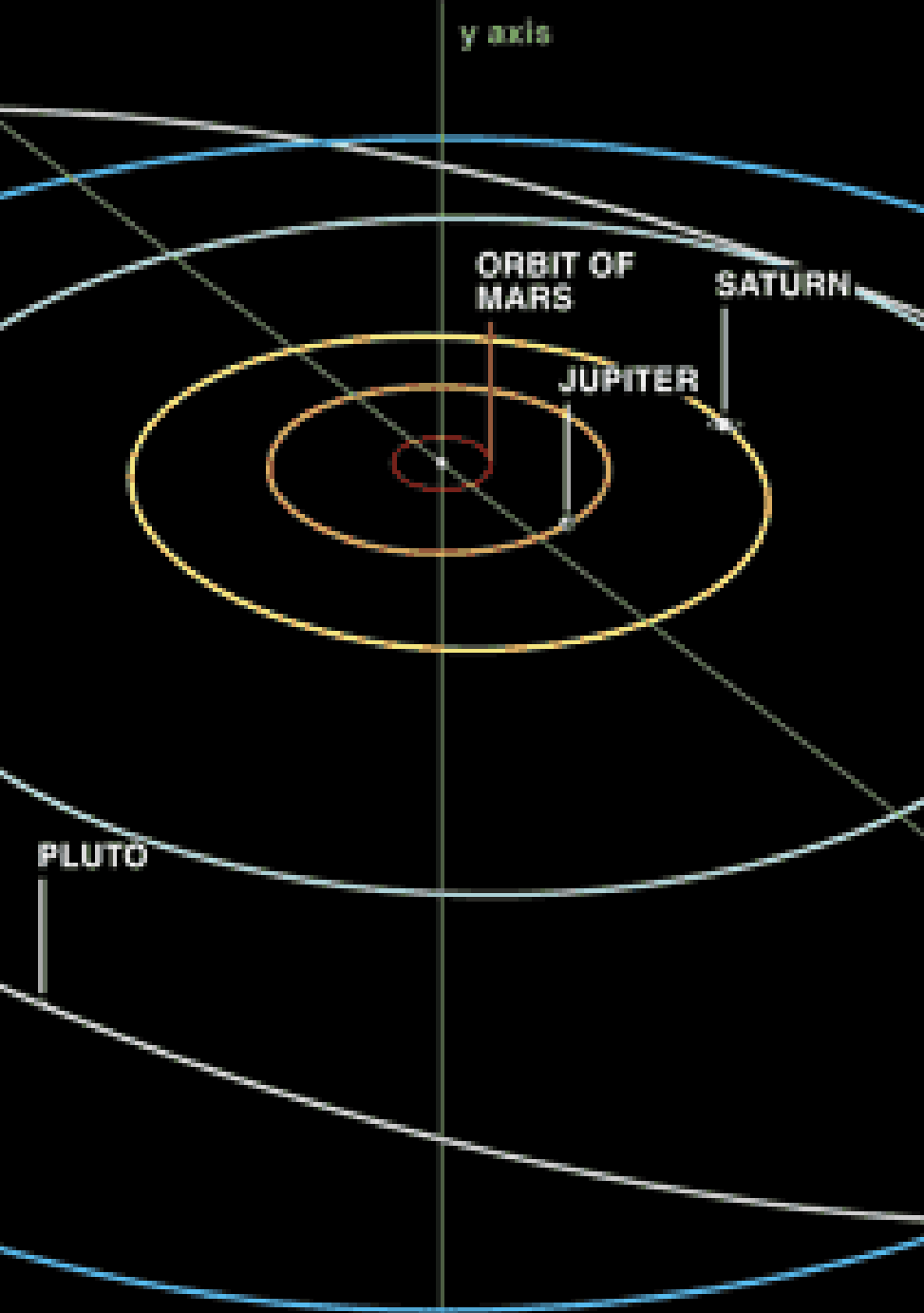# KEPLER'S LAWS OF PLANETARY MOTION

HAPPY FRIDAY!

- BELL RINGER: WHAT IS THE SHAPE OF A PLANET'S ORBIT?

- TODAY'S AGENDA:

  - BELL RINGER

  - FINISH WRITING PARAGRAPH IF NEEDED

  - NOTES AND PROBLEMS ON KEPLER'S LAWS OF PLANETARY MOTION

  - EXIT QUESTION

- LEARNING OBJECTIVE: I CAN UNDERSTAND THE MOTION OF PLANETS FROM KEPLER'S LAWS OF PLANETARY MOTION.

y axis

ORBIT OF MARS

SATURN

JUPITER

PLUTO
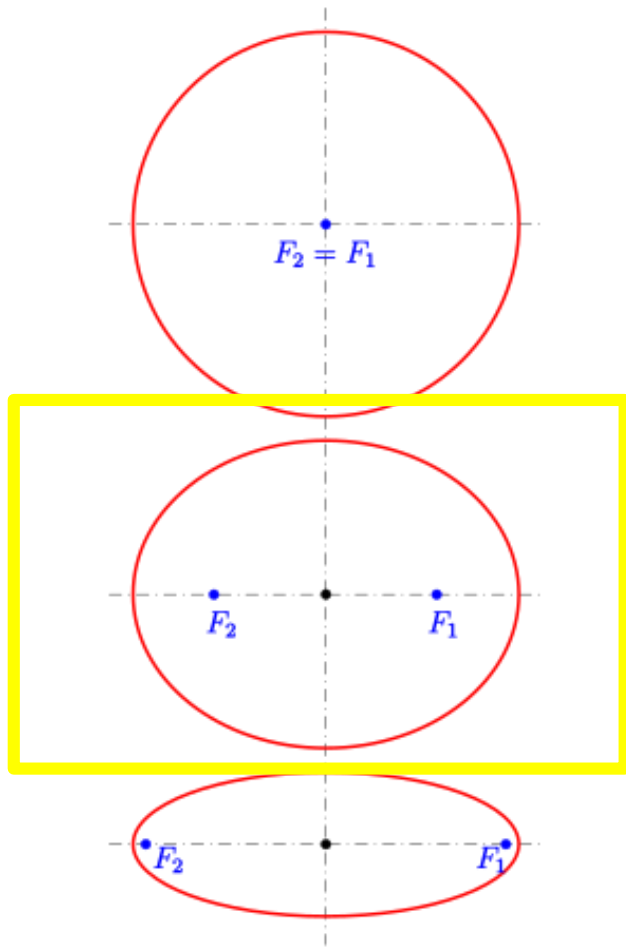
BELL RINGER ANSWER

PLANETS MOVE IN THE SHAPE OF AN ELLIPSE.

THEY PLANETS MOVE MOST CLOSELY TO THE MIDDLE DIAGRAM, A SLIGHTLY SQUISHED CIRCLE.

FINISHING THE BIG BANG PARAGRAPH

1. Fill-in the CER worksheet from Thursday using full sentences.

2. Type out the worksheet as a paragraph and read through it a couple times to make sure it sounds good.

3. Print out the Big Bang Evidence Organizer and your paragraph and staple everything (including the CER paper) together and turn it in.

WHO WAS KEPLER?

- Please watch the following video and answer this question in your notes. Headphones are up front for you to use.

- https://www.youtube.com/watch?time_continue=3&v=wjOOrr2uPuU&feature=emb_title

KEPLER'S FIRST LAW

- READ THIS ARTICLE ON KHAN ACADEMY

- HTTPS://WWW.KHANACADEMY.ORG/PARTNER-CONTENT/NASA/MEASURINGUNIVERSE/ORBITAL-MECHANICS/A/KEPLERS-FIRST-LAW

- KEPLER'S FIRST LAW STATES THAT OBJECTS MOVE IN AN ELLIPTICAL ORBIT AROUND THE SUN. DRAW AN EXAMPLE OF THIS IN YOUR NOTES.

 - WHERE DO THE FOCI GO? THE MIDDLE OR CLOSER TO THE EDGE?
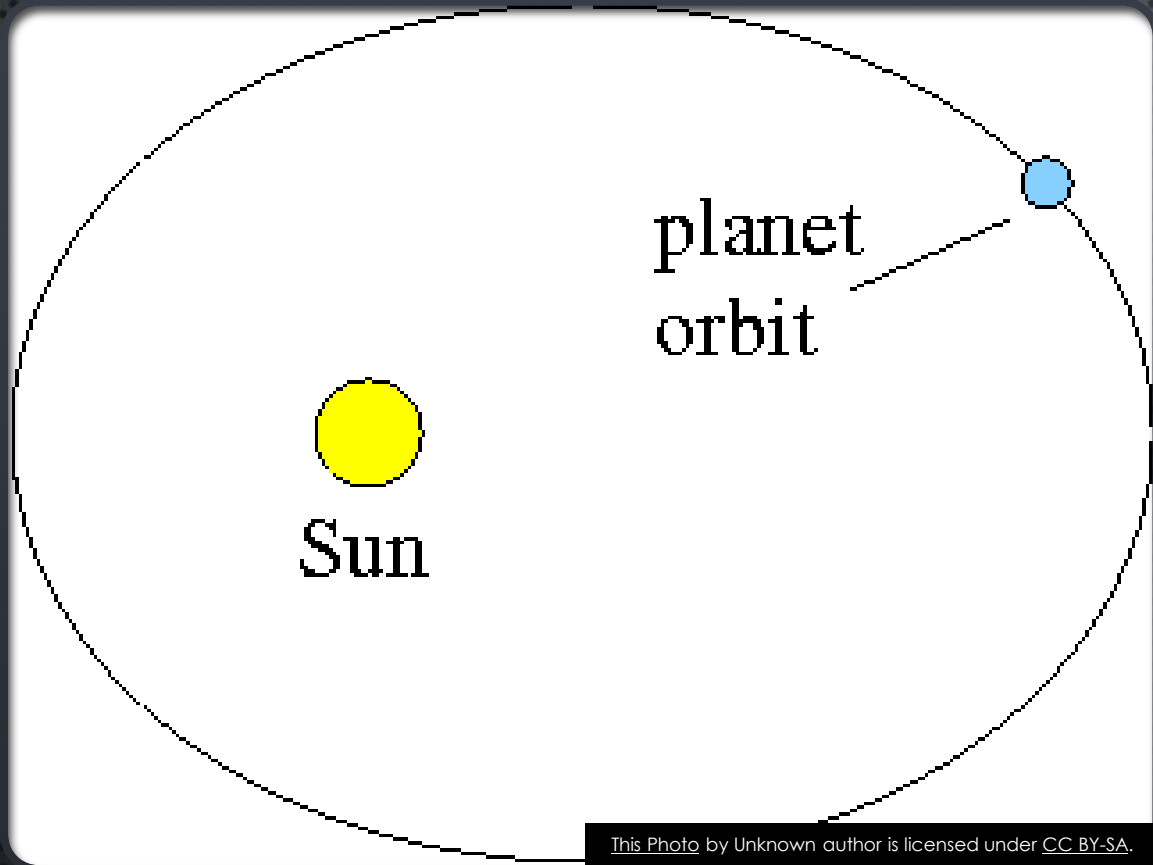
This Photo by Unknown author is licensed under CC BY-SA.

KEPLER'S FIRST LAW:

- THE PLANETS MOVE ABOUT THE SUN IN ELLIPTICAL ORBITS WITH THE SUN AT ONE FOCUS OF THE ELLIPSE.

KEPLER'S SECOND LAW

- WATCH THE VIDEO THEN ANSWER THE QUESTIONS IN YOUR NOTES: HTTPS://WWW.YOUTUBE.COM/WATCH?TIME_CONTINUE=141&V=QD3DIGJQRDU&FEATURE=EMB_TITLE

- THE LAW OF EQUAL AREA

  - THE STRAIGHT LINE JOINING THE SUN AND A GIVEN PLANET SWEEPS AN EQUAL AREA IN EQUAL TIME.
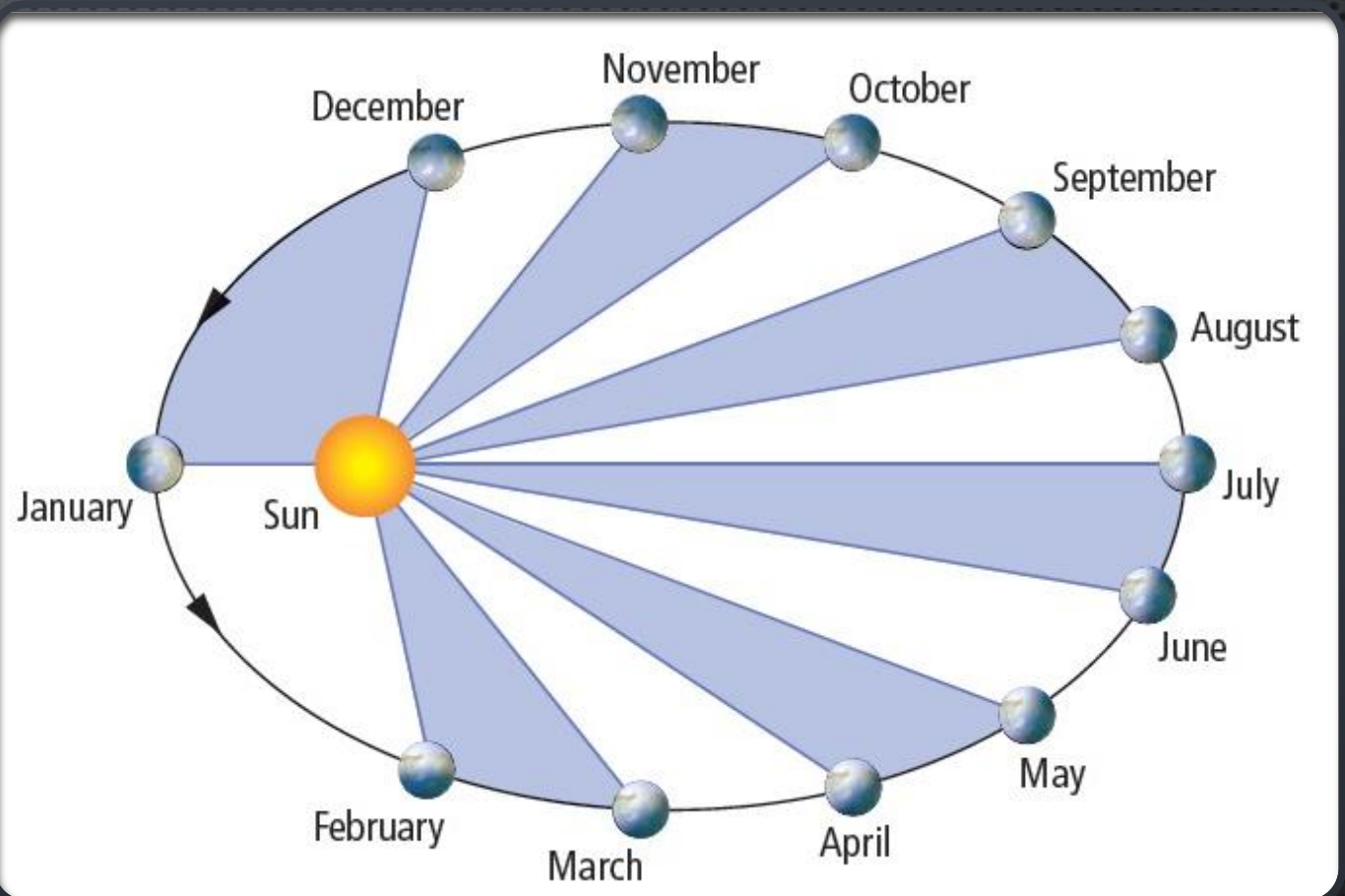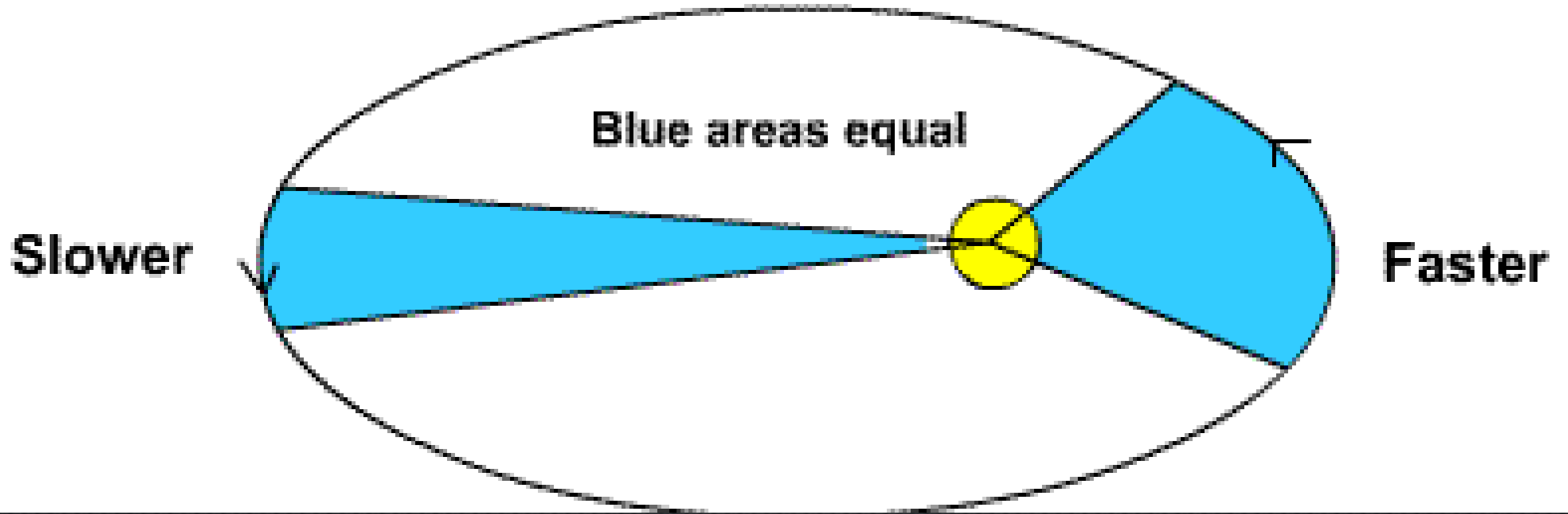
# HOW DOES A PLANET'S SPEED AROUND THE SUN CHANGE DURING ITS ORBIT?

WHEN A PLANET IS CLOSE TO THE SUN IT MOVES _____.

KEPLER'S THIRD LAW

- Kepler's third law took him much longer to figure out.

- It states that the square of the Orbital Period (P) of a planet around the sun is equal to the cube of its mean distance (A) from the sun.

- Well what does that mean? Watch the following video.

- https://www.youtube.com/watch?time_continue=203&v=HqGQ3A9q60I&feature=emb_title

KEPLER'S THIRD LAW

- What Kepler's third law says is that the further the planet is from its star (mean distance from sun, a) the longer it takes to orbit the sun (Orbital Period, P).

- Which planet would take longer to go around the sun, Earth or Uranus?
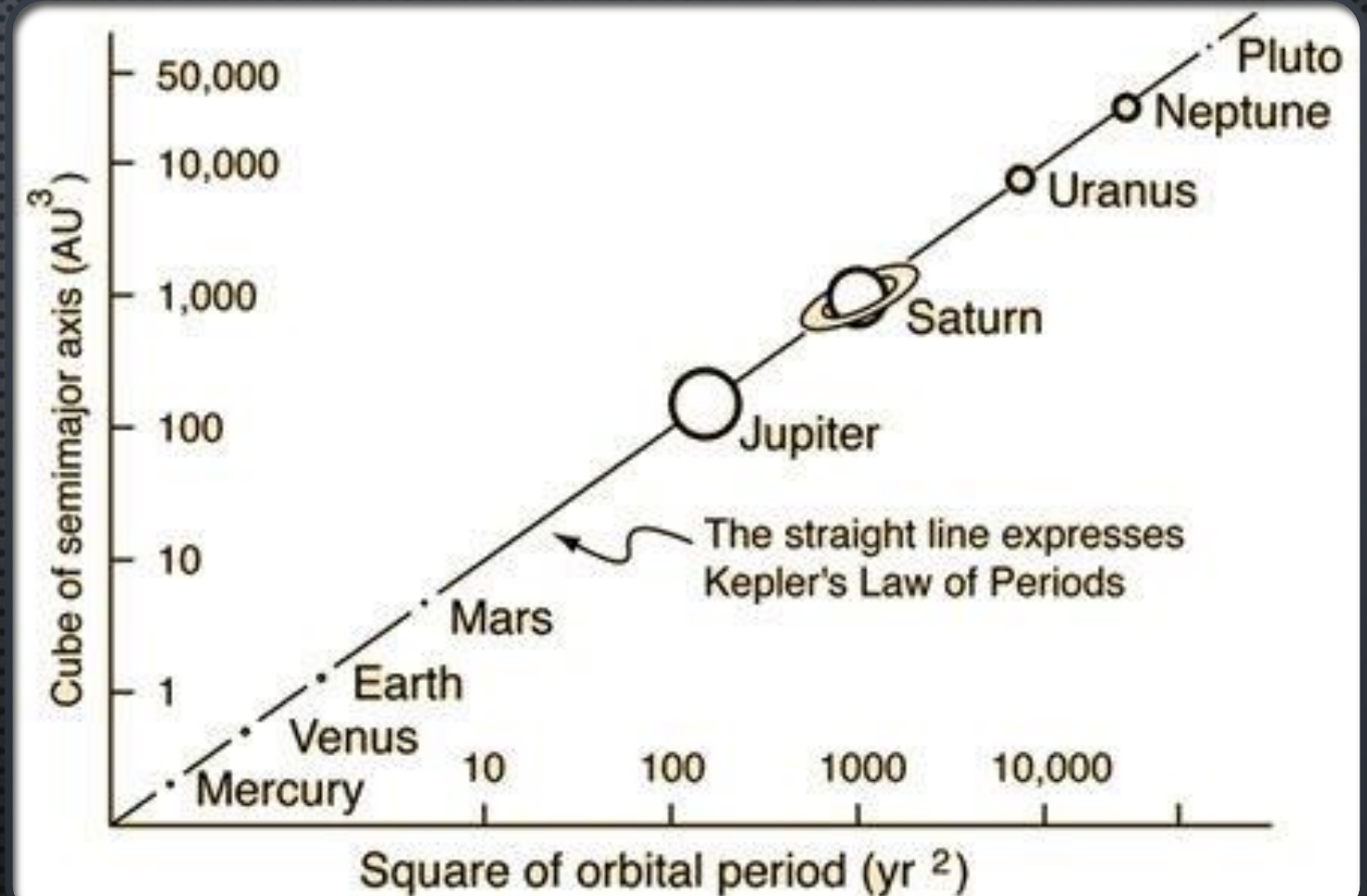
KEPLER'S THIRD LAW

- Uranus is further from the sun so it would take this planet longer to make one trip around the sun than Earth.

- Orbital Period (p): Time to orbit the sun

- Distance from the sun (a): Average distance measure in AUs

- A cubed = P squared

- Mathematically written $a^3 = p^2$

TRY CALCULATING IT YOURSELF!

- ## EARTH:

- ORBITAL PERIOD (P) = 1 EARTH YEAR

- DISTANCE FROM SUN (A) = 1 AU

  - DO YOU REMEMBER WHAT AU IS?

- $1^2 = 1^3$

- 1=1

FINISH THE PROBLEMS ON YOUR NOTES PAGE. TAKE THE QUIZ ON SOCRATIVE, YOU MAY USE NOTES, THEN TURN THE PAGE IN.

Have a super Weekend!