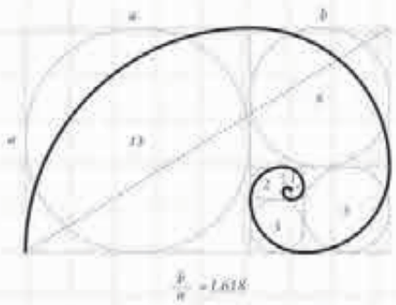


BIG BOOK OF MATH



A Historical Timeline of Math, Science, and Technology

KATHERINE HANNON

First printing: April 2024

Copyright © 2024 by Katherine Hannon and Master Books®. All rights reserved. No part of this book may be reproduced, copied, broadcast, stored, or shared in any form whatsoever without written permission from the publisher, except in the case of brief quotations in articles and reviews. For information write:

Master Books, P.O. Box 726, Green Forest, AR 72638

Master Books® is a division of the New Leaf Publishing Group, LLC.

ISBN: 978-1-68344-326-1
ISBN: 978-1-61458-867-2 (digital)
Library of Congress Control Number: 2023952134

Cover and Interior Design by Diana Bogardus

Scripture quotations are from the ESV® Bible (The Holy Bible, English Standard Version®), copyright © 2001 by Crossway, a publishing ministry of Good News Publishers. Used by permission. All rights reserved. The ESV text may not be quoted in any publication made available to the public by a Creative Commons license. The ESV may not be translated in whole or in part into any other language.

Please consider requesting that a copy of this volume be purchased by your local library system.

Printed in China

Visit our website for other great titles: www.masterbooks.com

For information regarding promotional opportunities, please contact the publicity department at pr@nlpg.com.

Space will not allow mentioning all the resources consulted in putting this together. However, a few seem extra worth pointing out due to their value with various concepts. A big thanks also to Joy Dubbs, Christina Loop, Brian Loop, Donna Burke, and Adam Hannon for their help in reviewing this project.

- Cajari, Florian. *A History of Mathematical Notations: Two Volumes Bound as One.* Mineola, NY: Dover Publications, 1993. First published in 1928 and 1929 by Open Court Publishing.
- DK. *The Physics Book: Big Ideas Simply Explained.* New York: 2020.
- Griffith, W. Thomas, and Juliet W. Brosing. *The Physics of Everyday Phenomena: A Conceptual Introduction to Physics,* 6th ed. McGraw-Hill, 2009.
- Groza, Vivian Shaw. *Survey of Mathematics: Elementary Concepts and Their Historical Development.* New York: Holt, Rinehart, and Winston, 1968.
- Jacobs, Harold R. *Geometry: Seeing, Doing, Understanding,* 3rd ed. Green Forest, AR: Master Books, 2020.
- Moes, Garry J. *Streams of Civilization*, Volume 2. NP. Arlington Heights, IL: Christian Liberty Press, 1997.
- Nickel, James D. *Mathematics: Is God Silent?* Rev. ed. Vallecito, CA: Ross House Books, 2001.
- Smith, David Eugene. *A Source Book in Mathematics. Vol. 1. General Survey of the History of Elementary Mathematics.* New York: Dover Publications, 1959.
- Tiner, John Hudson. *Exploring the World of Mathematics: From Ancient Record Keeping to the Latest Advances in Computers.* Green Forest, AR: Master Books, 2004.

Master Books®
A Division of New Leaf Publishing Group
www.masterbooks.com

1 READ

panel-by-panel at your own pace or look up specific concepts to supplement topics you are already studying. It's an exciting, easy-to-read visual presentation of math, science, and technology from the beginning of God's creation to the modern day!

2 EXPLORE

diverse applications of math throughout history in shaping pivotal technologies. Deepen your comprehension of God's world and the mathematical precision that explains it.

3 DISCOVER

how math impacts your everyday life, from the simple to the complex, from your computer to music, and more with this 15-foot chart that can be used for math, history, or science.

4 LEARN

about mathematicians and scientists — how they have used the consistency of God's creation to make new discoveries and challenges that persist to this day!

Math Helps Us Explore God's Orderly & Complex World

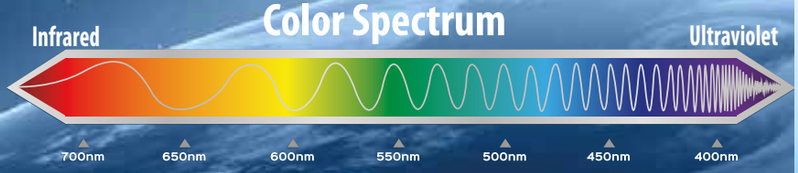
Math works outside of a textbook because it describes the quantities & consistencies around us —quantities and consistencies a triune God created and sustains.

Math's Message

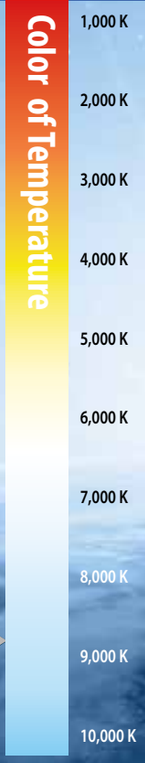
"Thus says the LORD: If I have not established my covenant with day and night and the fixed order of heaven and earth, then I will reject the offspring of Jacob and David my servant . . ." (Jeremiah 33:25–26).

God is pointing to creation's consistency — which math describes — **as a reminder of His faithfulness.**

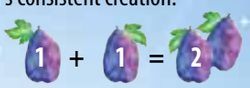
Math reveals and records incredible order within the light that God simply spoke into existence!



The complexities of math reflect the complexities of creation — which was originally perfect. These complexities in turn point us to the greatness and infinitude of the Creator.



Addition describes how objects add in God's consistent creation.



Math Reveals Evidence of the Fall



Example: Describing the magnitude of an **earthquake.**

$E=10^{11.8+1.5M}$

Science & Technology
Mathematicians & Scientists
World Events
Math Happenings

Key Worldview Ideas are marked with a key. Make the most of this timeline using your Guide! Items with a have more details in the Guide.

Cain built a city

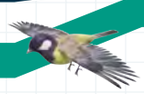
Musical instruments and bronze & iron made

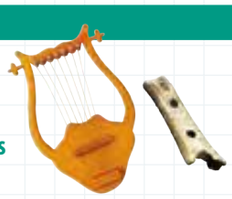
4004 B.C.• Days 1–6
God created the heavens & the earth

Man rebelled; death & suffering enter world

4004 B.C.•Time began

Day 6

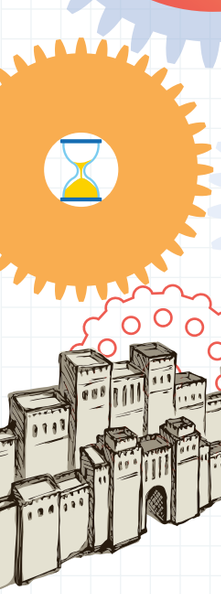




God gives units of time (day, week, etc.).

Adam named the animals (Genesis 2:18–20), which involved looking at God's creation and describing it. That's exactly what we do in math! "1" names a quantity.

Jubal "was the father of all those who play the **lyre and pipe**" (Genesis 4:21). Length of strings and location of holes determine sounds.



Origin of Timekeeping

God is the One who set up night and day, seasons, and years in how He created the earth to rotate on its axis and to orbit around the sun. Ever since then, men have worked to develop timekeeping devices that correspond with what God set up.

The Bible uses **numbers to order** the days of creation (Genesis 1); God established our 7-day week.

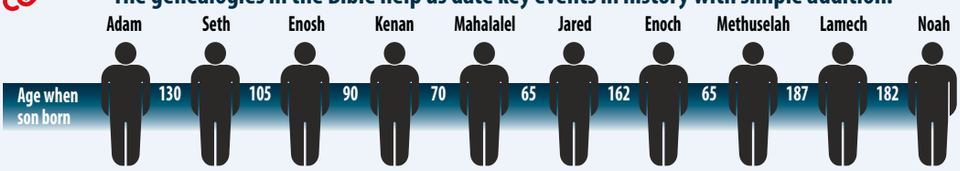
Cain built a city (Genesis 4:17). Building a city requires measuring, designing buildings, forming straight lines, calculating supplies needed, and more.



Tubal-cain was "the forger of all instruments of **bronze and iron**" (Genesis 4:22); this technology would likely have involved some math, such as measuring.

Genealogy Math

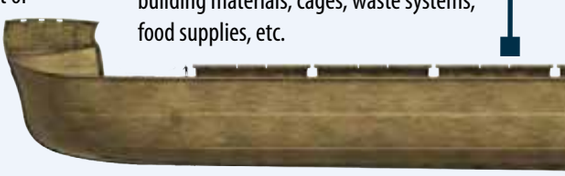
The genealogies in the Bible help us date key events in history with simple addition!



We can also use math to figure out who knew whom. Adam lived 930 years. We can see from what we calculated earlier that he wasn't alive for Noah's birth, as that came 1,056 years after creation (which was the start of Adam's life). If we subtract 182 (Lamech's age at Noah's birth) from that, we get 874 for Lamech's birth, which is less than 930. That means Adam was still alive when Lamech was born but died before Noah's birth at 1,056 years after creation.

Time from creation to Noah's birth =
130+105+90+70+65+162+65+187+182 = 1,056 yrs
Noah's age at Flood's start = 600 yrs
Time from creation to Flood = 1,056 + 600 = 1,656 yrs

God gave Noah specific measurements to **build the Ark** (Genesis 6:15). Noah would have also had to use math for building materials, cages, waste systems, food supplies, etc.



Biblical dates are taken from James Ussher's *The Annals of the World.* Dates for events B.C. are mainly approximate.
See the "General Notes" section in the Guide for more details.

Different Math Languages
God gave man the creativity to express quantities and consistencies differently!

24 in Different Notations

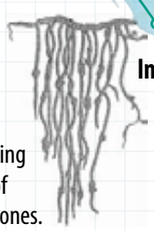
At the Tower of Babel, God confused the languages of the people. They then spread out over the earth. As they did, they also developed different symbols for representing quantities and different techniques. Much of math is simply a language system.

Aztec Indians

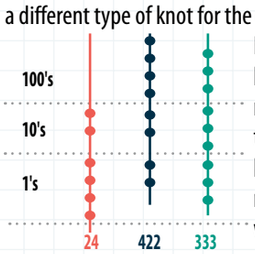


The symbol for twenty and four of the symbol for one.

Incas



In the Inca culture, knots were tied on a rope, called a **quipu,** with the location determining value. 24 would be shown by two knots higher up, representing the tens, and four lower ones of a different type of knot for the ones.



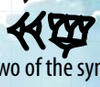
Between the color, length, and type of the rope combined with the type and location of knots, the quipu could record numbers and also what those numbers represented (people in a village, money, etc.). A quipu could be sent from one place to the next, transferring information much like a letter does today.

Hebrews



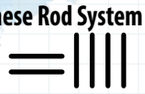
Symbol for four with their symbol for twenty to the right.

Babylonian*



Two of the symbol for ten and four of the symbol for one.

Chinese Rod System



~400s B.C. • Two horizontal rods for the tens and four vertical ones for the ones. In the oldest Chinese system, knots were tied on a string to show numbers; another Chinese system is shown on panel 3.

Mayans *



Four of the symbol for one in the one's place and one of the symbol for one in the twenty's place, which is on top of the one's place.

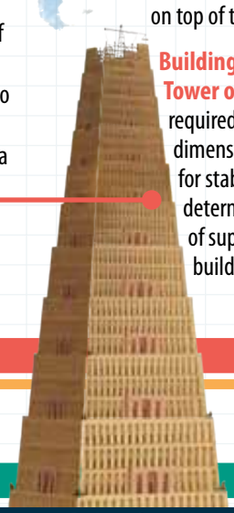
Egyptian



Four of the symbol for one and two of the symbol for ten.

*Babylonian and Mayan systems are shown on the next page with greater numbers.

Building the Tower of Babel required measuring dimensions, designing for stability, determining amount of supplies, leveling building surface, etc.



Different math languages emerge





Shipbuilding (Ark) | 2242 B.C.• Tower of Babel | Water drainage system | Stonehenge

2348 B.C.• Global Flood | 2242 B.C.• God confused languages

Civilizations Spring Up

After the Tower of Babel, civilizations burst forth all over the world, building structures that would have required math, such as a **water storage system** in India and **Stonehenge** in England. Sites like Stonehenge have long baffled historians, as we still don't understand exactly how the stones were hauled and aligned so mathematically. Ancient man was clearly intelligent.

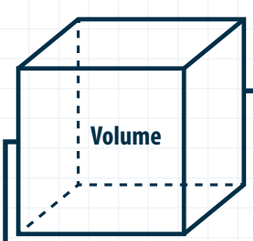
Ark Dimensions in Cubits & Feet

1 cubit (cu) ≈ 1.7 ft

Length	$(300\text{ cu})\left(\frac{1.7\text{ ft}}{1\text{ cu}}\right) = 510\text{ ft}$
Width	$(50\text{ cu})\left(\frac{1.7\text{ ft}}{1\text{ cu}}\right) = 85\text{ ft}$
Height	$(30\text{ cu})\left(\frac{1.7\text{ ft}}{1\text{ cu}}\right) = 51\text{ ft}$

Approximate Volume of the Ark

510 ft x 85 ft x 51 ft ≈ 1,880,000 ft³*



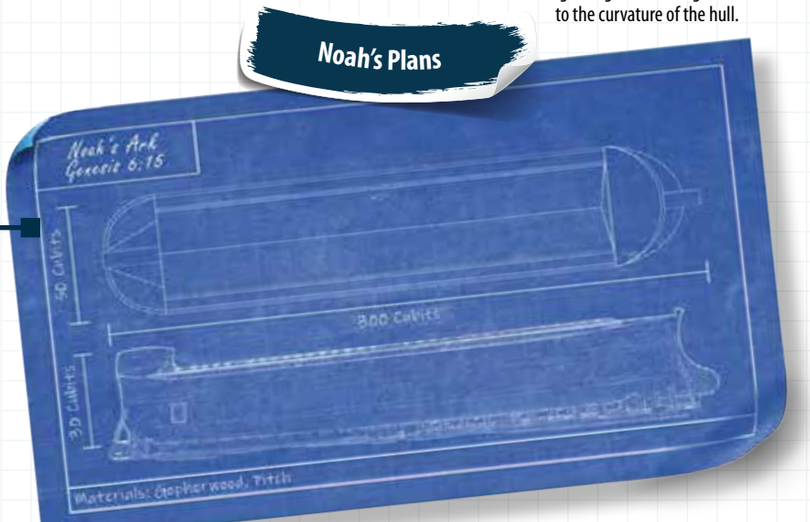
*The Ark would have had a curved hull; it wasn't a rectangle with 90° angles. This number is an approximate volume based on ignoring the "missing" volume due to the curvature of the hull.

Comparing the Volumes

Math helps us see that the Ark had plenty of space!

Volume of the Ark 510 ft x 85 ft x 51 ft		Volume of a 12 ft x 12 ft room with 8 ft ceiling		
≈ 1,880,000 ft³		= 1,152 ft³		
				
Volume of the Ark	÷	Volume of room	=	# of rooms inside Ark
1,880,000 ft³	÷	1,152 ft³	≈	1,632

Noah's Plans







Math can help us dig deeper and better understand sizes listed in the Bible.

Chinese Math
7,777 in traditional system

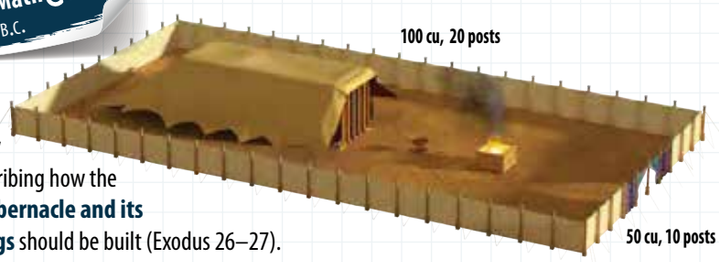


七	Symbol for 7	
千	Symbol for 1,000	7 x 1,000 = **7,000**
七	Symbol for 7	
百	Symbol for 100	7 x 100 = **700**
七	Symbol for 7	
十	Symbol for 10	7 x 10 = **70**
七	Symbol for 7	**7**

7,000 + 700 + 70 + 7 = 7,777

Tabernacle Math
1490 B.C.

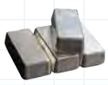
God used numbers extensively when describing how the **Jewish tabernacle and its furnishings** should be built (Exodus 26–27).





The Rhind Papyrus
1550 B.C. • This document gives us a glimpse into ancient Egyptian mathematics, such as their use of fractions and knowledge of pi.

Money and Measurements
Buying and selling is an important application of math. Israel and many surrounding countries used the shekel. Abraham bought a field for 400 shekels (Genesis 23:15). The Israeli shekel was later defined by the weight of the one kept inside the sanctuary (Exodus 30:13).


Gold & silver


Israeli shekel


African/Asian cowrie shells


Greek drachma

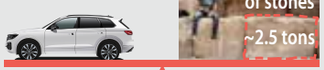
Babylonians & Mayans use 0

Egyptian Math

The pyramids are marvels of mathematical and engineering design.

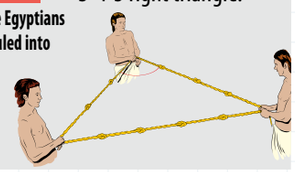


The average stone's weight equals that of a mid-size SUV.



Somehow the Egyptians had them hauled into place!

Measuring right angles using a rope with equally spaced knots arranged to form a 3-4-5 right triangle.



1550 B.C. • Rhind Papyrus

 = $\frac{1}{5}$

 = plus sign (+)

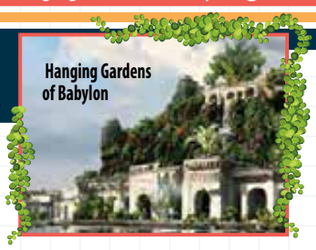
The Bible tells us that during the famine, Joseph bought the land in Egypt for Pharaoh, **exacting a $\frac{1}{5}$ tax** (Genesis 47:24). Note the use of fractions.

1800s B.C. or earlier • Great Pyramid built | **1500 B.C. • Egyptians use water clocks & sundials** | **c. 600 B.C. • Hanging Gardens of Babylon**




Water clock & sundial

1491 B.C. • Israelite exodus from Egypt
1490 B.C. • Israelite tabernacle built
1004 B.C. • Solomon's Temple built
721 B.C. • Israel Northern Kingdom into Babylonian Exile



Place Value & Zero

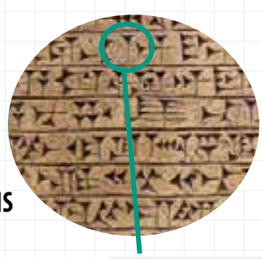
Base-20 Place Value (Mayan)

20's place		Represents two 1's in the 20's place, or 40
1's place		Represents 0

2 twenties + 0 ones = forty

Places progress vertically rather than horizontally.

0 **Notice that the Mayans (above) used the concept of 0, as did the Babylonians (below).**



BABYLONIANS

- Place value system based on 60.
- No 0 until ~200 B.C. (and then not used in calculations).

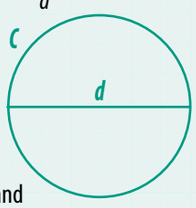
Symbol for 1

Could be used to mean 1 or 1 set of 60.

Can you imagine writing without 0? It would make place value hard. You wouldn't know if 1 meant 1 or 10 or 100 or 1,000,000. Context would have to be your clue.

π

$= \text{pi} = \frac{C}{d} \approx 3.14\ldots$



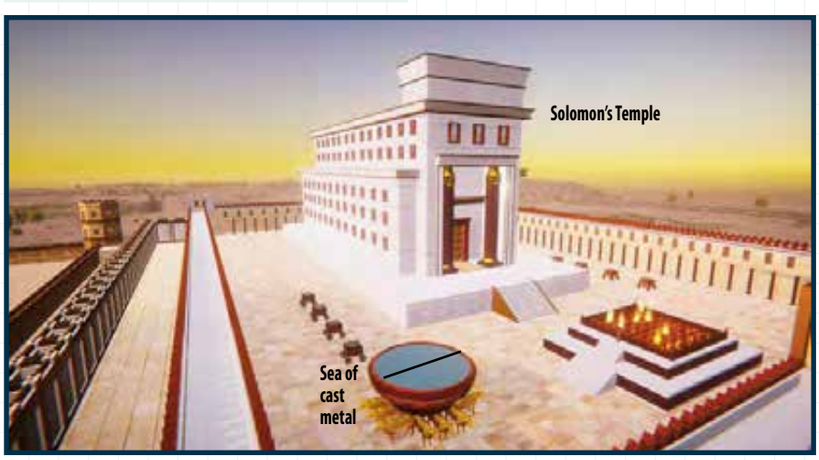
While this symbol wasn't adopted for pi until the 1700s A.D., men have been working with circles and the ratio between the circumference (*C*) and the diameter (*d*) since ancient times. The Rhind Papyrus, for example, gives a value for this ratio of about 3.1605. Pi is an irrational number that can't be fully written out.

There are aspects of God's creation we can't fully write out!

Solomon's Temple Built

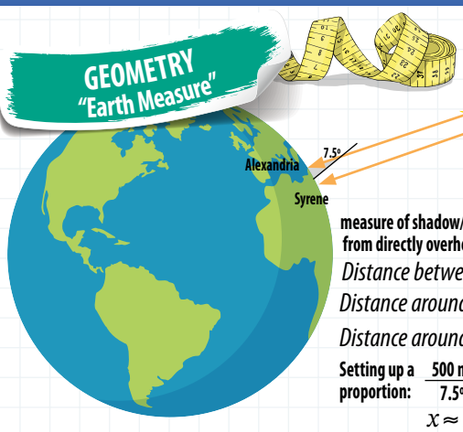
"Then he made the sea of cast metal. It was round, ten cubits from brim to brim, and five cubits high, and a line of thirty cubits measured its circumference" (1 Kings 7:23).

1004 B.C. • The sea was round — and we're given a diameter of 10 and a circumference of 30. This circumference may have been a rounded value (which would be perfectly acceptable), or the author may have been taking into account the thickness of the basin itself, which would mean he was using a remarkably accurate value for pi.



Other creationists have slightly different dates from Ussher for the Exodus (1446 B.C.), the building of the tabernacle (1441 B.C.) and Solomon's Temple (967 or 966 B.C.).

GEOMETRY "Earth Measure"



measure of shadow/angle difference from directly overhead = 7.5°

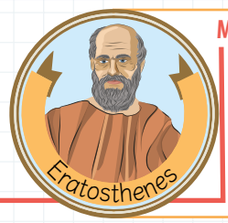
Distance between cities = 500 mi

Distance around a circle = 360°

Distance around the earth = x

Setting up a proportion: $\frac{500 \text{ mi}}{7.5^\circ} = \frac{x}{360^\circ}$

$x \approx 24{,}000$ mi



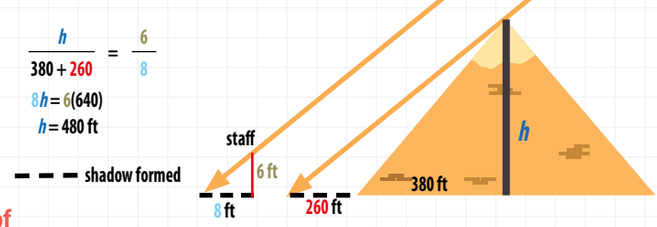
Measuring the Distance Around the Earth

200s B.C.• Since the sun formed a 7.5° shadow in Alexandria while it was directly overhead in Syrene, **Eratosthenes** realized the two cities were 7.5° apart on the earth and used math to find the distance around the earth, which is a great circle.



Alexandrian Library

284 B.C. • Famous repository of knowledge built in Alexandria, Egypt. Continued Greek method and knowledge for centuries.



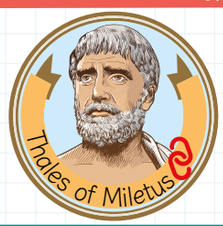
$\frac{h}{380 + 260} = \frac{6}{8}$

$8h = 6(640)$

$h = 480$ ft

Height of Great Pyramid

500s B.C. • **Thales of Miletus** used math to figure out the height of the great pyramid using a staff and knowledge of right triangles.



500s B.C.• Thales measures pyramid





246 B.C. • Lighthouse of Alexandria

Science & Technology

Mathematicians & Scientists

World Events

Math Happenings

432 B.C. • Parthenon finished

200s B.C.• Earth's circumference measured

200s B.C. • Archimedes' screw

432 B.C.• Pythagorean theorem

~300 B.C.• Euclid's *Elements*

360 B.C. • Platonic solids

284 B.C.• Alexandrian Library

588 B.C. • 1st Jewish temple destroyed & Southern Kingdom fell

336 B.C. • Alexander the Great (Macedonian Empire)

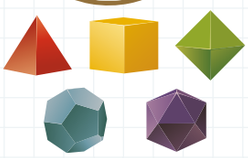
Thales • 640–547 B.C. Heraclitus • 540–480 B.C. Hippias • 460–400 B.C. Eudoxus • 408–355 B.C. Euclid • 325–265 B.C. Eratosthenes • 276–194 B.C.
Pythagoras • 570–500 B.C. Zeno • 495–430 B.C. Plato • 428–348 B.C. Aristotle • 384–322 B.C. Archimedes • 287–212 B.C.
Acharya Pingala • 200s or 300s B.C.

Greek Thinking

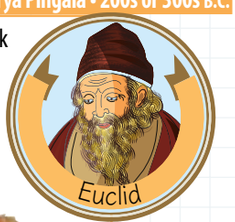


While men have been using math since the beginning, the Greeks were the first to develop a formal approach to mathematics. They were philosophers as well as mathematicians, but sadly, they enthroned human reasoning and ended up with lots of faulty views of creation. While they contributed a lot to geometry, their beliefs kept them from developing much everyday technology.





Platonic Solids



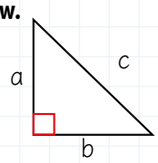
~300 B.C. • **Euclid** compiled Greek geometry in the *Elements,* which still forms the basis for what is taught in most high school geometry courses. Greek geometry is even referred to as **Euclidean geometry**.





500s B.C. • **Pythagoras** and his followers believed that all numbers could be reduced to whole numbers (i.e., 1, 2, 3, etc.). For example, 0.25 can be written as , $\frac{1}{4}$ a division of two whole numbers.

The **Pythagorean theorem** reveals irrational numbers, like $\sqrt{2}$, which cannot be written as a whole number or even a fraction! **The Pythagorean theorem itself disproves the Pythagorean worldview.**



if $a = 1$ and $b = 1$,

$1^2 + 1^2 = c^2$

$1 + 1 = c^2$

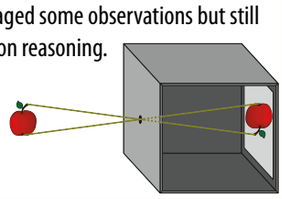
$2 = c^2$

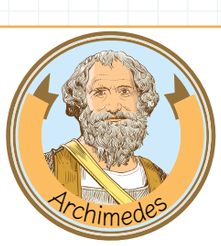
$\sqrt{2} = c$



300s B.C.• **Aristotle** was a key philosopher/mathematician and teacher of logic who was regarded as the authority for centuries. He encouraged some observations but still placed a huge emphasis on reasoning.

Aristotle used a **camera obscura** to observe an eclipse. These devices can be understood with geometry.



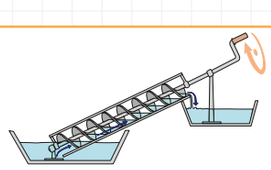


Archimedes • 200s B.C.

Archimedes and the Crown



Archimedes, who studied in Alexandria, was able to figure out if a supposedly gold crown had silver mixed in, using what he knew about the volumes of gold and silver.



Archimedes' screw (origin may have been earlier).



Archimedes explored levers and is purported as saying, "Give me a place to stand and with a lever I will move the whole world."[1]