

# As you come in, choose one activity to complete.

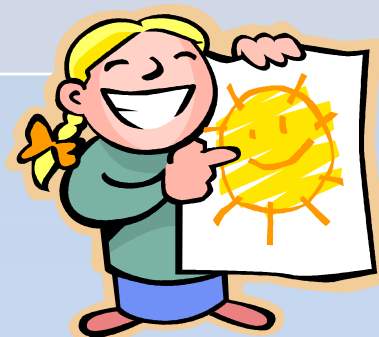
## Activity 1:

Using an index card, list benefits and challenges associated with math extensions or math enrichments.



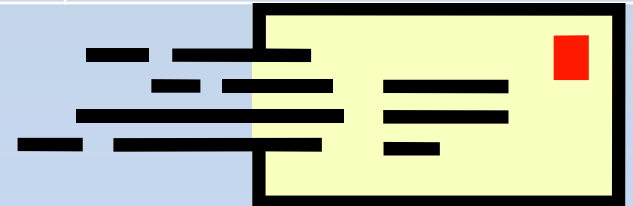
## Activity 2:

Using an index card, create a visual representation of a student who is engaged in math class 90%-99% of the time.



## Activity 3:

Using an index card, write an email to your best math teacher telling them what they did to engage you in learning about math.





# Pascal, Fibonacci, Sierpinski...Oh My!

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507-460-1912

$$\frac{a+b}{a} = \frac{a}{b} = \varphi \approx 1,61803$$

# Introduction

- Classroom Teacher for 10 years [Grades 2-4]
- Gifted and Talented Interventionist for 3 years [Grades K-5]
- District Coordinator of Gifted and Talented Education for 3 years [Grades K-12]
- F.I.R.S.T. Lego League Coach for 5 years
- Serve as MEGT Board Member for Homestead Region in SE MN



# 2013-14 Demographics of Woodson Kindergarten Center

## Gender

52% Female

48% Male

## Total #

Students

422

## Poverty

63% Free/Reduced Lunch

## Ethnicity

52% White

33% Hispanic

10% Black

6% Asian

<1% American Indian

## Languages

19 different languages [55 district-wide]

Arabic, Chinese Mandarin, French, Lao, Polish, Spanish, Vietnamese, Samoan, Amharic, Bulgarian, Nuer, Anuak, Filipino, Karen, Dinka, Karenni, Gissi, & Kosraean



The largest Kindergarten Center  
in Minnesota!

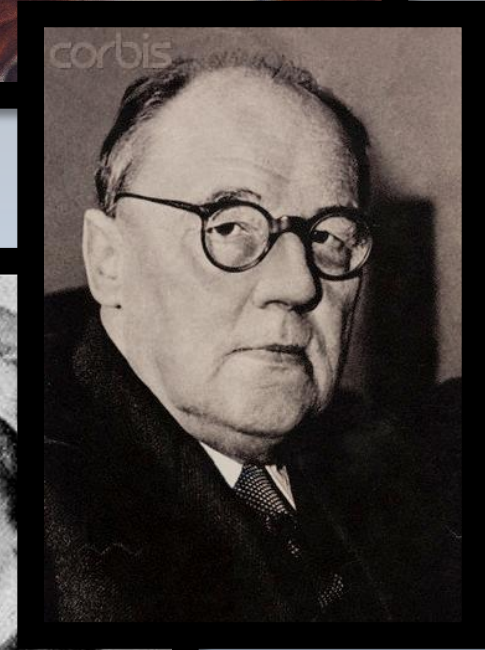
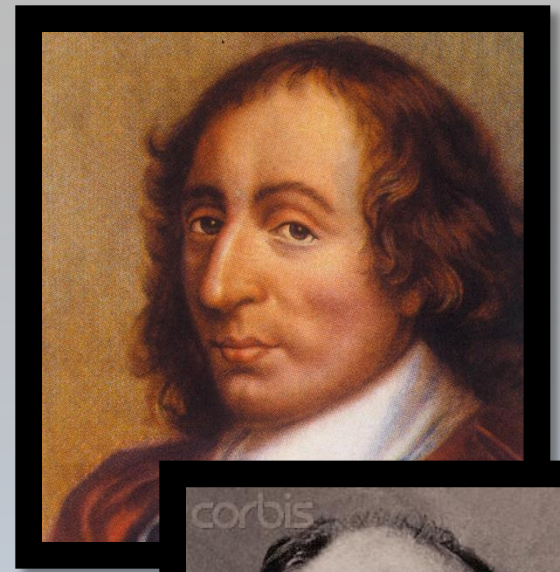


Above an  
educator, I am a  
father and  
husband and  
son and brother  
and uncle



# Objectives

- To think critically about various math patterns and concepts by exploring mathematicians like Pascal, Fibonacci, Sierpinski and others.
- To implement multiple activities in the classroom when upon return.
- To have fun!



Grounding

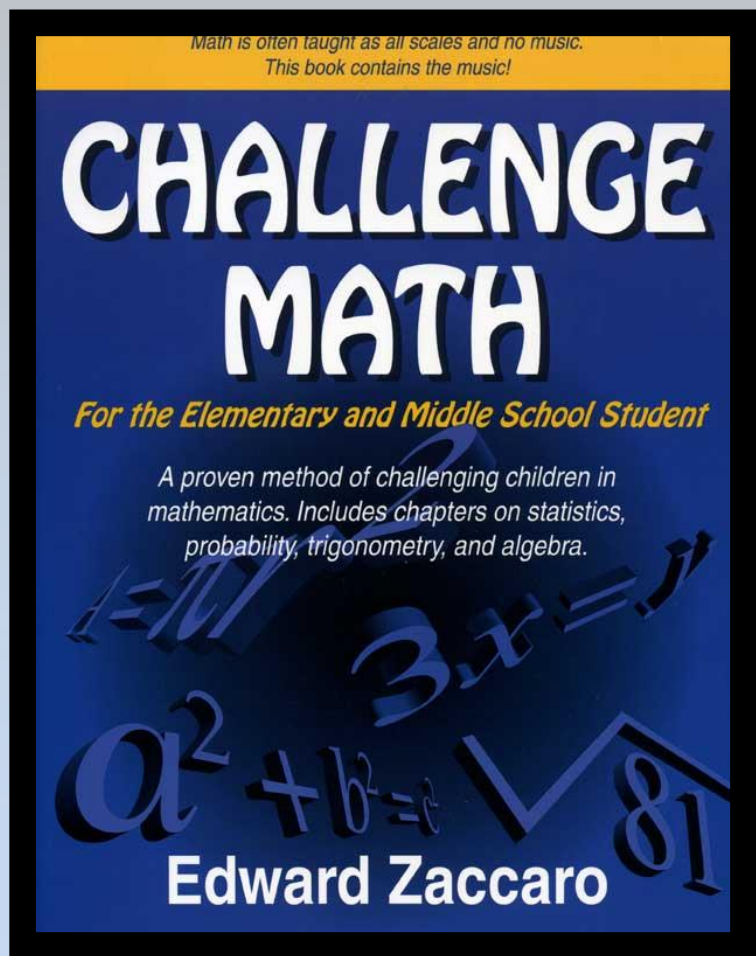
**SHARE OUT**



# What to do with math talent?

To enrich?

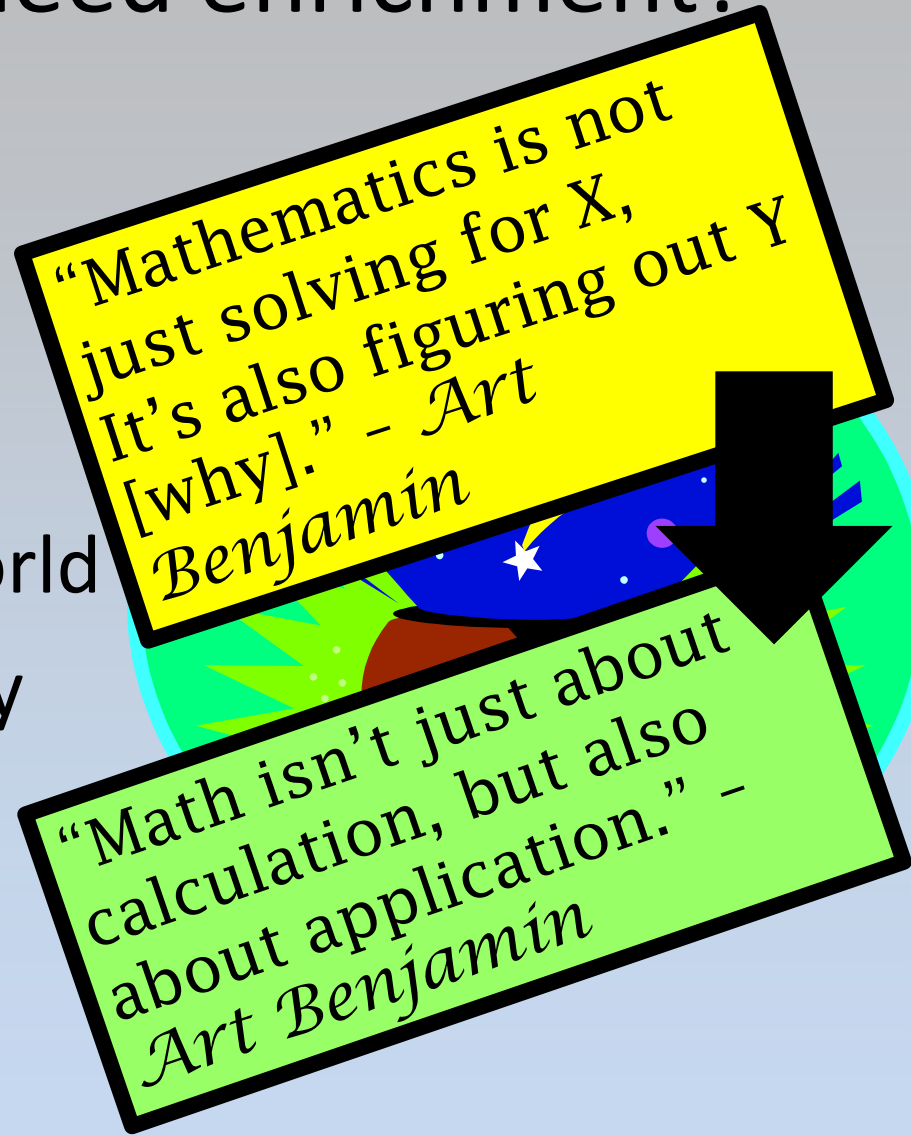
To accelerate?



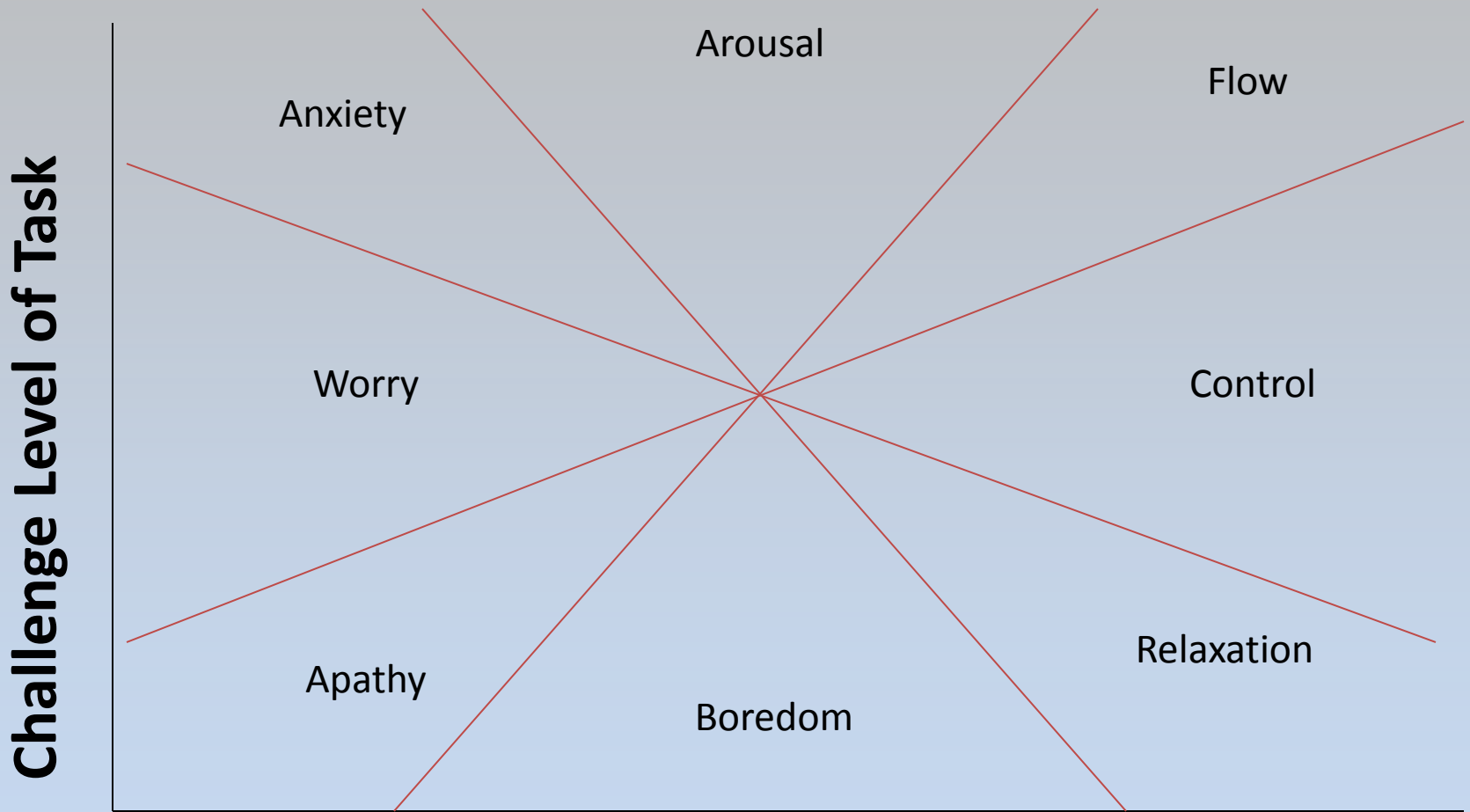


# Why do students need enrichment?

- Problem-solving
- Posing new questions
- Making generalizations
- Connections to real-world
- Mathematical creativity
- Mathematical curiosity



# Enrichment increase **Engagement**



**Skill Level of Learner**

Sternberg

# FIBONACCI



LEONARDO DI PISA ALSO KNOWN  
AS FIBONACCI

# Rabbits!

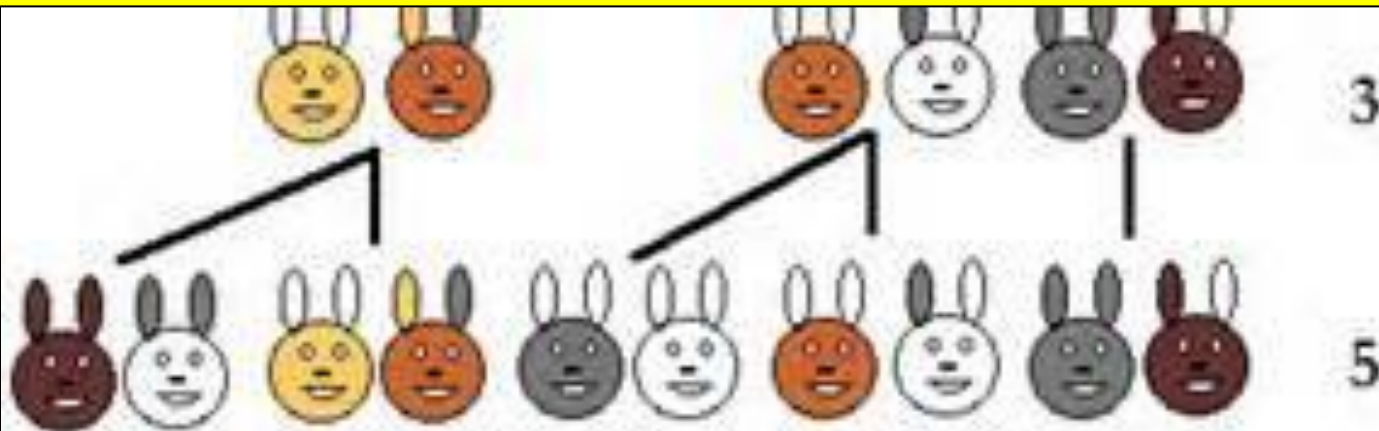


- Leonardo of Pisa, son of Bonacci
- Born in 1170 in Pisa, Italy
- Developed Fibonacci's numbers in 1200AD when answering a question about breeding rabbits:  
*How many pairs of rabbits would be in a pen after 12 months if you start with a pair of adult rabbits who have a pair of babies at the first of each month. All baby rabbits take one month to become adults and bear a pair of baby rabbits at the first of each month. No rabbits die.*



Number  
of pairs  
1

These numbers appear in many diverse places such as nature, art, architecture, music, poetry, astronomy, computer science, psychology, gambling, chemistry, human body, physics, and the stock market!



# The Golden Ratio



$$AB / AC = AC / CB = 1.618$$

After the first number, any Fibonacci number divided by the next one will produce a number smaller than 1.

After the first number, any Fibonacci number divided by the previous one will produce a number larger than 1.

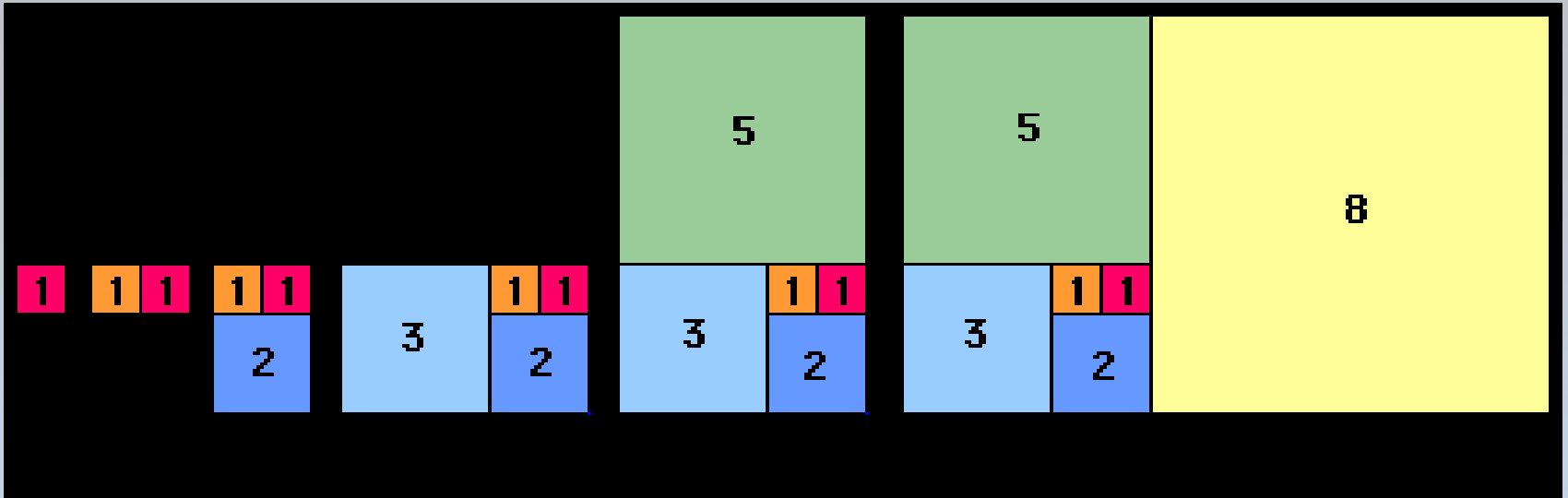
The further along the sequence the numbers are, the closer the ratios get to the Golden Ratio!



[http://www.ted.com/talks/arthur\\_benjamin\\_the\\_magic\\_of\\_fibonacci\\_numbers.html](http://www.ted.com/talks/arthur_benjamin_the_magic_of_fibonacci_numbers.html) 6:25 minutes

# **THE MAGIC OF FIBONACCI NUMBERS**

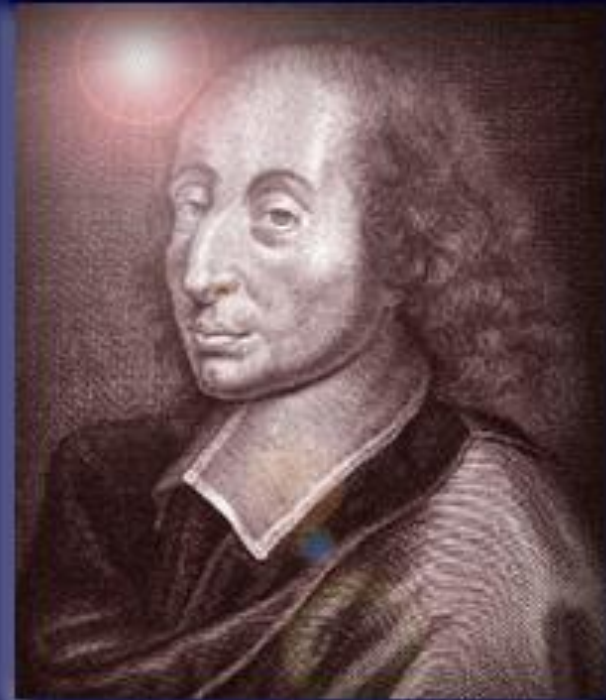
## **TED TALK ~ ARTHUR BENJAMIN**



# FIBONACCI ACTIVITIES



**PASCAL**



# Banned from Math!



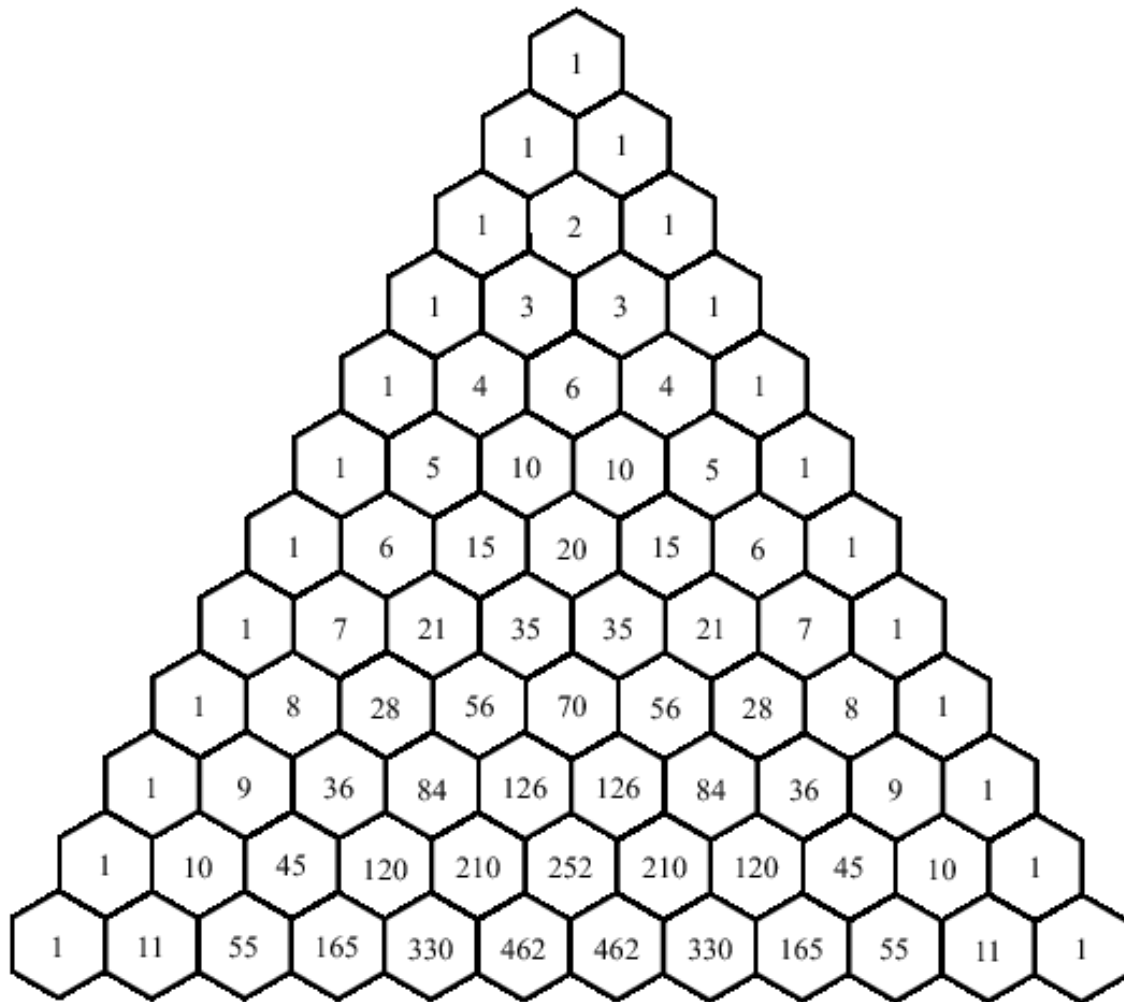
- Blaise Pascal
- Born in 1623 in Clermont, France
- To get Blaise interested in Math, his father banned all math books from his home until he was 15
- Took Blaise to mathematical meetings with famous European mathematicians of the time
- Later he gave up mathematics and devoted his life to Christian theology



## PASCAL ACTIVITIES

# Pascal's Triangle

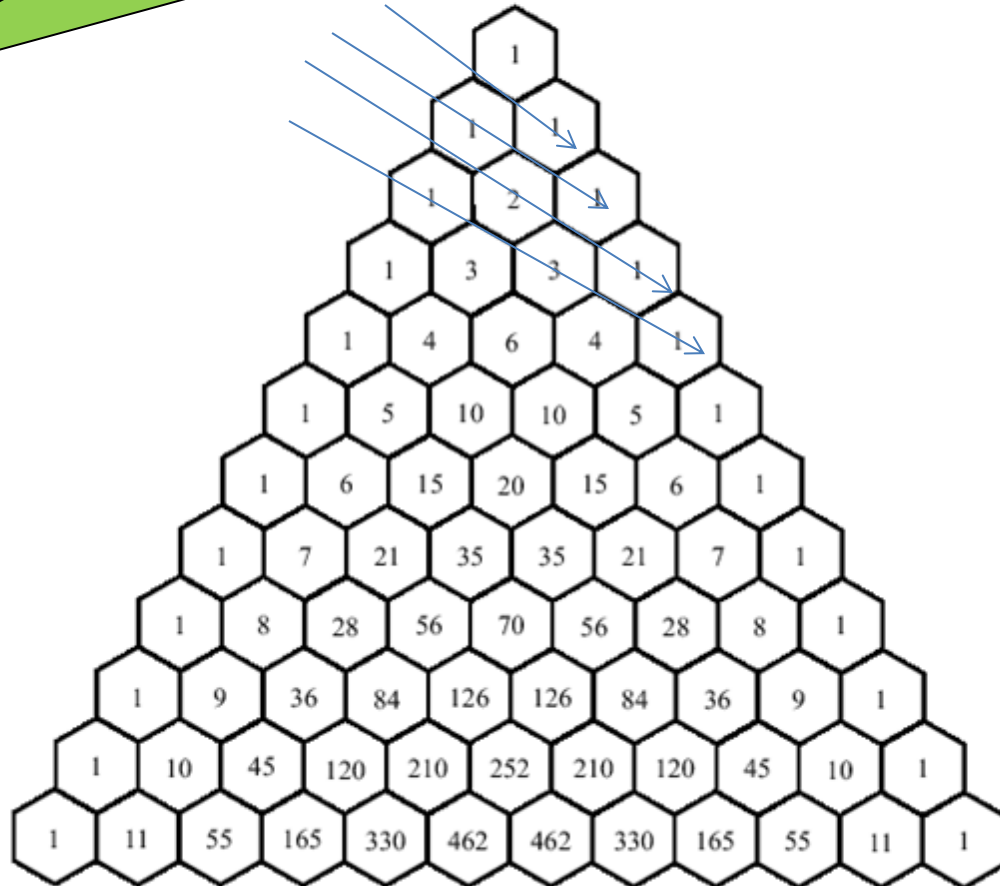
First 12 rows.



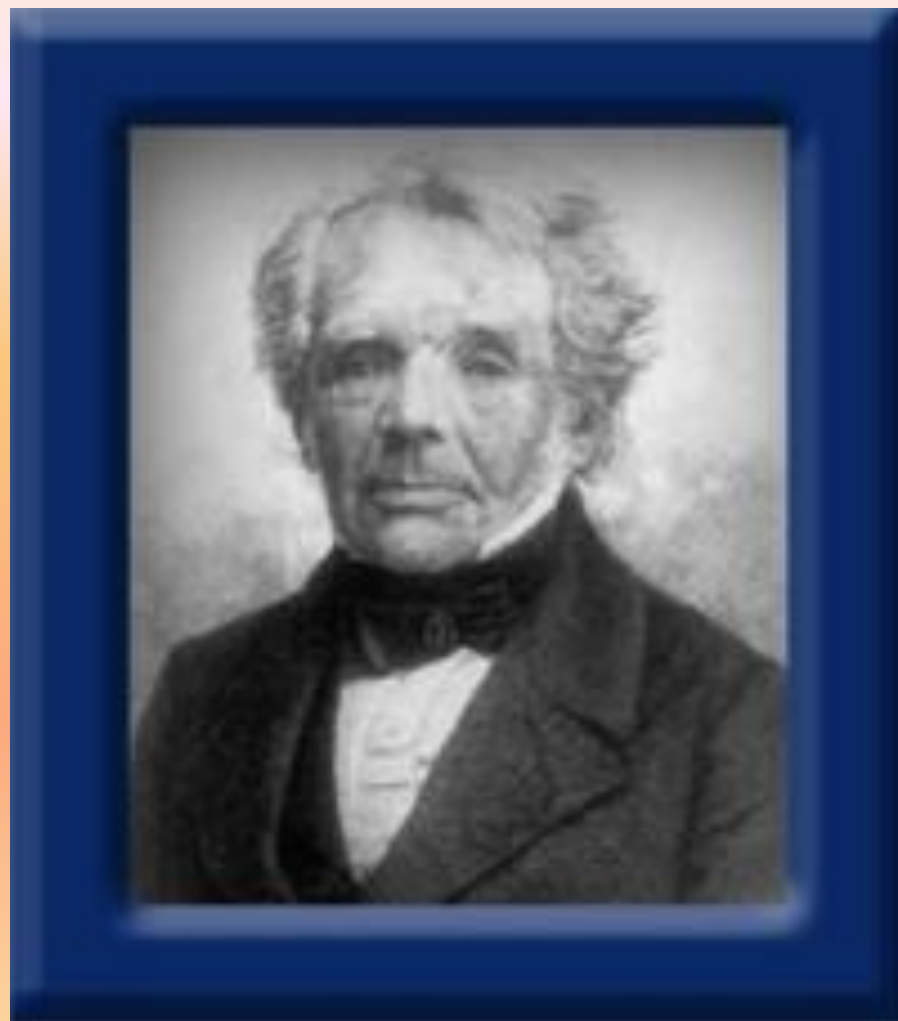
Pascal connects  
to Fibonacci

### Pascal's Triangle

First 12 rows.



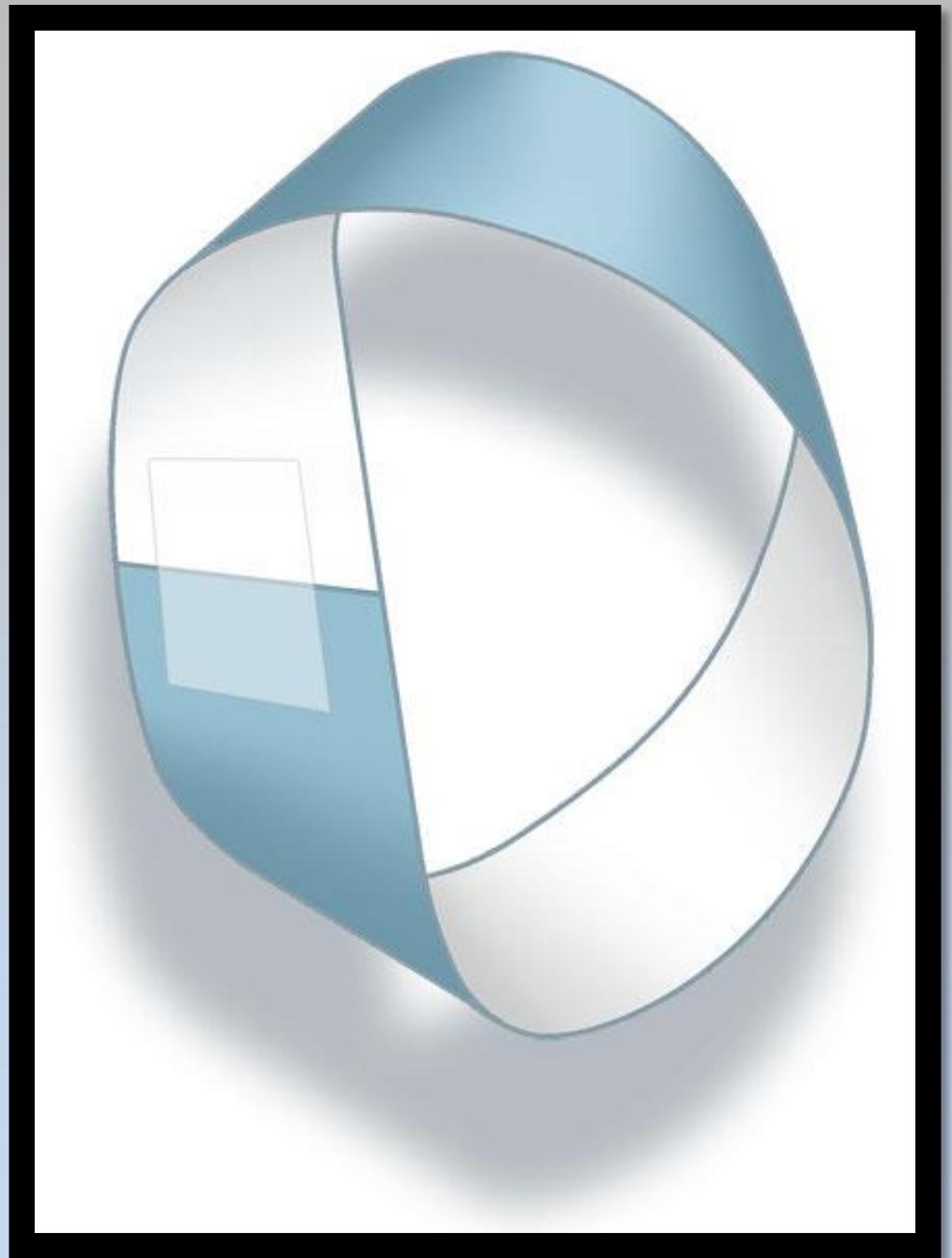
**MOBIUS**



# Topology

- Born in 1790 in Schulpforta, Saxony [now Germany]; died in 1868
- Created a model can easily be created by taking a paper strip and giving it a half-twist, and then joining the ends of the strip together to form a loop – Mobius Strip
- Belongs to a field of mathematics called Topology – classification of surfaces

# MOBIUS ACTIVITIES





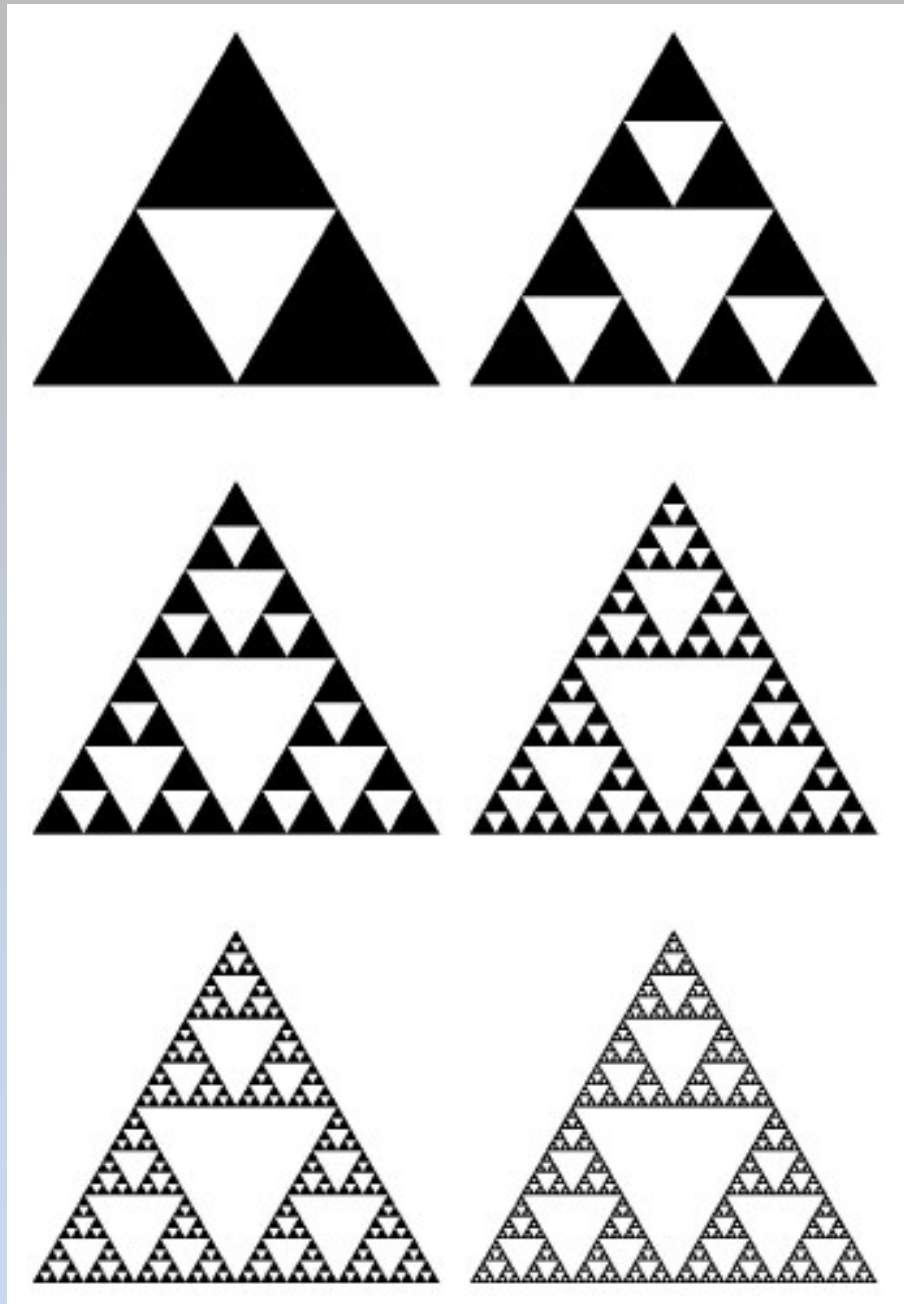
**SIERPINSKI**



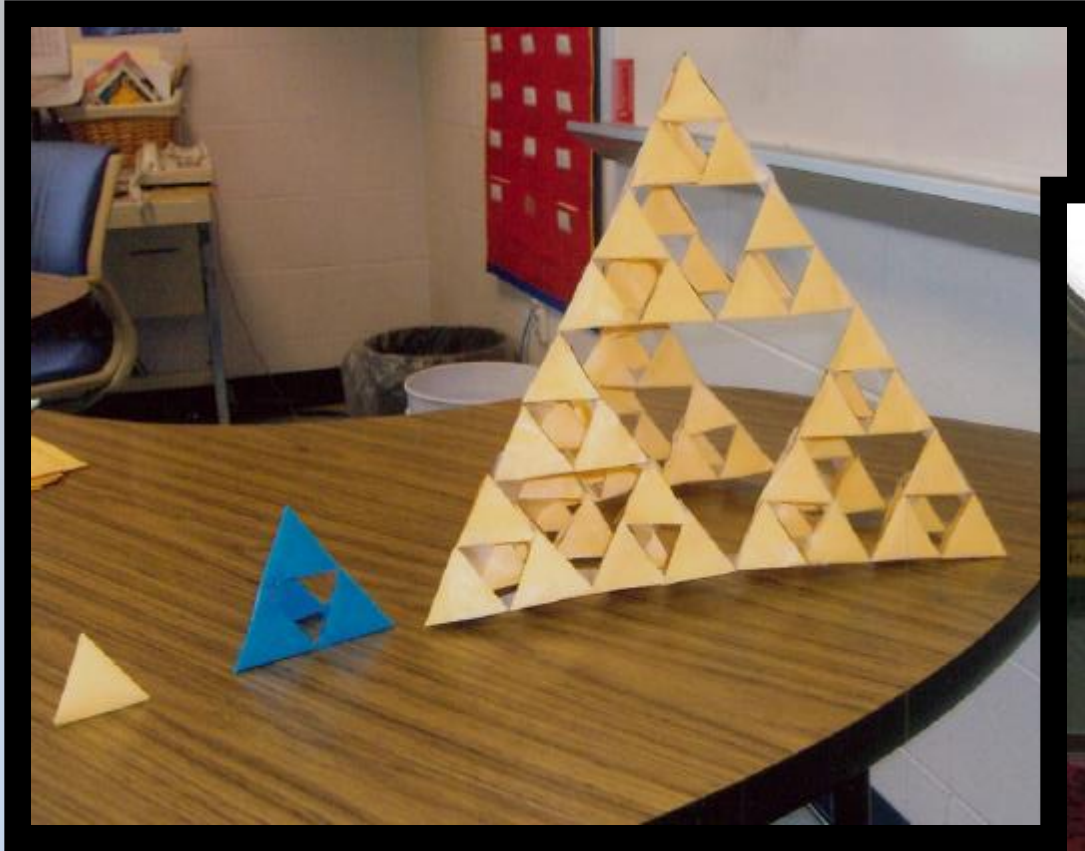
# Background

- Waclaw Sierpinski lived from 1882 to 1969.
- While researching on topology, discovered Sierpinski's Triangle
- A fractal is a geometric shape which is self-similar and which has a fractal dimension.
- A **fractal** is a mathematical set that typically displays self-similar patterns, which means they are "the same from near as from far".

# SIERPINSKI ACTIVITIES



# 3-D Sierpinski's Triangle

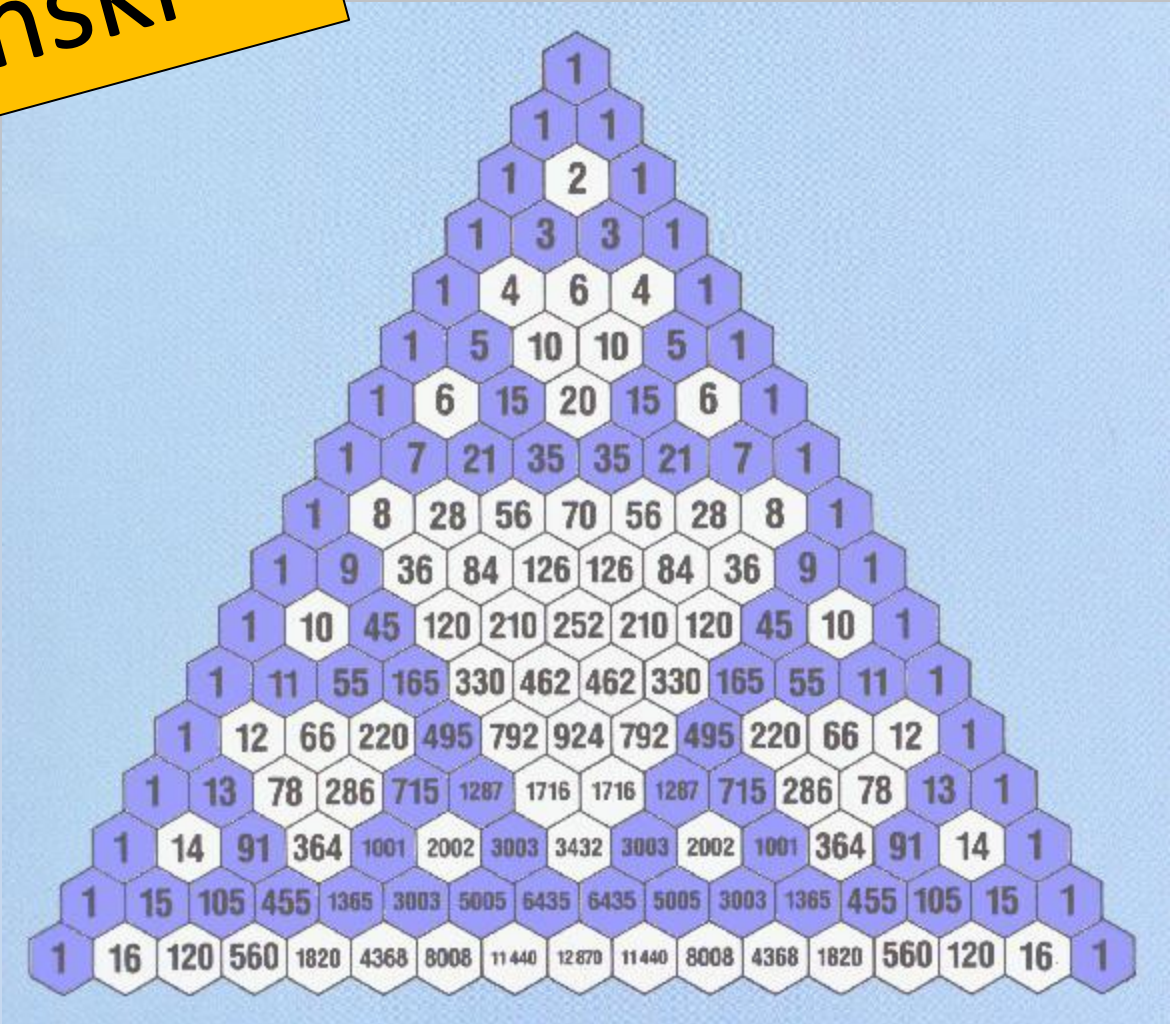


# Pascal connects to Sierpinski

All you need is  
2 colors!

Color Odds  
color #1

Color Evens  
color #2





Sorry, running out  
of time 😊 Watch it  
at home!

[http://www.ted.com/talks/ron\\_eglash\\_on\\_african\\_fractals.html](http://www.ted.com/talks/ron_eglash_on_african_fractals.html) 17:00  
minutes

# AFRICAN FRACTALS

## TED TALK ~ RON EGLASH

**ESCHER**



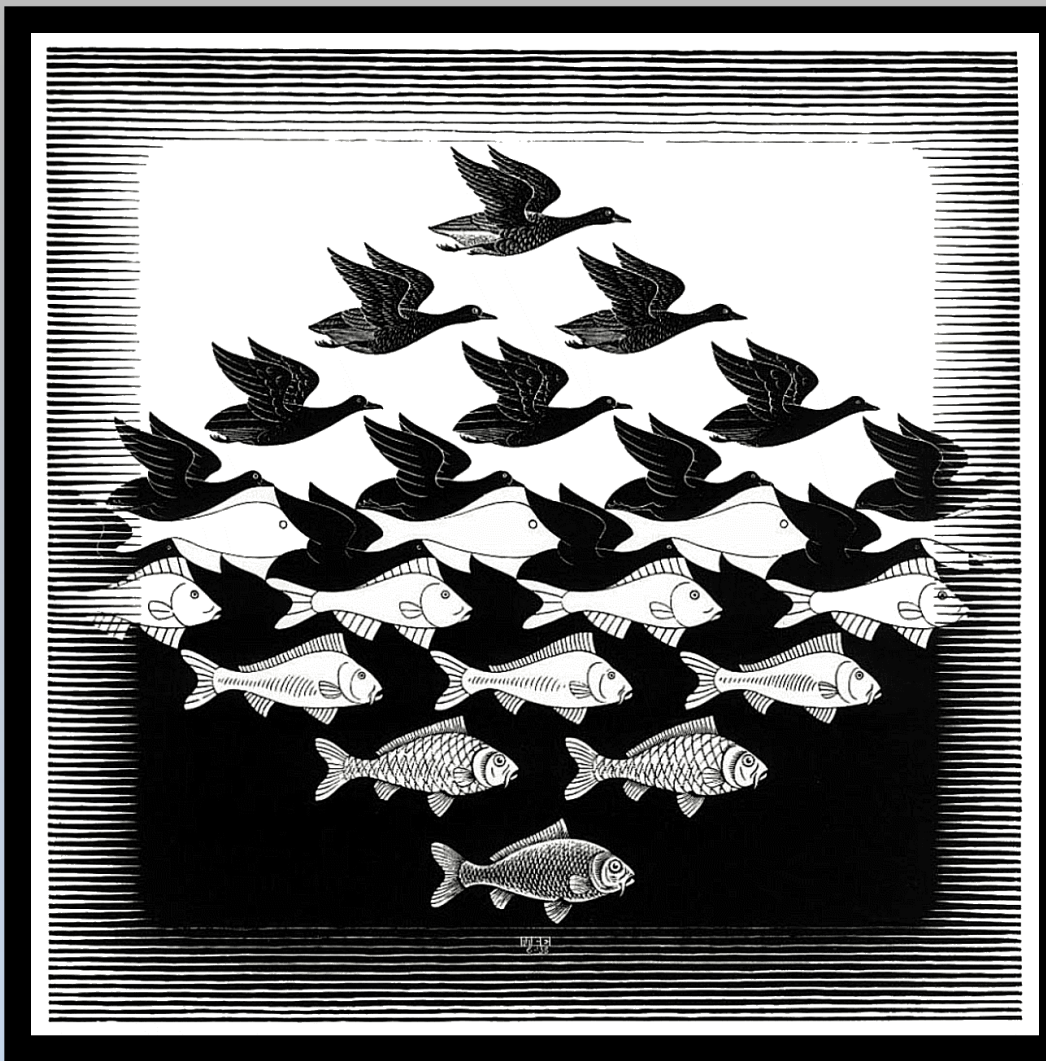
# Background

- Maurits Cornelis Escher (1898-1972)
- 448 lithographs, woodcuts and wood engravings and over 2000 drawings and sketches
- He played with architecture, perspective and impossible spaces
- Famous for tessellations - the tiling of a plane using one or more geometric shapes, called tiles, with no overlaps and no gaps.

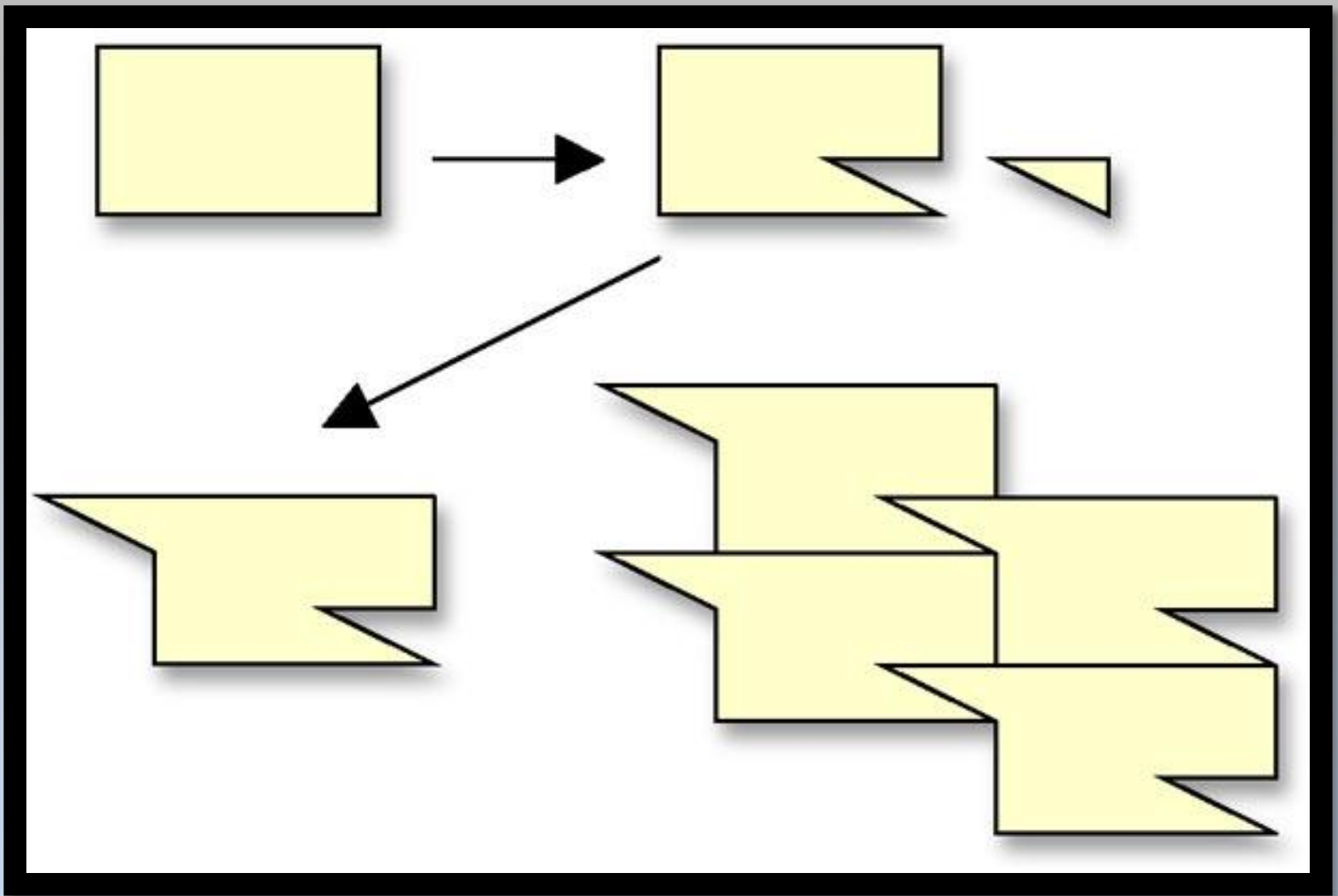




Escher connects  
to Fibonacci

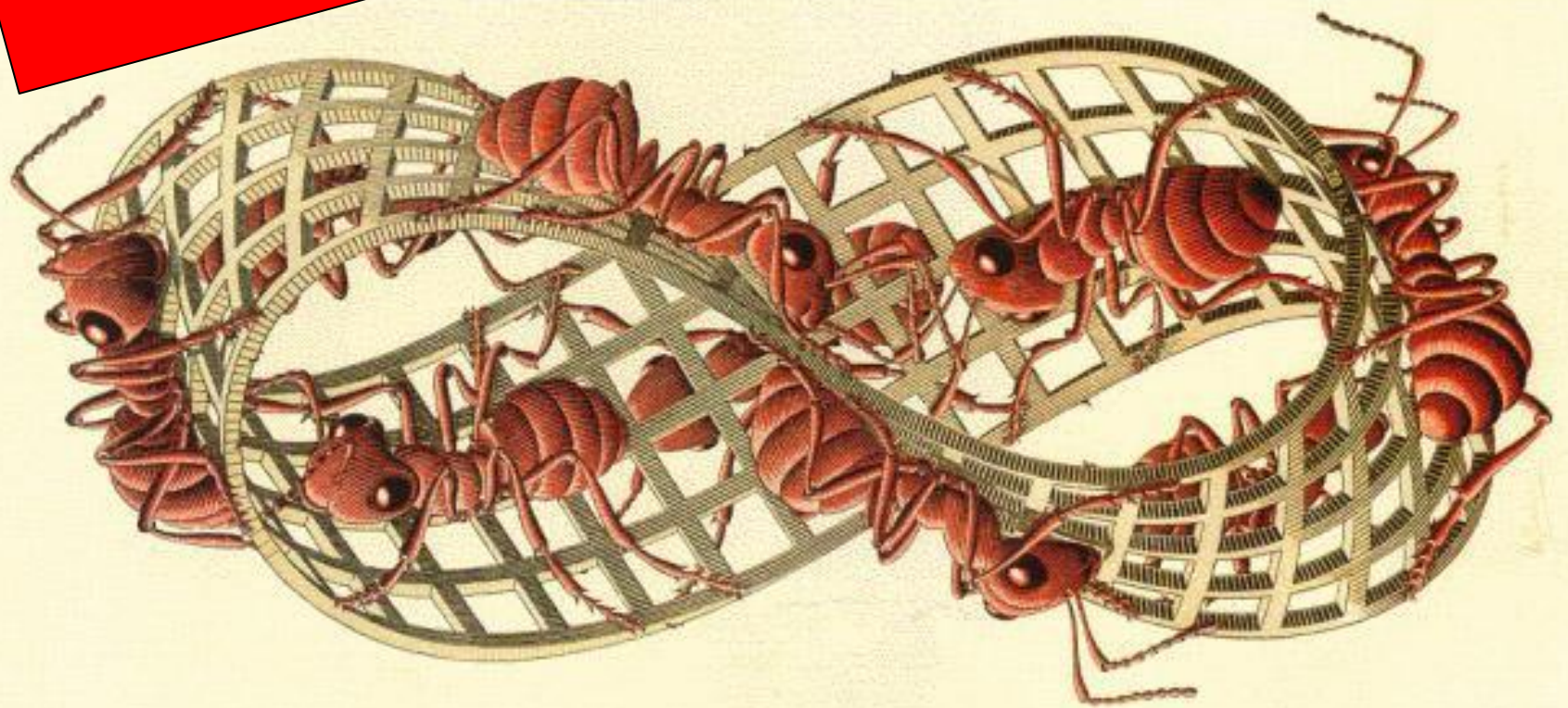


17. Die Vögel und Fische von J. M. W. Turner, 1844. Öl auf Leinwand, 100 x 150 cm.

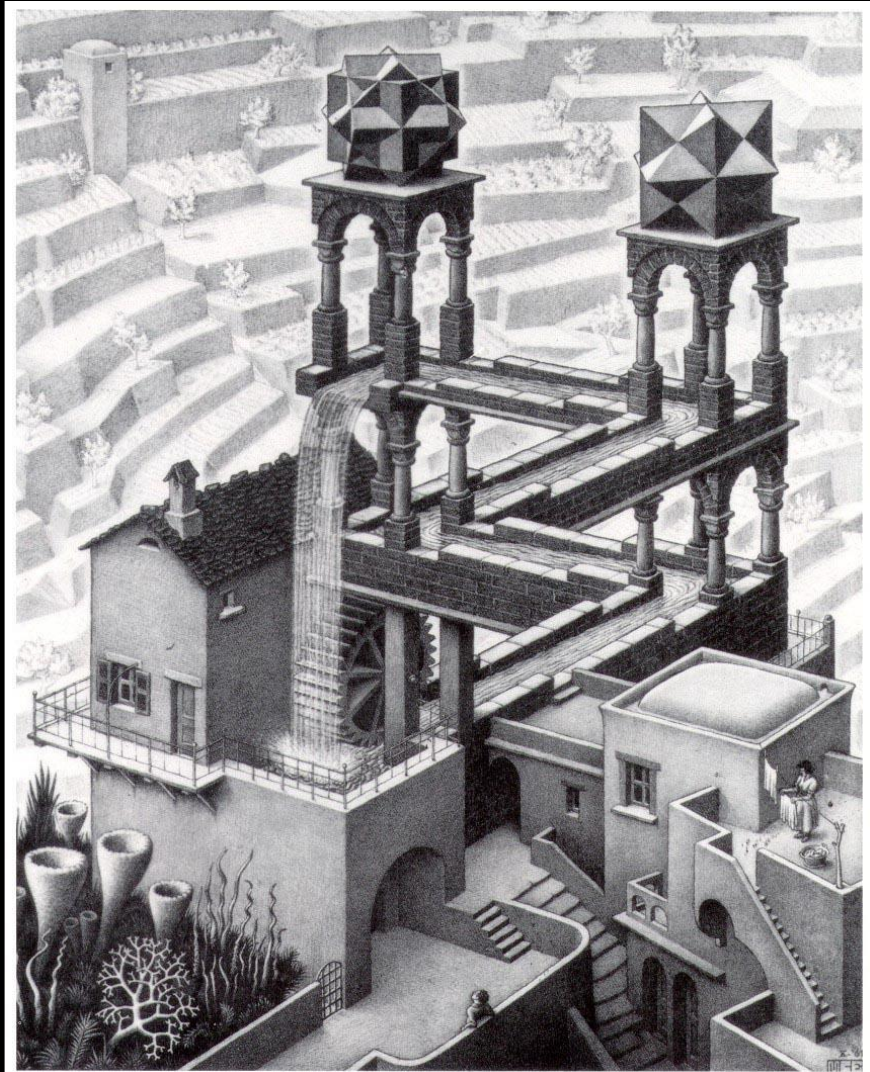
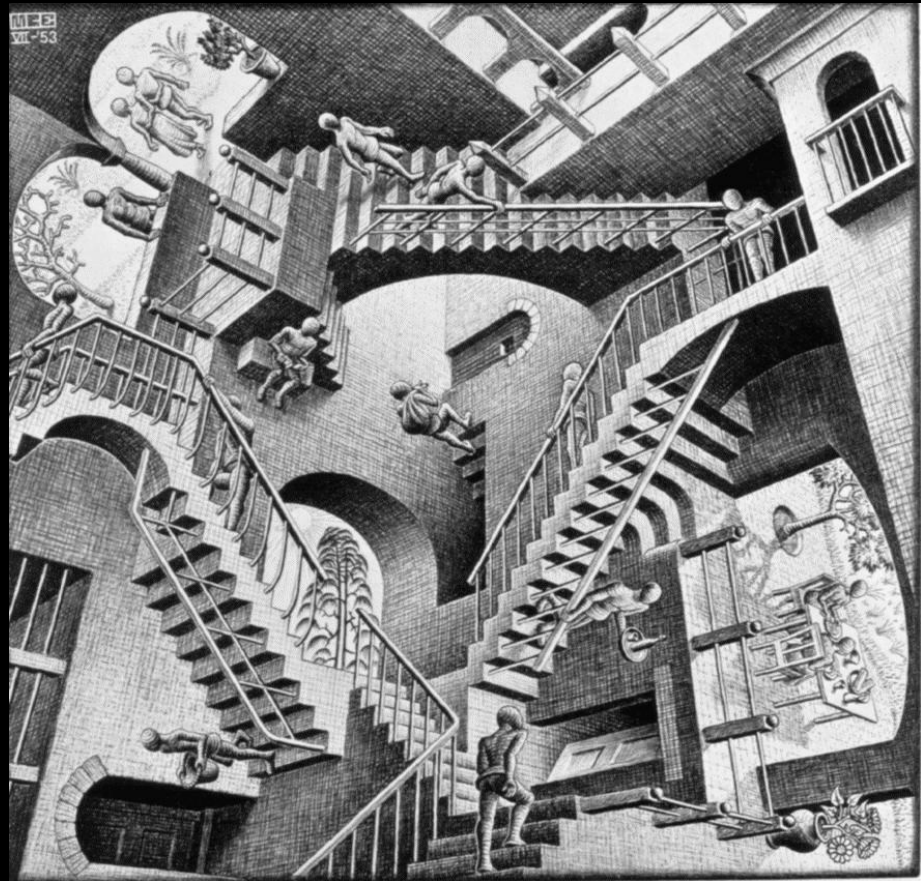


**ESCHER TESSELLATIONS**

Escher connects to Mobius



MEP  
VII-53



June 8-12, 2014

THE HORMEL FOUNDATION

**GIFTED & TALENTED**

Minnesota Department of  
Education

**Austin Public Schools**

ENGAGING AND EMPOWERING  
**ALL LEARNERS FOR LIFE!**

ANNUAL SYMPOSIUM

<https://www.austin.k12.mn.us/educatoralservices/GTsymposium/default.aspx>

# www.coursera.org

The screenshot shows the Coursera website with the following elements:

- Browser Tabs:** "Courses | Coursera" and "How It Works | Coursera".
- Address Bar:** "https://www.coursera.org/about/howitworks".
- Security/Tools:** Norton logo, "THIS PAGE IS SAFE", "ACCESS VAULT", and "SHARE VIA SELECT".
- Navigation:** "coursera" logo, "Courses", "Specializations **New**", "Institutions", "About", "Sign In", "Sign Up".
- Left Sidebar (Navigation Links):** Our Vision, Pedagogy, Leadership, Team, Community, Programs, Press, Careers, Contact, Terms, Privacy Policy, California Privacy, Safe Harbor, | How it works.
- Main Content Area:**
  - Section 1:** "Discover a course you're interested in and enroll today". Includes an icon of a video player. Text: "Choose from 400+ courses in over 20 categories created by 85 Universities from 16 countries."
  - Section 2:** "Learn with 4 million Courserians". Includes an icon of three people connected by dashed lines. Text: "Watch short video lectures, take interactive quizzes, complete peer graded assessments, and interact live with your new classmates and teachers."
  - Section 3:** "Achieve your learning goals and build your portfolio". Includes an icon of a person jumping. Text: "Finish your class, receive recognition for a job well done, and achieve your goals, whether they be career, personal, or educational."

## 3-2-1 Exit Slip [Handout]

- Write 3 things you now know or remember from this session.
- Write 2 connections you made to your professional practice or private life.
- Write 1 question you still have and would like to call/email/talk to David about.

# EXIT SLIP



# Austin Public Schools

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**ALL** LEARNERS FOR LIFE!

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