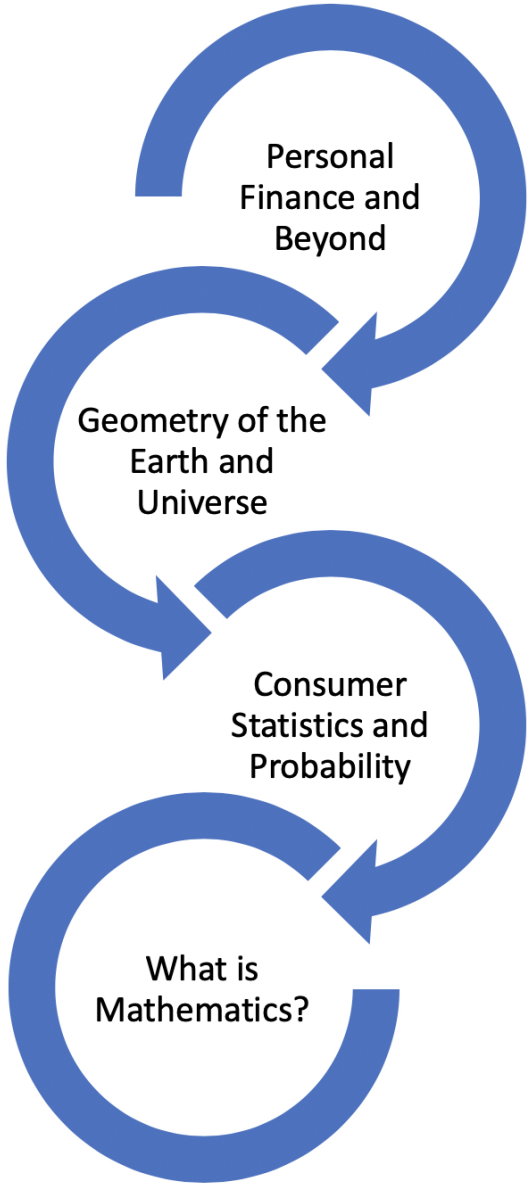

- diverse perspectives including local to global connections
- truth & consequences, the role of chance and probability
- ways that diverse people succeed in and impact mathematics
- what mathematics is & offers

Where to Get Help

- need help from me, your classmates, or tech support forum
  -Zoom typically 10:20am &12:20pm M–F, and 8pm S–Th
  -office hours on the face-to-face days typically before and after class [today, Wed Jun 5, Fri Jun 14, Tues Jun 25, Fri Jun 28 in 326 or 310 Walker]
- advice from prior students

I care about you and your success!

http://alangregerman.typepad.com/.a/6a00d83516c0ad53ef0168e783575e970c-800wi

1. begin personal finance and beyond
2. introduction to Excel
3. move to the lab to work on an Excel activity
4. introduction to the course activities, grading policies...

philosophers-stone.co.uk/wordpress/wp-content/uploads/2013/11/paycheck-for-all.jpg

Interest: 10.3 in The Heart of Mathematics

- Babylonians 20% interest: 20 out of 100 = $\frac{20}{100} = .20$

YBC 04698: 17 problems statements on interest rates, prices and profit
`https://cdli.ucla.edu/dl/photo/P255010.jpg`

- Latin “id quod inter est” or “that which is between.”
- Suppose we deposit $1000 in a savings account that pays 5% interest compounded annually for 142 years—how much will we have in total savings?

Suppose we deposit \$1000 in a savings account that pays 5% interest compounded annually for 142 years—how much will we have in total savings?

- Why NOT: ~~$1000 + 1000 \times .05 \times 142 = 8100$~~?

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- year 1: $1000 + 1000 \times .05 = 1050$
- year 2: year 1 total + year 1 total $\times .05$
  could do this 142 times but would take forever—apply algebra!

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  factor out the common term of 1000 (1 + .05)
  =1000 (1 + .05) (1 + .05)

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  factor out the common term of 1000 (1 + .05)
  =1000 (1 + .05) (1 + .05)
  use exponent rule to simplify
  $= 1000(1 + .05)^2$

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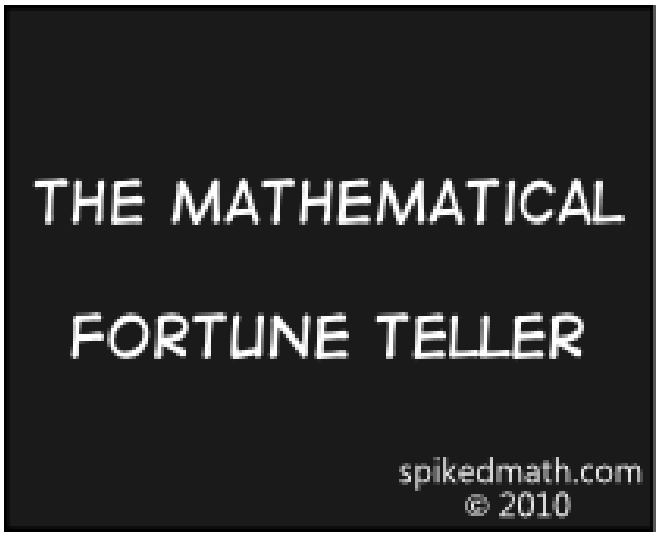
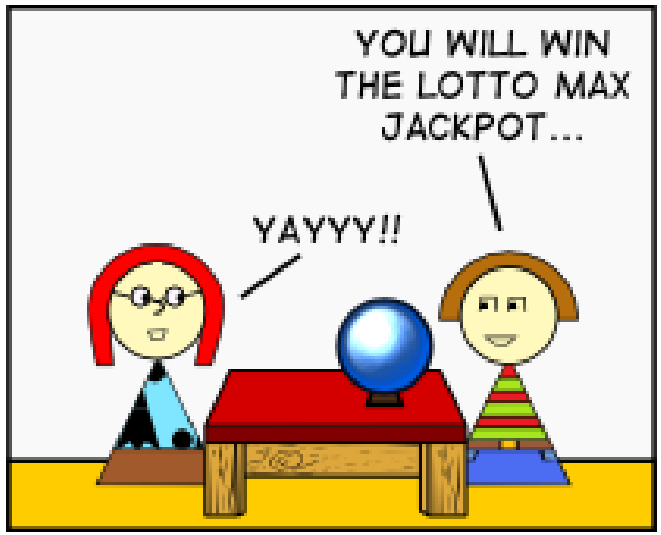
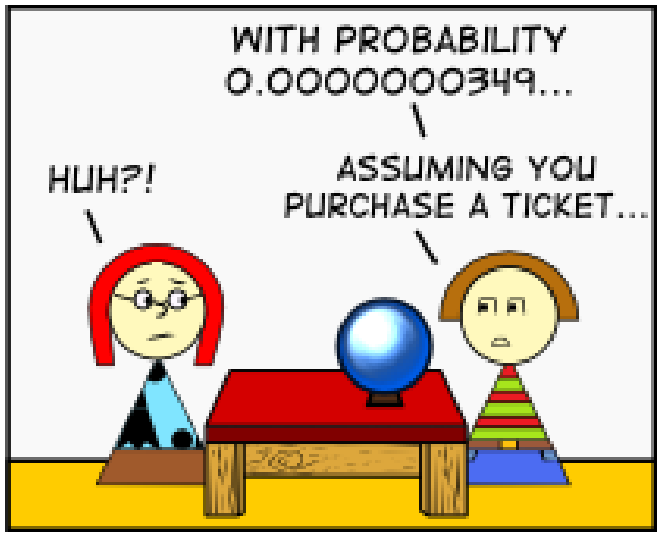
  $= 1000(1 + .05) \times 1 + 1000(1 + .05) \times .05$
  factor out the common term of 1000 (1 + .05)
  =1000 (1 + .05) (1 + .05)
  use exponent rule to simplify
  $= 1000(1 + .05)^2$
- year 142?

How We Derived the Lump Sum Formula

We obtained the general formula for lump sum using the total from the year before to calculate the principal and interest for the next year. This process works fine, but is too difficult to use when the number of years is large. So we looked for a way to obtain a simplified formula. We looked for the commonality and recognized the repeated appearance of (1+rate) after factoring. Once we found this pattern, we used it to find a simplified formula.





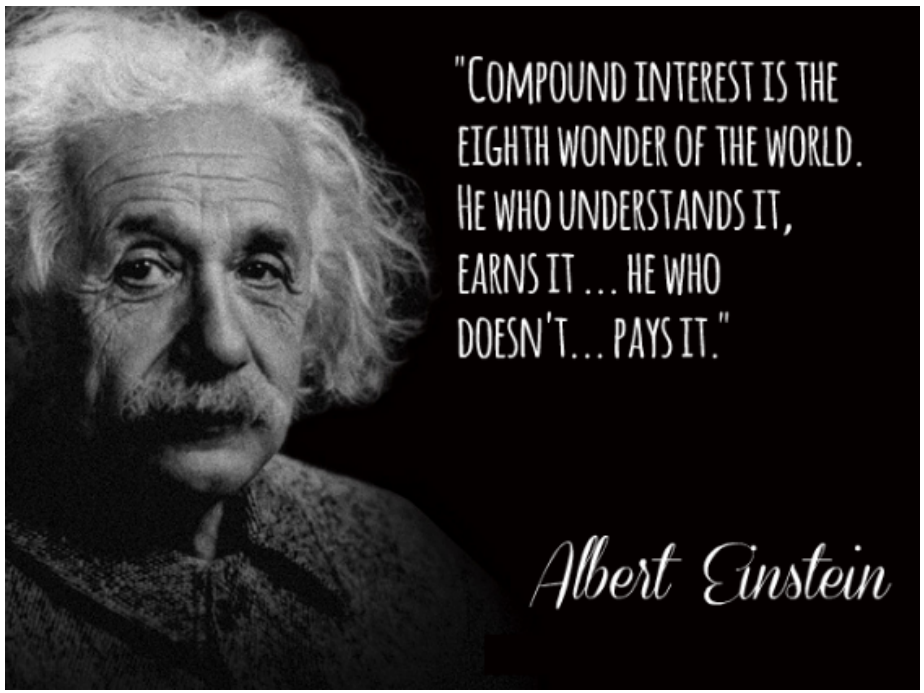


http://spikedmath.com/355.html

What kind of world are we making? can we be making?

What does our interest look like, how do we know, and how do we represent it? Pros and cons and other possibilities...

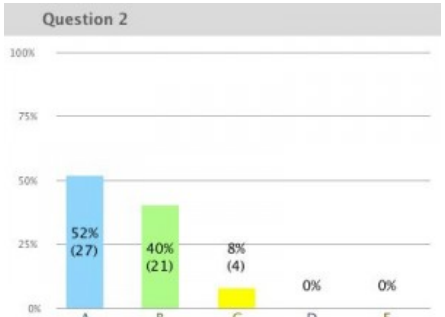
- diverse perspectives including local to global connections
- truth & consequences, the role of chance and probability
- ways that diverse people succeed in and impact mathematics
- what mathematics is & offers



http://www.investingtips360.com/leverage-the-power-of-compounding-interest/

The purpose of *think-pair-share* activities is to practice concepts, computational strategies, and critical & creative thinking and communication.

- **Think** about a possible answer(s) on your own
- **Pair up**: discuss your thoughts in a group
- Prepare to **share** something from your group's discussion. This may take the form of an assertion, question, definition, example, or other connection. It could be something you tried and rejected.
- May be a lag at times—use this to **review** related concepts and examples, and **add** to your notes



http://laurafreberg.com/blog/wp-content/uploads/2009/06/10904130911_c2-300x225.jpg

Making mistakes is integral to the learning process and enriches our understanding as we extend content and clear up misconceptions.

Suppose we deposit \$1000 in a savings account that pays 5% interest compounded annually for 142 years—how much will we have in total savings? $1000(1 + .05)^{142}$

1. Suppose we deposit \$1000 in a savings account that pays 5% interest compounded monthly for 142 years—how much will we have in total savings?

Suppose we deposit \$1000 in a savings account that pays 5% interest compounded annually for 142 years—how much will we have in total savings? $1000(1 + .05)^{142}$

1. Suppose we deposit \$1000 in a savings account that pays 5% interest compounded monthly for 142 years—how much will we have in total savings?

5% interest compounded monthly means 5% is the annual rate so the monthly rate, the periodic rate, is $\frac{.05}{12}$

Suppose we deposit \$1000 in a savings account that pays 5% interest compounded annually for 142 years—how much will we have in total savings? $1000(1 + .05)^{142}$

1. Suppose we deposit \$1000 in a savings account that pays 5% interest compounded monthly for 142 years—how much will we have in total savings?

5% interest compounded monthly means 5% is the annual rate so the monthly rate, the periodic rate, is $\frac{.05}{12}$

a) $1000(1 + \frac{.05}{12})^{142}$

b) $1000(1 + \frac{.05}{12})^{1704}$

c) other

Which is better interest in this scenario, compounding annually, compounding monthly, or are they the same?

Suppose we deposit \$1000 in a savings account that pays 5% interest compounded annually for 142 years—how much will we have in total savings? $1000(1 + .05)^{142}$

1. Suppose we deposit \$1000 in a savings account that pays 5% interest compounded monthly for 142 years—how much will we have in total savings?

5% interest compounded monthly means 5% is the annual rate so the monthly rate, the periodic rate, is $\frac{.05}{12}$

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b) $1000(1 + \frac{.05}{12})^{1704}$

c) other

Which is better interest in this scenario, compounding annually, compounding monthly, or are they the same?

total = lump (1 + periodic rate) $^{\#\text{times we actually compound}}$

interest = total $-$ amount put in as a lump sum

2. Which do you think best explains why it does make sense to charge interest?

a) historically, animals, land and other property was lent out, and a part of the actual growth of the living animals, crop, etc, were given back to the lender.

b) when a bank or someone loans money they should reasonably expect to make back what they could have earned elsewhere, if they aren't running a charity.

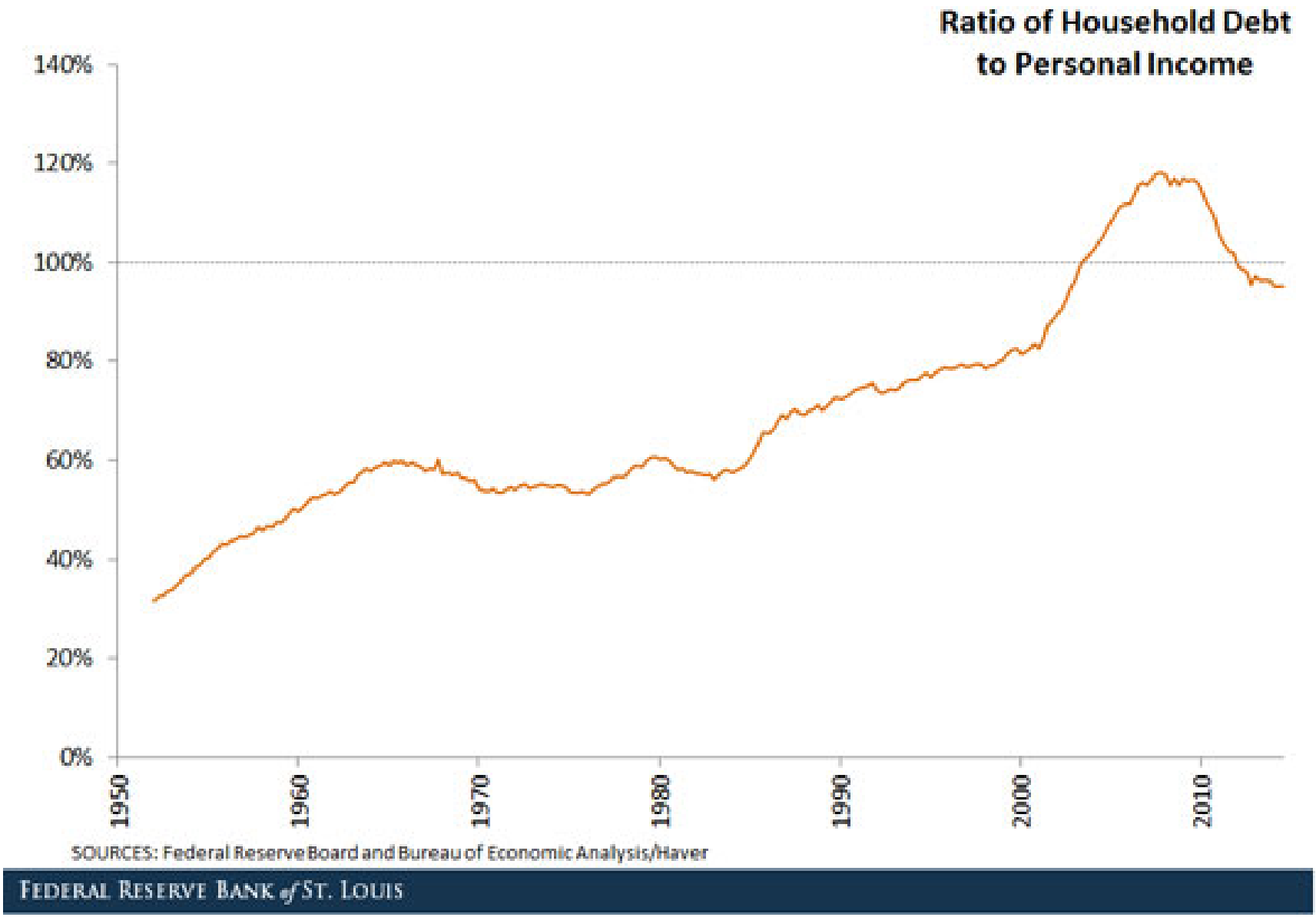
c) can help cover risk, liabilities and losses for people who don't pay back

d) helps generate business and keeps the economy moving

e) other

The role of chance and probability in financial forecasts

- All financial forecasts, whether about the specifics of a local business, like sales growth, or predictions about the global economy as a whole, are informed guesses based on historical data and other analyses.
- Historical data is all we have to go on and there is no guarantee that the conditions in the past will persist into the future.
- If there are 500 different lottery tickets total, and you have purchased 2 of them, what is the probability you will win?
- Dividing reward/risk is a common ratio to compare risk versus reward. Risking $10 to gain millions in a lottery is a much better investment than investing in the stock market from a reward/risk perspective (millions/10). However, it is a much worse choice in terms of the probability of losing all your money!



www.stlouisfed.org/on-the-economy/2015/march/mortgage-debt-and-the-great-recession

3. Which do you think is most compelling of why it might not sense to charge interest?

a) abuses of the system with interest way too high (for example, sharecropping, or in 1304 interest rates in Nuremberg were 220%!) and the system may contribute to concentrating wealth in the hands of a small minority
b) there is not enough money in existence to pay back all that is currently loaned out
c) in numerous religions over time, including Christianity, Judaism, and Islam, there were prohibitions against charging interest on money to members of the community (usury), but was ok for strangers. Lending to your neighbor was considered philanthropy and part of a giving back to the community. [Responsibilities of Community Membership]
d) we can't plant gold coins and get a bumper harvest of more gold coins
e) other

4. If you were going to design an independent, self-sustaining, space mission, who travel far away to continually explore the geometry of the universe, would you charge interest within it?

a) yes

b) no

c) in some instances but not in others

5. Real-life situation: Past student was told that her certificate of deposit (CD) will be compounded monthly at 8% for 8 months, and is told that this 8% will apply each and every month (i.e. is the monthly rate). Let's say that she put in \$1000. How much would her CD be worth at the end of 8 months if the annual rate was indeed $8 \times 12 = 96\%$ instead of 8%?

a) $1000(1 + .08)^8$

b) $1000(1 + \frac{.08}{8})^8$

c) $1000(1 + .\frac{08}{12})^{8 \times 12}$

d) $1000(1 + \frac{.08}{12})^8$

e) none of the above

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c) $1000(1 + .\frac{08}{12})^{8\times12}$

d) $1000(1 + \frac{.08}{12})^8$

e) none of the above

What did the bank really mean?

interest = total $-$ amount put in as a lump sum

total = lump $(1 + \text{periodic rate})^{\#\text{times we actually compound}}$

lump amount, time length, rate, or number of times compounding per year might be the unknown

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total = lump (1 + periodic rate) $^{\#\text{times we actually compound}}$

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- Intro to Goal Seek in Excel spreadsheet via seeing how long it will take to double our money using her rate. $2000 = 1000(1 + \frac{.96}{12})^{?}$
- cell is denoted by its column, row: A1
- formulas in Excel start with =

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total = lump (1 + periodic rate) $^{\#\text{times we actually compound}}$

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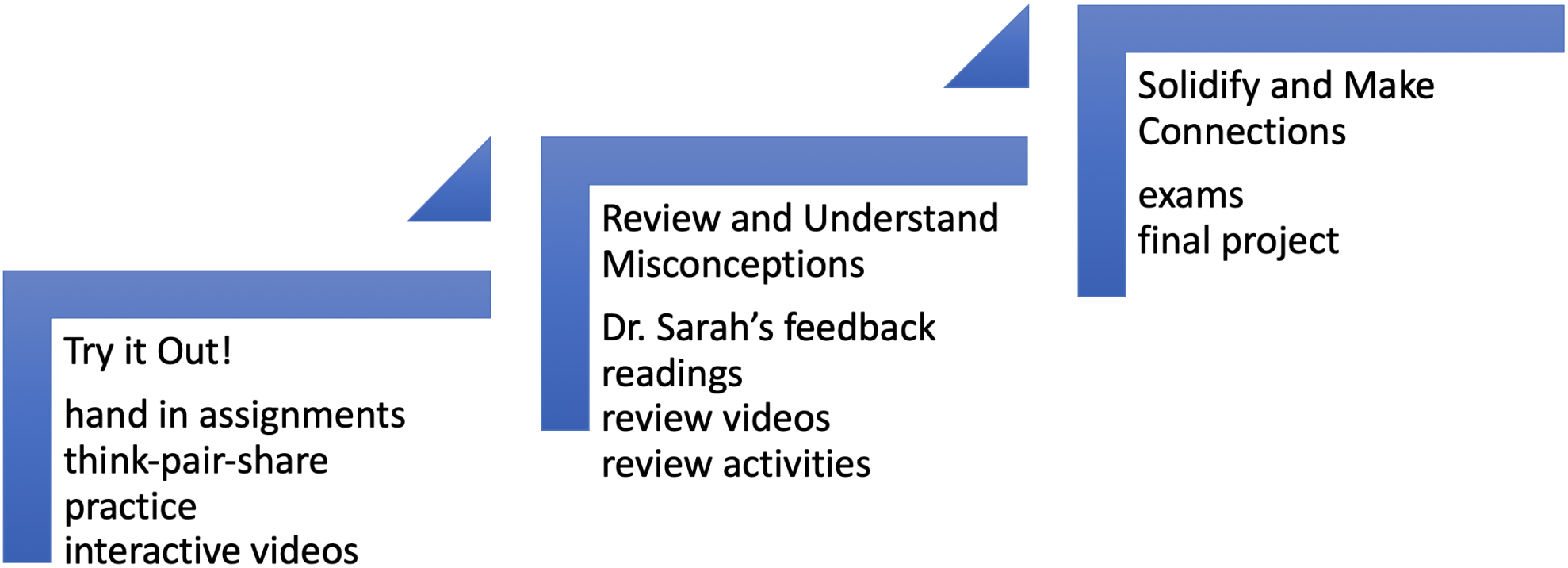
- cell is denoted by its column, row: A1
- formulas in Excel start with =

	A	B	C
1	total savings	months	years
2	=1000*(1+.96/12)^B2		=B2/12

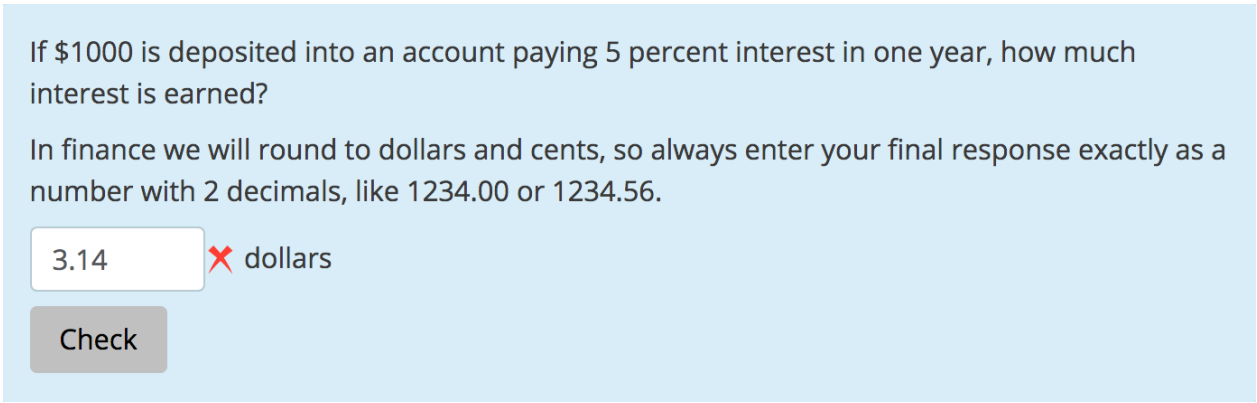
I care about your success and have designed 1010 to help you learn, incorporating feedback from prior students and principles from the literature like *Make It Stick: The Science of Successful Learning* by Peter Brown et al., which I highly recommend.

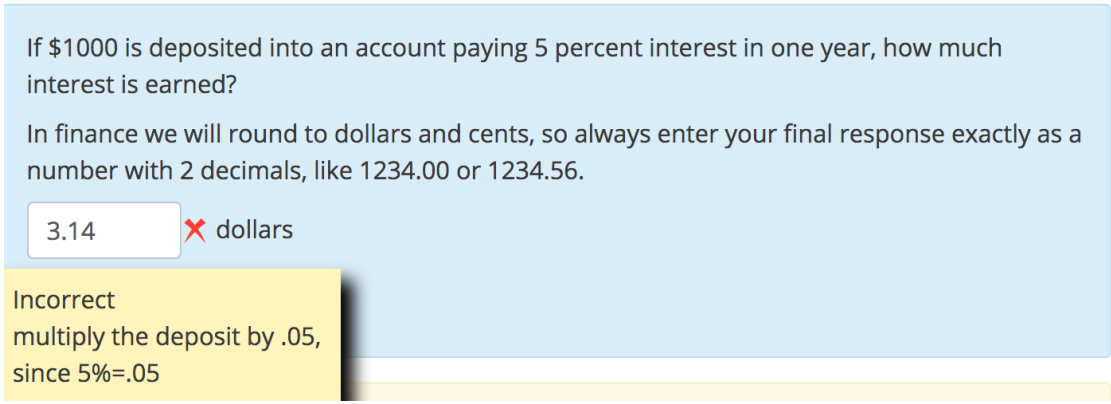


practice with instantaneous feedback check from me, repeatable

Instantaneous Feedback

Opens after you **Check** a response in a given problem, and then you can retake it if you wish. For a box where you enter the symbols, **hover over the box to see the feedback**.





 practice with instantaneous feedback from me, repeatable

General Feedback

Opens after you submit all problems on an assignment and finish (you can retake an assignment before it is due–that is repeatable too!). For credit I ask for a good faith effort rather than a specific score—aim for at least 70%, retaking if needed. The point of these is to help you develop your understanding.

Avoid Becoming too Dependent on the Online System

Take notes to help further solidify the material. Try them again on paper before the exam (without the solutions in front of you).

Second Chance

If you weren't able to succeed then a second chance will open after the deadline, but the checkmark is easier to obtain when it was originally due (70% instead of 90%).


interactive video activities.
The check feature will provide you with instant feedback so that you can revise your responses and earn credit after you'll watch the entire video and submit all the answers at the end.


webpages, PDF, files, videos, glossaries...
Some checkmarks may be ones where you can manually mark the activity as completed whenever you are ready to do so.
Other checkmarks may only be earned when you receive a grade or when you access an assignment.

Where do earnings actually come from intro

5 Question(s) answered

You have answered 5 questions, click below to submit your answers.

Submit Answers

Answered questions		Score
1:26	Warren Buffett question	1 / 1
2:48	$37 question	1 / 1
3:52	Futurama question	1 / 1
6:47	Thrifty Savers question	1 / 1
9:31	Excel formula question	1 / 1


hand in. Some must be on the handouts and turned in as one single PDF (like Benjamin Franklin's legacy).

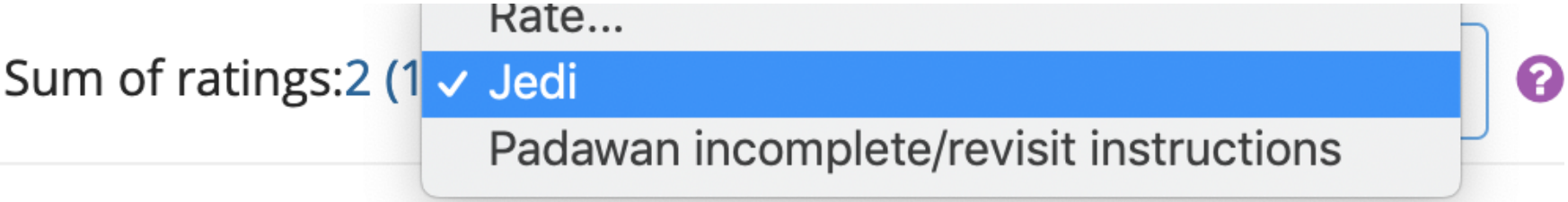
Grade:

scale	Padawan (still training)	Jedi	Jedi Master	Good start but this is incomplete. See the attached file.

- Padawans are training to one day become a Jedi.
- Both Jedi and Jedi Master ratings earn a checkmark.
- I'll respond with feedback within 24 hours from the due date. Any revisions for Padawans are due by the cut-off date.

think-pair-share to

1. respond to the questions with your own thoughts and
2. respond separately to someone else's post with something new that justifies your position on (at least) one of the questions. Don't just say, "Yeah, I agree." Instead, say, "Yes, but we also need to consider..." Or, "I don't agree because..." You might also pose questions, answer questions, extend ideas, or compare and contrast your responses and summarize what you chose and why.



Both must be rated as Jedi for a checkmark (you can revise as needed by completing/revisiting the instructions). You may temporarily see a checkmark before the other is rated.

I'll also respond with comments to the class on the shared posts within the successive days activities (in the next day or two) or within a class announcement.

- Effective Class Engagement 40%
  The percentage of checkmarks determines the overall engagement grade (to accommodate for emergencies, the lowest 2 checkmark assignments are dropped)
- Exams 45%
  There are three written exams, in the face-to-face component. To encourage exams as a learning experience, accommodate for emergencies, and help solidify your knowledge, you can turn in revisions on one exam. Otherwise, no late tests allowed.*
- Final Project 15%
  To reflect more broadly about the course themes as we tie the segments together. You can choose a topic you are interested in and research how course topics relate to it or you can design a creative review of what we covered in class. You will communicate your expertise in a poster presentation session in the face-to-face component. You must participate in the final project to pass the class. No late projects allowed.*

Getting Started 5/28

- Is 80% asynchronous MAT 1010 a good fit? ☑
- syllabus ☑
- What is Mathematics? ☐
- Add a profile picture (name/Edit profile) ☐

Personal Finance and Beyond 5/28-6/5

Tues 5/28

- face-to-face 5/28 10:20 ☐
- real-life rates ☐
- percent practice ☐
- lump sum practice ☐

Wed 5/29

- Where do earnings actually come from intro ☐
- Benjamin Franklin's financial legacy ☐
- lump earnings think-pair-share ☐

Thur 5/30

- periodic payment intro ☑

What I'll collate:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Last Updated:	**May 19**					Effective class engagement is collated through column O with the lowest 2 dropped.									
Name	**Final Project 15%**	**Exams 45% (can revise 1)**	Exam 1	Exam 2	Exam 3	**Effective Class Engagement 40%**	**Padawan #**	5/28 face-	Is 80% as	syllabus	what is m	profile pic	real-life ra	percent pr	lump su
Turanga Leela		90	88	92		100	1	☑	☑	☑	☑	☑	☑	☐	☐
Vicky Klima		43	44	42		60	4	☐	☑	☐	☑	☐	☐	☑	☑
Doctor Who		85	98	72		100	1	☑	☑	☑	☑	☑	☐	☑	☐

I'll share your grades with you in an invitation email:

Turanga Leela MAT 1010-102 Summer 1 2019 Grades - Invitation to view - Sarah Greenwald has invited you to view the following...

Turanga Leela ...

via your own Google sheet:

A	B	C	D	E	F	G	H	I	J
Last Updated:	May 19					Effective class engagement is collated through column O with the lowest 2 dropped			
Name	Final Project 15%	Exams 45% (can revise 1)	Exam 1	Exam 2	Exam 3	Effective Class Engagement 40%	Padawan #	5/28 face-to-face	Is 80% asyn
Turanga Leela		90	88	92		100	1	☑	☑

expected grade:

.15 Final Project +.45 Exams + .40 Effective Class Engagement

The grading scale is: $A \geq 93; 90 \leq A- < 93; 87 \leq B+ < 90...$

I'll estimate your letter grade after each exam as:

$$\frac{.45\text{Exams}+.40\text{Effective Class Engagement}}{85} \times 100$$

Getting Started 5/28

- Is 80% asynchronous MAT 1010 a good fit? ☑
- syllabus ☑
- What is Mathematics? ☐
- Add a profile picture (name/Edit profile) ☐

Personal Finance and Beyond 5/28-6/5

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- face-to-face 5/28 10:20 ☐
- real-life rates ☐
- percent practice ☐
- lump sum practice ☐

Wed 5/29

- Where do earnings actually come from intro ☐
- Benjamin Franklin's financial legacy ☐
- lump earnings think-pair-share ☐

Thur 5/30

- periodic payment intro ☑

	A	B	C
1	Last Updated: May 19	Name	Turanga Leela
2		Final Project 15%	
3		Exams 45% (can revise 1)	90
4		Exam 1	88
5		Exam 2	92
6		Exam 3	
7	Collated through "percent practice"	Effective Class Engagement 40%	100
8	Lowest 2 dropped	Padawan #	1
9	Personal Finance and Beyond	5/28 face-to-face activities	☑
10		Is 80% asynchronous 1010 a good fit for you?	☑
11		syllabus	☑
12		what is mathematics	☑
13		profile picture	☑
14		real-life rates	☐
15		percent practice	☑
16		lump sum practice	☐
17		Where do earnings actually come from? intro	☐
18		Benjamin Franklin's financial legacy	☐
19		lump earnings think-pair-share	☐
20		periodic payments intro	☐
21		my response to lump earnings think-pair-share	☐
22		lump & periodic practice	☐
23		Jane & Joan	☐
24		lottery	☐
25		lump & periodic think-pair-share	☐
26		loan intro	☐
27		my response to lump & periodic think-pair-share	☐
28		loan practice	☐
29		condo decisions	☐
30		reflection on finance	☐
31		loan think-pair-share	☐
32		my response to loan think-pair-share	☐
33		car decisions	☐
34		payday lending	☐
35		review themes intro	☐
36		review practice	☐
37		review problems think-pair-share	☐
38		my response to review problems think-pair-share	☐
39		study guide exam 1	☐
40		glossary/wiki for finance	☐