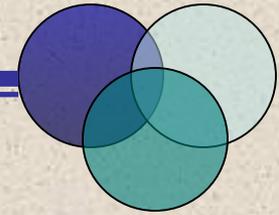


Simple Ways to Begin and End Math Class that Make Learning More Fun



Mark Colgan
Taylor University
Upland, IN 46989
mrcolgan@taylor.edu



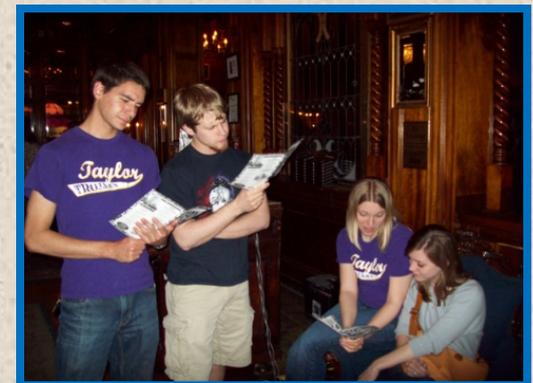
“Are there Small Changes in our Teaching that could help our Students Learn?”

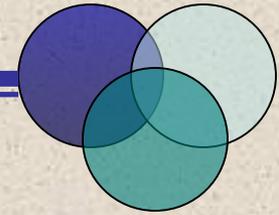
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“Small changes to our teaching — in things like course design, classroom practices, and communication with students — can have a powerful impact on student learning.”

—James M. Lang

[www.chronicle.com/specialreport/
Small-Changes-in-Teaching/44](http://www.chronicle.com/specialreport/Small-Changes-in-Teaching/44)



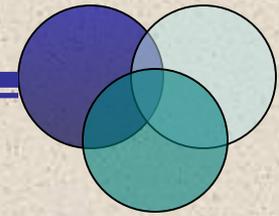


1. Interactive Websites

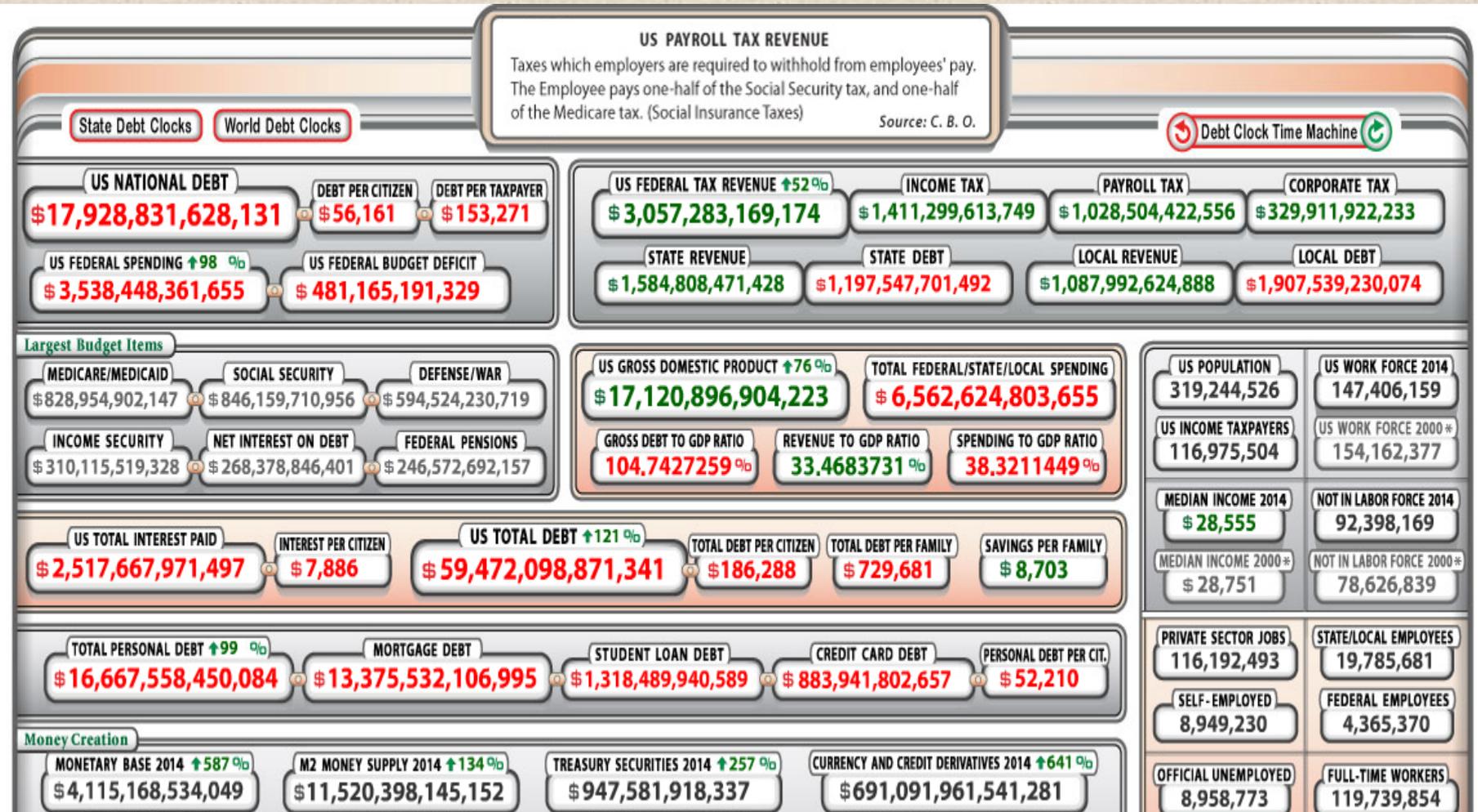
Display a website for students to look at when they arrive at class.

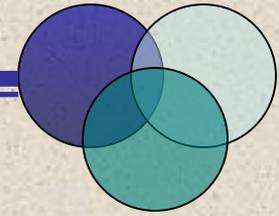
- <http://www.usdebtclock.org/>
- <http://www.worldometers.info/world-population/>
- <http://www2.stetson.edu/~efriedma/numbers.html>
- <https://www.careercast.com/jobs-rated/2018-jobs-rated-report>
- <http://www.wolframalpha.com/>
- (names, cities, sports, weather, etc.)
- Buying new or used cars, ways to save, Kennedy-Lincoln coincidences, etc.





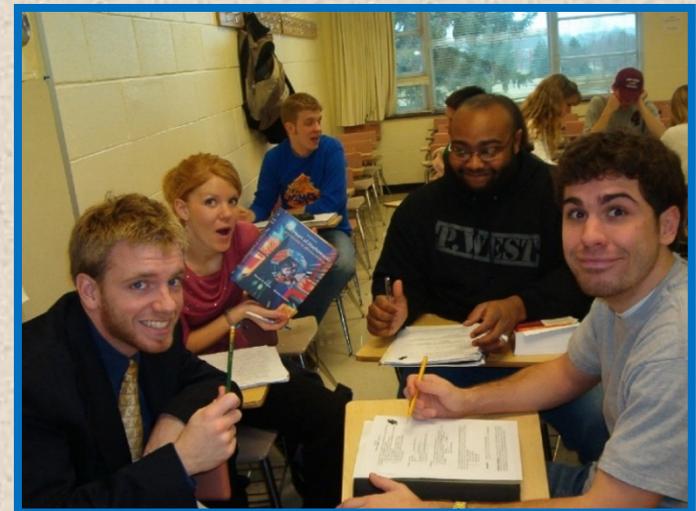
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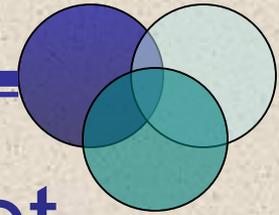




2. Get to Know Students

- Talk to a different student each day before class
- Ask students to complete note cards with their name and 3 random facts, for calling on students at random
- Show school athletic results
- Have them suggest a popular YouTube video





3. Develop a Course Packet

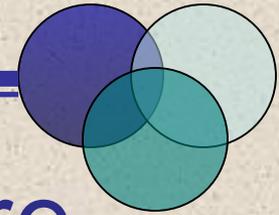
- Daily handouts have the main ideas of each lesson, directions for activities, and the homework assignment.
- Students can think about the ideas instead of writing a lot of notes.
- Weekly reflections, review tests, and projects are included at the end of the booklet.

Investigations in Mathematics

MAT 120
Class Handouts



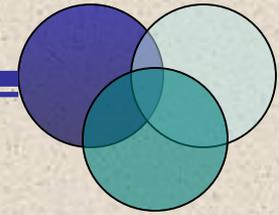
Dr. Mark Colgan
Mathematics Department
Taylor University



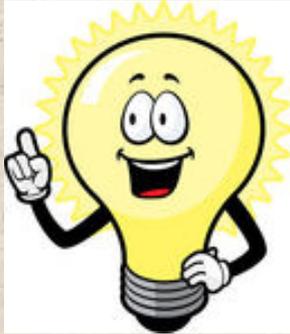
4. E-mailing Students Before

- Before the first class session, welcome them and share your hopes for the class, and encourage them to sit near the front in mixed groups.
- Share information about textbooks, Math Labs, video links, and other helpful resources.
- Remind them of assignments and create interest in the next topic.

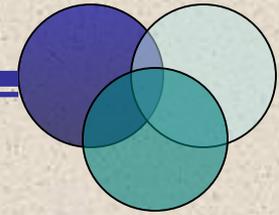




Sharing Ideas



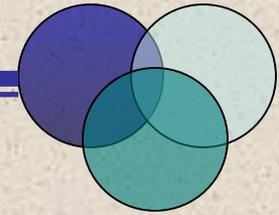
- At your table, discuss some things you do before class time begins.
- Be prepared to share with the larger group.



5. Start with a Big Idea Question

- Write a question or two on the board before class starts.
- Some examples would be: “How likely are coincidences in your life?”
- “How do you feel about gambling?”
- “How can we save money on our cars and houses?”
- “Where do we find math in nature?”
- “What makes something beautiful?”

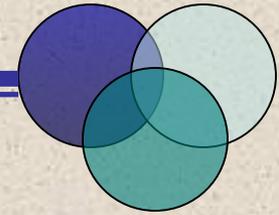




6. Videos for Real Life

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- Exponential growth with Dominos:
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- Vi Hart Fibonacci Spirals and many others:
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- Dave Ramsey on finance and compound interest:
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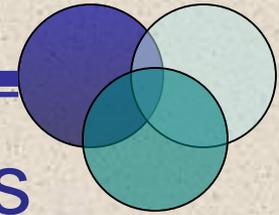




7. Applications & Group Guessing Games

- Each group guesses and we see which group can come the closest to the answer, which is not revealed until we can solve it by the end of the class.
 - If Vanessa deposited \$1 per day every day for 45 years in an account paying 8% compounded daily, guess how much money she would have after 45 years?
 - How much area is between $y=4-x^2$ and $y=4-4x$?
 - If a newly married couple decides they would like to have 3 children, what is the probability they will have all 3 girls?

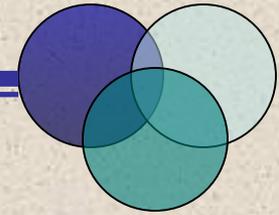




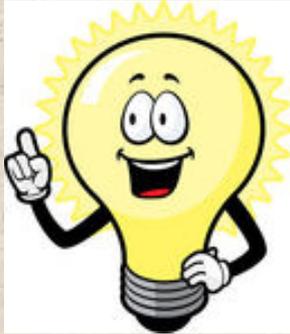
8. Community Building Questions

- Start by asking students something about themselves: what did you do fun over fall break, weekend activities, favorite movie, first job, summer activity, etc.?
- May tie the question to the lesson: “What is the greatest coincidence that ever happened to you?”
“How many pets have you had in your life?”
“What misleading advertisements have you seen recently?”



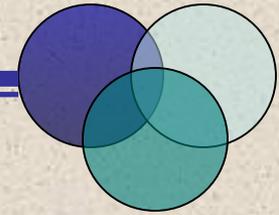


Sharing Ideas



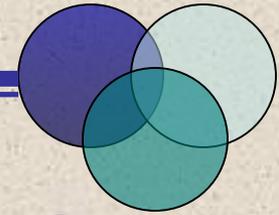
- At your table, discuss some ways you like to begin class.
- Be prepared to share with the larger group.

9. End with a Math Life Lesson



- Refer back to the beginning Big Idea (Math Life Lesson) question and see if we can now answer it.
- Some examples would be: “How likely are coincidences in your life?”
- “How do you feel about gambling?”
- “How can we save money on our cars and houses?”
- “Where do we find math in nature?”
- “What makes something beautiful?”





10. Assign a Math Life Lesson Reflection

Part I (10 points)

Homework.

Part II (5 points)

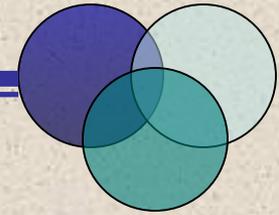
Write a short reflection on:

“My Reflections on Math in Nature.”



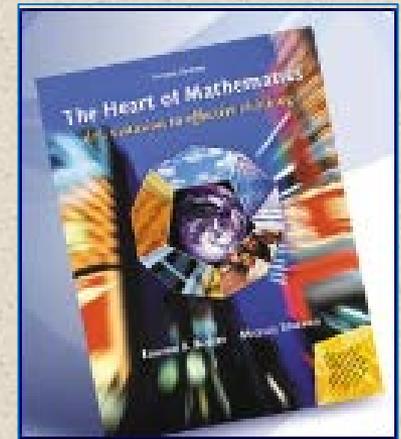
A. Read pages 49-50 of the textbook to get you thinking about discovering the beauty of the Fibonacci numbers, and consider the activities we did in class with the Golden Ratio.

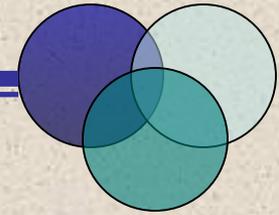
B. Do an Internet search on "Fibonacci" and share at least one interesting thing you find that we did not discuss in class. You may want to watch the 3-part video series by Vi Hart on the Fibonacci numbers.



11. Informal Written Feedback

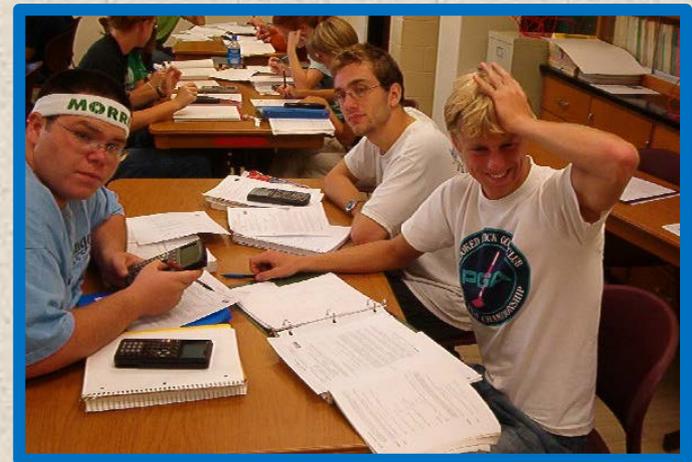
- 1) How are you doing with the challenges of the semester?
- 2) What do you like about the course (what is helping you learn)?
- 3) What would you suggest to improve the course (and help you learn)?

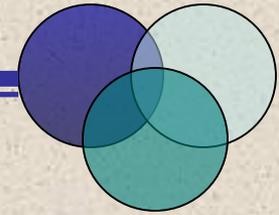




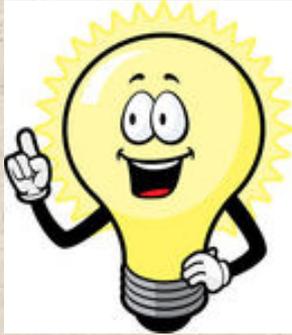
12. End with a Practice Problem

- Give them a problem to solve (perhaps in pairs).
- When they have an answer they can check with the teacher, and if correct then they are free to leave.

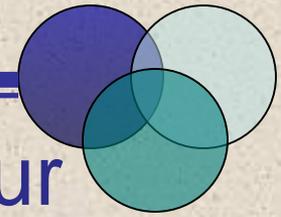




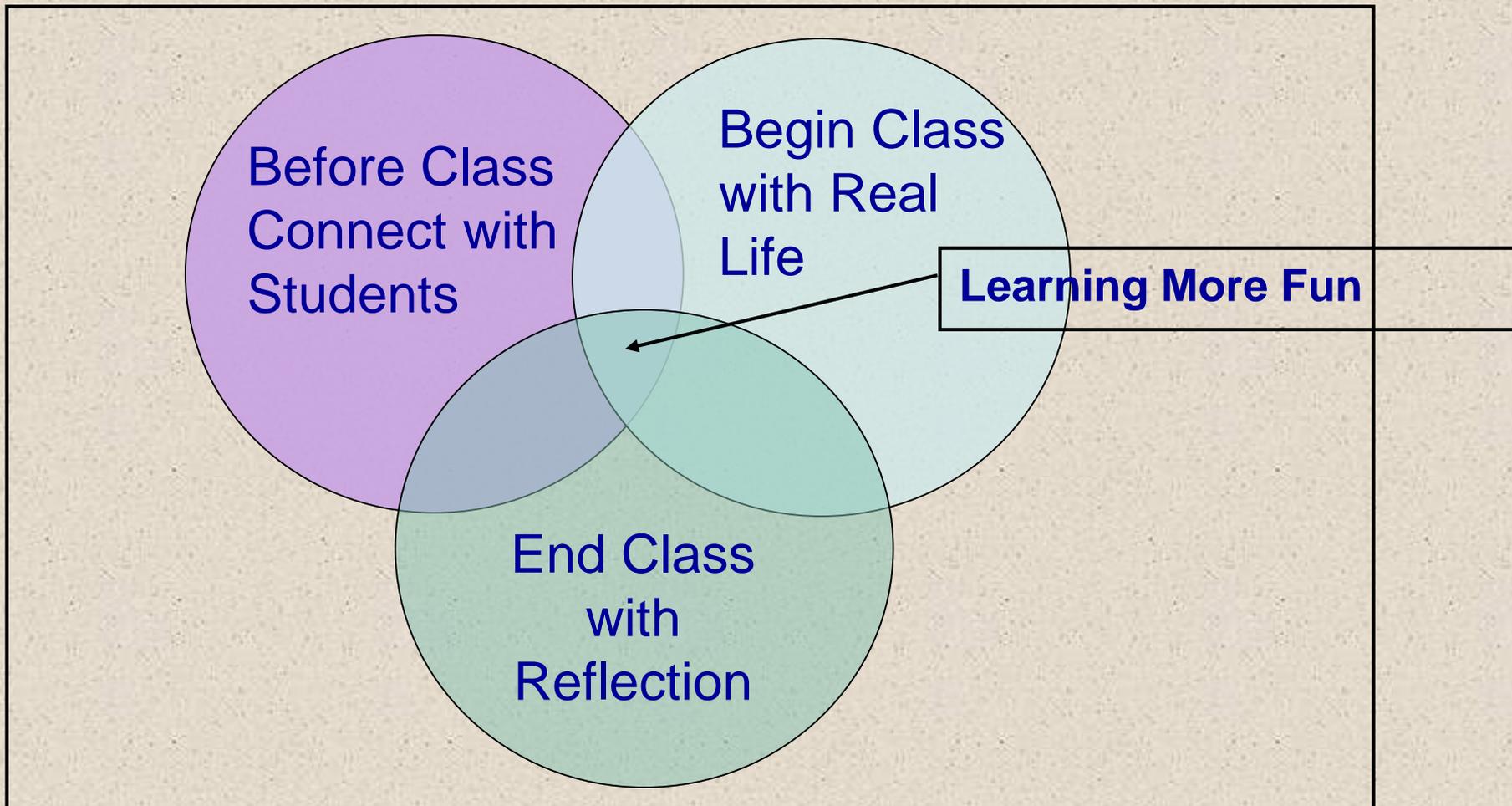
Sharing Ideas



- At your table, discuss some ways you like to end class or help students apply Math Life Lessons.
- Be prepared to share with the larger group.



“Are there Small Changes in our Teaching that could help our Students Learn?”



Simple Ways to Begin and End Math Class that Make Learning More Fun



2018 AMATYC Conference
Mark Colgan, Taylor University, Upland, IN
mrcolgan@taylor.edu

Small Changes in Teaching

—James M. Lang

www.chronicle.com/specialreport/Small-Changes-in-Teaching/44

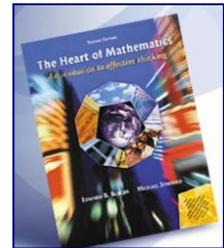
“The more time I spend with students in that brief space before the start of class, the more I recognize that those warm-up minutes actually represent a fertile opportunity. I can use the time to enhance the learning that will take place in the hour that follows, to build a more positive atmosphere for class discussion, or simply to get to know my students a little better.”

“Small changes to our teaching — in things like course design, classroom practices, and communication with students — can have a powerful impact on student learning.”

Before Class Time Begins

1. Display interactive websites for students to look at when they arrive

- <http://www.usdebtclock.org/>
- <http://www.worldometers.info/world-population/>
- <http://www2.stetson.edu/~efriedma/numbers.html>
- <https://www.careercast.com/jobs-rated/2018-jobs-rated-report>
- <http://www.wolframalpha.com/> (names, cities, sports, weather, comparisons, etc.)
- Buying new or used cars, ways to save money, Kennedy-Lincoln coincidences, etc.



2. Get to know students

- Talk to a different student each day before class
- Ask students to complete note cards with name and 3 random facts, for random calling
- Show athletic results
- Have them suggest a popular YouTube video

3. Develop a Course Packet to give structure to the course and to each session

- Daily handouts have the main ideas of each lesson, directions for activities, and the homework assignment.
- Students can think about the ideas instead of writing a lot of notes.
- Weekly reflections, review tests, and projects are included at the end of the booklet.

4. E-mailing students before class

- Before the first class session, welcome them and share your hopes for the class, and encourage them to sit near the front in mixed groups.
- Share information about textbooks, Math Labs, video links, and other helpful resources.
- Remind them of assignments and create interest in the next topic.



At your table, discuss some things you do before class time begins.

Ways to Begin Class

5. Start with a Big Idea (Math Life Lesson) question to be discussed during the class session

- Write a question or two on the board before class starts.
- Some examples would be: “How likely are coincidences in your life?” “How do you feel about gambling?” “How can math help us make wise decisions?” “How can we save money on our cars and houses?” “What is your favorite number?” “Where do we find math in nature?” “How much do we know?” “What makes something beautiful?” “How can simple processes model change?” “How can one small event change your life?”

6. Videos for Real Life

- Short video clips can bring life to class.
- Khan Academy: You Can Learn Anything:
<https://www.youtube.com/watch?v=JC82II2cjqA>
- Exponential growth with Dominos:
<http://www.youtube.com/watch?v=5JCm5FY-dEY>
- Vi Hart Fibonacci Spirals and many others:
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- Dave Ramsey on finance and compound interest:
<https://www.youtube.com/watch?v=eIOUGZcmauo>
- 60 Minutes—Slot Machines: The Big Gamble:
<http://www.youtube.com/watch?v=rLD17r0U2D0>
- Fourth Dimension: Dr. Quantam:
<http://www.youtube.com/watch?v=BWyTxCsIXE4>
- The Time You Have in Jelly Beans:
https://www.youtube.com/watch?v=BOKsW_NabEk

7. Application Starters and Group Guessing Games

- Each group guesses and we see which group can come the closest to the answer, which sometimes is not revealed until we can solve it by the end of the class.
- If Vanessa deposited \$1 per day every day for 45 years in an account paying 8% compounded daily, guess how much money she would have after 45 years?
- How long will it take for \$1000 to double at 5% annual compound interest?
- How much area is between $y=4-x^2$ and $y=4-4x$?
- If a newly married couple decides they would like to have 3 children, what is the probability they will have all girls?
- Do there exist 2 non-bald people on the planet who have exactly the same number of hairs on their bodies? --from *The Heart of Mathematics* by Burger and Starbird

8. Community Building Questions (Circle Share)

- Start by asking students something about themselves: what did you do fun over fall break, weekend activities, favorite movie, first job, summer activity, etc.?
- May tie the question to the lesson: “What is the greatest coincidence that ever happened to you?” “How many pets have you had in your life?” “What misleading advertisements have you seen recently?”
- In the middle of class time, have everyone stand and play a Rock-Paper-Scissors single-elimination tournament as a way to get everyone up and moving.



At your table, discuss some ways you like to begin class.

Ways to End Class

9. End with a Math Life Lesson discussion

- Refer back to the beginning Big Idea (Math Life Lesson) question and see if we can now answer it.
- Ask students how we can apply what we just learned.

10. Assign a Math Life Lesson reflection

- Have them write a short reflection that applies the math we are studying to a life lesson.
- The assignment may include a short reading, a video, and a few discussion questions.
- Topics might include the advantages of working in groups, misleading statistics, gambling, saving money and compound interest, debt and credit, beauty in mathematics, math in nature, why we study math, fourth dimension, things we should maximize or minimize in life, etc.

MAT 120 Homework & Reflection Assignment #5

Part I (10 points)

Turn in homework assigned before Friday (2.2, 2.3, and 2.6).

Part II (5 points)

Answer the following questions in a short, typed, and printed reflection with the title: **“My Reflections on Math in Nature.”**

The reflection should be about one page, double-spaced— at least 300 words. The reflection will be evaluated on thoughtfulness and basic grammatical style.

A. Read pages 49-50 of the textbook to get you thinking about discovering the beauty of the Fibonacci numbers, and consider the activities we did in class with the Golden Ratio.

B. Do an Internet search on "Fibonacci" and share at least one interesting thing you find that we did not discuss in class. You may want to watch the 3-part video series by Vi Hart on the Fibonacci numbers: <https://www.youtube.com/watch?v=ahXIMUkSXX0>.

11. Get students' informal written feedback on their learning

- 1) How are you doing with the challenges of the semester?
- 2) What do you like about the course (what is helping you learn)?
- 3) What would you suggest to improve the course (and help you learn)?

12. End with a Motivating Practice Problem

- Give them a problem to solve (perhaps in pairs).
- When they have an answer they can check with the teacher, and if correct then they are free to leave.



At your table, discuss some ways you like to end class or help students apply Math Life Lessons.

Every Number is Interesting Math Puzzle

Sample: 12 = M. in a Y.

Answer: 12 = Months in a Year

Source: Unknown

1. 12 = M. in a Y.
2. 26 = L. of the A.
3. 7 = W. of the W.
4. 1001 = A.N.
5. 12 = S. of the Z.
6. 54 = C. in a D. (with the J.)
7. 9 = P. in the S.S.
8. 88 = P.K.
9. 13 = S. on the A.F.
10. 32 = D.F. at which W.F.
11. 18 = H. on a G.C.
12. 90 = D. in a R.A.
13. 200 = D. for P.G. in M.
14. 8 = S. on a S.S.
15. 3 = B.M. (S.H.T.R.)
16. 4 = Q. in a G.
17. 24 = H. in a D.
18. 1 = W. on a U.
19. 5 = D. in a Z.C.
20. 57 = H.V.
21. 11 = P. on a F.T.
22. 1000 = W. that a P. is W.
23. 29 = D. in F. in a L.Y.
24. 64 = S. on a C.B.
25. 36 = I. in a Y.
26. 6 = W. of H. the E.
27. 212 = D. at which W.B.
28. 3 = P. for a F.G. in F.
29. 20 = Y. that R.V.W.S.
30. 101 = D.
31. 60 = S. in a M.
32. 7 = H. of R.
33. 56 = S. of the D. of I.
34. 5 = F. on the H.
35. 40 = T. (with A.B.)
36. 30 = D.H.S.A.J. and N.
37. 1 = D. at a T.
38. 10 = A. in the B. of R.
39. 435 = M. of the H. of R.
40. 16 = O. in a P.
41. 31 = I.C.F. at B.R.
42. 50 = C. in a H.D.
43. 2 = T.D. (and a P. in a P.T.)
44. 4 = H. of the A.
45. 13 = C. in a S.
46. 8 = P. of S. in the E.L.
47. 20,000 = L.U. the S.
48. 9 = I. in a B.