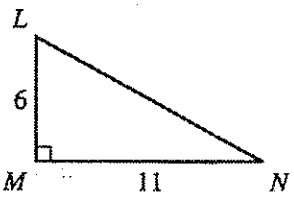
A. 8,000
B. 6,000
C. 5,000
D. 4,000
E. 3,000

20. The perimeter of a parallelogram is 80 inches, and the length of 1 side is 18 inches. If it can be determined, what are the lengths, in inches, of the other 3 sides?

F. 18, 13, 13
G. 18, 18, 26
H. 18, 22, 22
J. 18, 31, 31
K. Cannot be determined from the given information

DO YOUR FIGURING HERE.

21. The side lengths of right triangle $\triangle LMN$ are given in centimeters in the figure below. What is tan N?



A. $\frac{6}{11}$

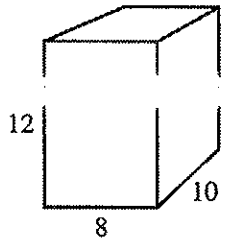
B. $\frac{6}{\sqrt{157}}$

C. $\frac{11}{6}$

D. $\frac{11}{\sqrt{157}}$

E. $\frac{\sqrt{157}}{11}$

22. The empty container shown below is a right rectangular prism with dimensions given in inches. How many cubic inches of liquid are needed to fill the container to 75% of its capacity?



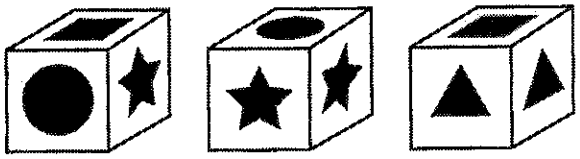
F. 148
G. 240
H. 444
J. 720
K. 960

23. The length of a rectangle is 4 inches longer than the width. The perimeter of the rectangle is 28 inches. What is the width of the rectangle, in inches?

A. 5
B. 7
C. 10
D. 12
E. 14

DO YOUR FIGURING HERE.

24. The figure below shows 3 different views of the same fair cube. Each face of the cube has 1 design drawn on it. The cube will be rolled once. What is the probability that a face showing a star (★) will be on top?



F. $\frac{1}{2}$

G. $\frac{1}{3}$

H. $\frac{2}{3}$

J. $\frac{1}{4}$

K. $\frac{1}{6}$

25. For functions f and g defined by $f(x) = 2x^2 + x$ and $g(x) = 3x - 1$, what is the value of $f(g(3))$?

A. 29
B. 62
C. 136
D. 162
E. 168

26. What is the value of $\sqrt{a^4 + b^4}$ when $a = \sqrt{5}$ and $b = \sqrt{10}$?

F. $\sqrt{15}$
G. $5\sqrt{2}$
H. $5\sqrt{5}$
J. 15
K. 125

27. All of the following statements concern triangles that are similar, congruent, or both. Which statement is FALSE ?

A. Triangles that are congruent to each other are always similar to each other.
B. Lengths of corresponding sides of similar triangles are always equal.
C. Lengths of corresponding sides of congruent triangles are always equal.
D. Measures of corresponding angles of similar triangles are always equal.
E. Measures of corresponding angles of congruent triangles are always equal.

DO YOUR FIGURING HERE.

28. Distinct lines l and m intersect, forming 4 pairs of adjacent angles. Which of the following statements *must* be true about these 4 pairs of angles?

F. The difference of the angle measures in each pair is less than 45°.
G. The difference of the angle measures in each pair is 90°.
H. The measure of each angle in each pair is 45°.
J. The sum of the angle measures in each pair is 90°.
K. The sum of the angle measures in each pair is 180°.

29. In the standard (x,y) coordinate plane, what is the slope of the line through (3,7) and (−2,4) ?

A. $\frac{3}{5}$
B. $\frac{2}{3}$
C. $\frac{5}{3}$
D. 2
E. 3

30. Which of the following expressions is equivalent to $(2x-3)(-x-7)$?

F. $(2x+3)(x+7)$
G. $(2x-3)(x-7)$
H. $(2x-3)(x+7)$
J. $(-2x+3)(-x-7)$
K. $(-2x+3)(x+7)$

31. Tomas plans to construct a circular fishpond with a diameter of 9 ft. Which of the following is closest to the length, in feet, of the decorative fencing that Tomas needs to enclose the fishpond along its perimeter?

A. 15
B. 19
C. 29
D. 64
E. 255