Core Curriculum Assessment Report
2011_12

Department Physics

Representative Dr. Chin-Che Tin

Course Name / number PHYS1150

1. **AGSC Content Area of Alignment:** Area III: Science and Math
2. **SLO(s) being assessed: Student will..**

   SLO 10: Students will understand and appreciate methods and issues of science and technology.

3. **Assessment Method(s):**

   [Explain how assessment for the measures associated with this SLO - not grading for the course as a whole - was conducted. You my cut/paste rubics for inclusion here, identify faculty reviewing committees, or identify specific kinds of test questions important to your method. Is this the method you initially planned to use? Provide a separate paragraph for each method].

   The assessment of this course comes under the purview of the Learning Improvement Committee for Introductory Physics and Astronomy, chaired by Dr. Chin-Che Tin. The committee believes that learning assessment should not be viewed as a measure of the teaching effectiveness of the instructors. To discourage such unwarranted association and to encourage participation in the assessment efforts, the committee has decided not to identify the instructors. However, during the committee meetings to discuss assessment data, the instructors may choose to identify themselves to aid in the discussion, and many instructors did.Members of the Learning Improvement Committee for Introductory Physics and Astronomy were:Dr. Chin-Che Tin (Chair)Dr. Satoshi HinataDr. Stephen KnowltonDr. Stuart LochDr. Joseph PerezThe Chair of the committee has the prerogative to invite other instructors teaching those courses under the purview of this committee but who are not members of the committee, to the meetings.The instructor in this course has chosen tests/exams as the mode of assessment. This is one of the methods accepted by the department for learning assessment.Data were collected for Spring 2012.The SLO data were submitted to the Chair of the Learning Improvement Committee for Introductory Physics and Astronomy, Dr. Chin-Che Tin, after the end of Spring semester 2012. The committee met on Sept 27, 2012, to discuss the assessment data for this course.

4. **Findings: What assessment data did each assessment method produce?**

   Average score for Spring 2012: 76%This score was higher than typical test scores (~60%) in Introductory Physics in the Physics Department.

5. **How did you (or will you) use the findings for improvement?**

   [What questions / issues / concerns did your data raise for the faculty teaching the course? What discussion did the faculty have about the findings? What future actions to improve student attainment of this outcome will the department / program take as a result of this analysis?]

   Instructor's Verbatim Comments:I notice that students perform poorly on questions related to measure 2 and 3. This is expected as their preparation (most students are non-science majors) is poor in math and science compared with other basics. It is not the lack of intelligence, as they can understand the contents of algebraic relations if you express them in English. This is no big problem, if your thought process involves one or two steps, but it becomes a huge disadvantage if the number of logical steps increases. So, as is always the case, our objective is to challenge the students to read and interpret graphs and diagrams in addition to interpret what algebraic relations mean, without discouraging them to the point they give up.

6. **Additional Comments:**

   [What else would you like the Committee to know about your assessment of this course or plans for the future?]

   The instructor has done a better job in this year's assessment by using more questions.The instructor commented during the assessment meeting that he has problems identifying proper questions for some of the

measures such as Measure 1.

7. Committee Comments

Mean of rubric score= 2.67 (out of 4)Questions allegedly assessing Measures 1 and 2 have nothing to do with measures 1 and 2, hard to see some of the correlations between the questions and measuresSince questions don't relate to Measures, then no findings can logically emergeNo discussion evident, did increase number of questions and has a committee oversight

PHYS 1150 – Astronomy
Spring 2012
Instructor B
Mode of Assessment: Tests

Measures	Problems	% Average Score
1	1.1	71.6
1	1.2	97.4
1	1.3	90.5
1	1.4	96.6
1	1.5	88.2
1	1.6	90.7
1	1.7	90.7
2	2.1	93.5
2	2.2	60.0
2	2.3	65.5
2	2.4	50.7
2	2.5	38.0
2	2.6	21.3
3	3.1	89.0
3	3.2	88.5
3	3.3	37.9
3	3.4	79.1
3	3.5	49.3
3	3.6	54.0
4	4.1	93.5
4	4.2	95.5
4	4.3	94.6
4	4.4	87.6
5	5.1	92.9
5	5.2	98.0
5	5.3	94.6
5	5.4	74.5
5	5.5	62.7
5	5.6	75.3
5	5.7	58.7
Average		76.0

PROBLEMS:

Measure 1: Articulate the philosophical and historical foundations of modern science.

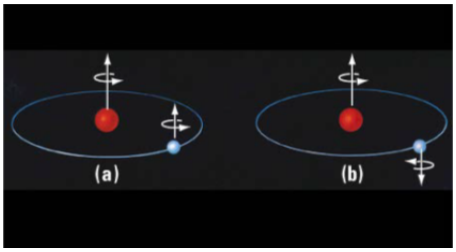
1.1 Why do you use multiple mirrors for telescopes?
- A. It is easier to move the telescope to different locations.
- B. To avoid the deformation of mirror surface by its own weight.
- C. To correct the shape of the component mirrors from behind.
- D. B and C.

1.2 Why do you have to use satellites to observe astronomical objects?
- A. To avoid the absorption by the atmosphere except for visible and radio waves.
- B. To be closer to the object.

1.3 How Do We Probe the Interior of the sun?
- A. Solar pulsation
- B. Solar neutrino
- C. X-ray observation
- D. Visible light
- E. A & B

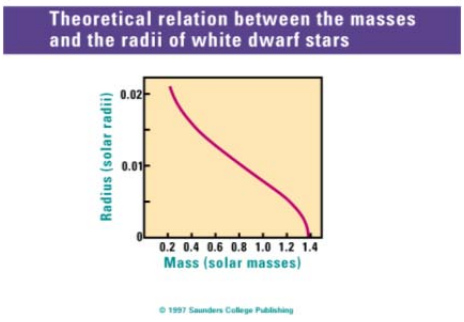
1.4 You see 5 stars that have the colors listed below. Which star has the lowest surface temperature?
- A. Yellow
- B. White
- C. Blue
- D. Red
- E. Orange

1.5 This diagram shows the two states of the hydrogen. What kind of wave is emitted by the hydrogen when it drops to a lower energy state?



- A. Visible light.
- B. X-rays
- C. Infra-red
- D. 21 cm microwave
- E. Other

1.6 The diagram shows the calculation by young Chandrasekhar. What does it tell us?



- A. The size of star increases with its mass.
- B. The radius of star decreases with mass and the star will collapse forever if its mass exceeds a critical value.

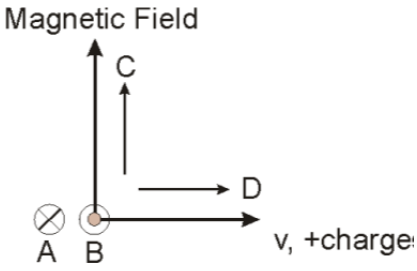
1.7 What are the effects of mass? Choose the most appropriate.
- A. It warps the space-time.
- B. It bends the light.
- C. It exerts attractive force.
- D. All of the above.
- E. None of the above.

Measure 2: Understand the scientific method and demonstrate an ability to apply it across a variety of situations.

2.1 If the intensity at distance d = 1m is 1 unit, how many units is the intensity at d = 3m?
A. 1/9
B. 1/3
C. 1
D. 3
E. 9

2.2 If $T_A=4T_B$, and distances to star A and B are the same, and the size of the stars are the same, what is I_A / I_B ?
A. 1/81
B. 1/9
C. 81
D. 16
E. 256

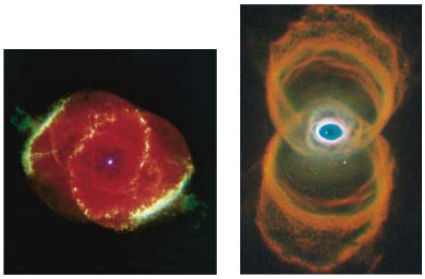
2.3 The direction of the magnetic field and that of a positive charge are shown by arrows. Which direction is the force on the charge?



2.4 Reaction time of A+B→C+D is $\tau=10^9$ seconds. There are 10^{20} pairs of A & B in a box. How many reactions will take place in 10 seconds in this box?
A. 10^{29} per second
B. 10^{30} per second
C. 10^{11} per second
D. 10^{12} per second
E. None

2.5 Why is Helium burned so rapidly in the star after the Hydrogen is used up?
A. Because the temperature is so much higher when the helium is burned than in the main sequence stage when hydrogen is burned.
B. Because at this stage of evolution, the pressure that supports the star against collapse by the gravity is provided by the degeneracy of electrons that is independent of temperature, and hence the star lacks the control mechanism of helium burning.

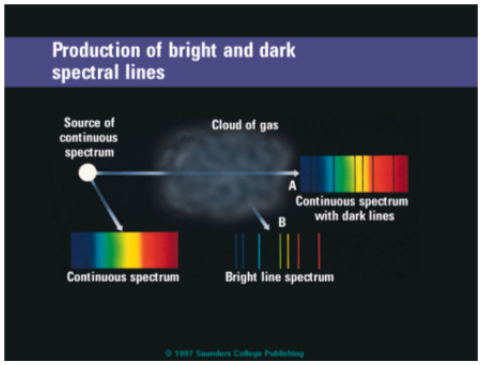
2.6 What is at the center of these objects?
A. Supernova remnants.
B. Planetary nebulae
C. Novae
D. Neutron stars
E. White dwarfs



Measure 3: Demonstrate an ability to conduct, and interpret the results of experiments aimed at better understanding natural phenomena.

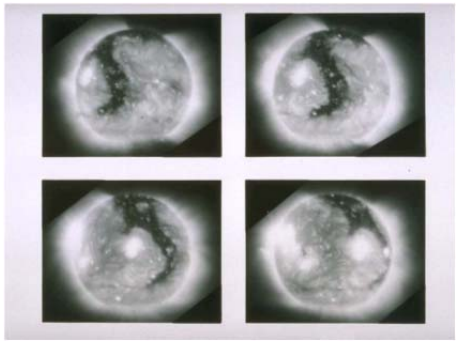
3.1 Choose the correct statement.

A. The wavelengths of the emission lines in B are the same as the absorption lines in A.
B. The wavelengths of the emission lines in B have no relation to the absorption lines in A.



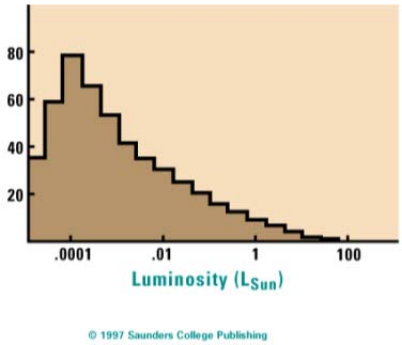
3.2 What does a sequence of the x-ray images of the sun demonstrate?

A. Sun is static
B. Sun oscillates
C. Sun rotates
D. Photosphere has dark areas called sunspots.



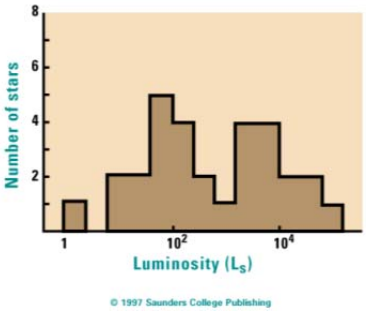
3.3 This is a number of stars as a function of luminosity. Which one is the correct statement?

A. Sample is taken from a volume at a very far distance.
B. Sample is taken from a volume near the solar system.



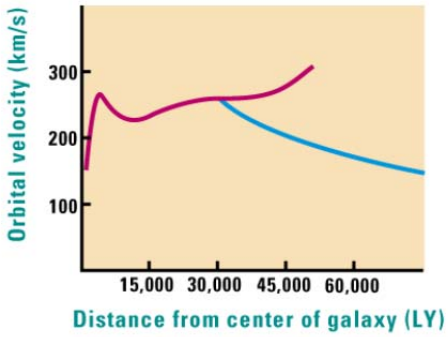
3.4 This is the number of stars as a function of luminosity. Which is the correct statement?

A. Sample is taken from a volume at a very far distance.
B. Sample is the 30 brightest stars in the sky.



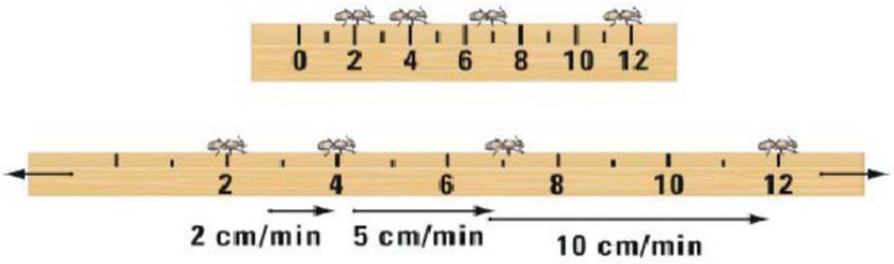
3.5 The rotation curve (red) of the Milky Way is shown. What do you conclude from this?

A. The mass of the galaxy is increasing toward the edge.
B. The mass of the galaxy is concentrated to the center.



3.6 The stick doubles its length per minute. If you are at 0cm marker, what is the speed of an ant at 7cm maker?

A. 2cm/min
B. 3cm/min
C. 5cm/min
D. 7cm/min
E. 10cm/min



Measure 4: Understand major issues and problems facing modern science and technology, including issues related to ethics, cultural values, public policies, and the impact of human activity upon the planet.

4.1 What is the main reason why you refrigerate an infrared telescope?

A. To avoid the change of shape of the telescope.
B. To avoid the sweating of the telescope.
C. To reduce the infrared radiation from the telescope.

4.2 Why do we select observatories in the remote site which is relatively dry?

A. To avoid light pollution
B. Good seeing
C. Both A & B

4.3 What is this tank?

A. Storage of cleaning fluids.
B. Detector of positrons.
C. Detector of neutrinos
D. Detector of cosmic rays

4.4 Why are the infra-red and microwave useful in probing the large scale structure of the Milky Way galaxy?

A. They are easily absorbed and so they show medium in the galaxy
B. They are not easily absorbed or scattered by the interstellar medium & can propagate a long distance to let us know the content of the galaxy.

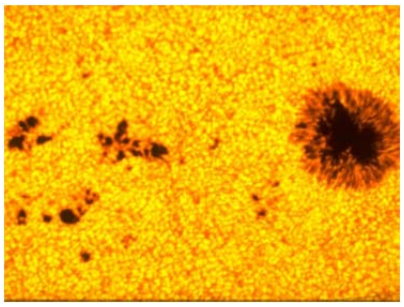
Measure 5: Demonstrate knowledge in one area of science, including understanding its basic principles, laws, and theories.

5.1 What types of observatories are useful on the ground?

A. Radio
B. Infra-red
C. Optical
D. X-rays & Gamma rays
E. A & C

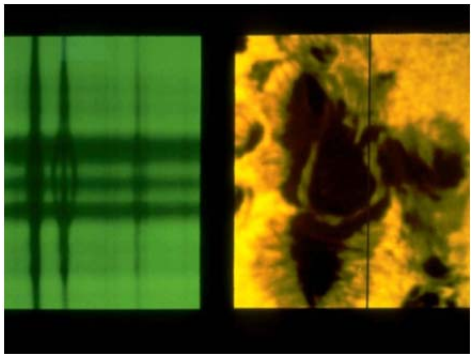
5.2 Why do you not see granules in the sunspots?

A. The bottom of the sunspot is cold and does not cause convection.
B. The sunspot is too dense and convection is prohibited.
C. The sunspot is the region of strong magnetic field that controls the motion of ionized gas and suppress the convection.



5.3 There are three images of the sun through the spectrometer. Which one indicates the magnetic field?

A. The left and right image with a single line.
B. The middle image with a single line splits into three lines.



5.4 The parallax of star A is 0.1 arc seconds. What is the distance from the sun to star A?

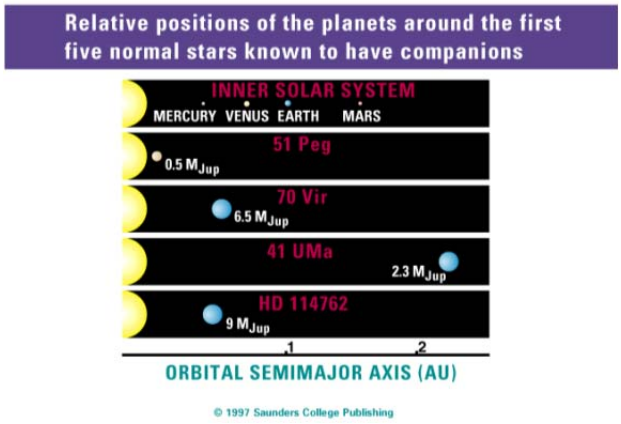
A. 0.1 PC
B. 1 PC
C. 10 PC
D. 100 PC
E. Other

5.5 What is the reddish-white region?

A. Glowing bright as the gas is heated by a hot star inside the cloud.
B. It is the scattered light of a star not visible by the gas.

5.6 Why do we observe large planets close to the star so frequently?

A. Larger planets are likely to form near star.
B. Observational bias: larger planets near the star are easier to detect.



5.7 What type of galaxy is this, & what is the reason for your conclusion?

A. It is an elliptic galaxy, because of its shape.
B. It is an irregular galaxy, as it it broken up in two pieces.
C. It is a spiral arm galaxy, because it contains distinct dust lane.