① Read the pages outlined and/or follow the instructions given.
② Unless space has been given, answer the questions on a separate sheet and then staple it to this sheet.
③ Use complete sentences when necessary (i.e. explain, describe, why, ...). Also, watch your spelling and grammar and be sure to write neatly!

A. Definitions/Check & Reflect on Your Reading (P.258-267)

1. Define the following terms:
   (a) astronomical unit (AU) (c) celestial object (e) nebula (g) universe
   (b) astronomy (d) light-year (ly) (f) supernova
2. Explain why looking at a distant star is like looking back in time.
3. Even though astronauts have flown to the Moon, why is a journey to other solar systems impossible?
4. (a) What are the inner planets? Why are they sometimes referred to as terrestrial planets?
   (b) What are the outer planets? Why are they sometimes referred to as the gas giants?
5. The star Aldebaran, visible from Earth, lies about 65 ly away from us. Assuming someone was there to receive it and respond, what is the minimum amount of time that would be required to send a radio message to Aldebaran and receive a reply? (Hint: radio messages travel at the speed of light.)
6. (a) Calculate how many <u>years</u> it would take a spacecraft to travel the 150 000 000 km between Earth and the Sun (1 AU) if the travel speed were 1000 km/h. Express your answer to <u>one decimal place</u>.

   (b) Using the answer you got for (a), calculate approximately how long it would take that same spacecraft to make a one-way trip from the Sun to Neptune (30.1 AU). Express your answer as a <u>whole number</u>.

Time = distance ÷ speed

= 150 000 000 km ÷

=

hours

(but the time is in hours & we need years)

Time = # hours ÷ 24 hr/dy ÷ 365 dy/yr

=

=

years

Therefore it will take the craft years to travel the 150 000 000 km (ie 1 AU).

1 AU = years

30.1 AU = "x" years

(I need to solve for "x" now!)

B. Activity #1 (Scientific Notation P.265)

Example: The speed of light is about 299 800 000 m/s. Write this in scientific notation.

Step 1: Put a decimal point after the first digit on the left. This gives 2.99 800 00 for the example.
Step 2: Count the number of places from the decimal point to the end of the zeros. For 2.99 800 000, there are eight places. This means the power of base 10 has an exponent of 8, written as 10^8.
Step 3: Delete the zeroes. The number written in scientific notation is 2.998×10^8 m/s.

1. Scientific notation helps to make very large numbers shorter and easier to handle. Write the following measurements in scientific notation in the space provided.

(a) the distance from the Sun to the nearest star: 40 000 000 000 000 km = _____ km

(b) the average distance from Earth to the Sun: 150 000 000 000 m = _____ m

(c) the distance from the Milky Way to the farthest galaxy: 13 000 000 000 ly = _____ ly

(d) the total number of celestial objects (mostly asteroids) in the solar system: 152 500 = _____

C. Activity #2 (All These Worlds P.266)

1. Use a scientific calculator and the assumptions given below to complete the following calculations. Place your answers, expressed in proper scientific notation, in the space provided.

Assumptions	Answer
In the Hubble Ultra Deep Field image shown at the start of this unit (P.254), a computer counted the galaxies and determined there to be about 35 000, or 3.5×10^4.	3.5×10^4 galaxies (~ pin head)
The patch of sky viewed in the Hubble Deep Field is small, the size of the head of a pin held at a distance of 1 m. The number of pin heads needed to cover the inside of a sphere 1 m in radius is approximately 13 million, or 1.3×10^7.	3.5×10^4 galaxies X 1.3×10^7 = _____ galaxies (total)
A typical galaxy has approximately 200 billion stars, or 2×10^{11} stars.	_____ galaxies (total) X 2×10^{11} (# galaxies from above) = _____ stars (total)
Assume (conservatively) that 1 star in every 100 has a planet around it, or 0.01 of stars has a planet.	_____ stars (total) X 0.01 (# stars from above) = _____ planets (total)
Assume that of the stars that have planets, only 1 in 1000 has an Earth-like planet around it, or 0.0001 of stars has an Earth-like planet.	_____ planets (total) X 0.001 (# planets from above) = _____ Earth-like planets (total)
The human population of Earth is about 7 billion people (7×10^9). Divide the number of Earth-like planets by the population of Earth to estimate how many Earth-like planets there are in the visible universe for every man, woman, and child on Earth.	_____ Earth-like planets ÷ 7×10^9 (# Earth-like planets from above) = _____ Earth-like planets/person

2. Does this last calculation affect your assessment of whether there are other forms of life in the universe? Explain.

_____

_____

_____

_____