Name:_____

Intro Astro Lab Prep Quiz: Lab 9: Double Stars

Instructions: There are 10 multiple-choice problems each worth 10 marks for a total of 100 marks altogether. Choose the **BEST** answer, completion, etc., and **DARKEN** fully the appropriate circle on the table provided below. Read all responses carefully. **NOTE** long detailed responses won't depend on hidden keywords: keywords in such responses are bold-faced capitalized.
This is a 10 minute quiz.

Answer Table for the Multiple-Choice Questions

	a	b	c	d	e		a	b	c	d	e
1.	O	O	O	O	O	6.	O	O	O	O	O
2.	O	O	O	O	O	7.	O	O	O	O	O
3.	O	O	O	O	O	8.	O	O	O	O	O
4.	O	O	O	O	O	9.	O	O	O	O	O
5.	O	O	O	O	O	10.	O	O	O	O	O

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009 qmult 00100 1 4 1 easy deducto-memory: double star defined @ prep

1. "Let's play *Jeopardy*! For $100, the answer is: Two stars that appear very close on the sky to an observer. Usually the observer is using a telescope."

   What is a _____, Alex?

   a) double star b) visual binary c) spectroscopic binary d) close binary
   e) doubloon star

   SUGGESTED ANSWER: (a)

   Wrong answers:
   a) Avast matey, AAaaargh.

   Redaction: Jeffery, 2013jan01

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009 qmult 00110 1 1 4 easy memory: binary defined @ prep

2. A double star that is gravitationally bound is a:

   a) single star. b) bound pair. c) gravitational pair. d) binary. e) triple.

   SUGGESTED ANSWER: (d)

   Wrong answers:
   a) Oh, c'mon.

   Redaction: Jeffery, 2013jan01

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009 qmult 00120 1 1 5 easy memory: binaries classified @ prep

3. Visual binaries, spectroscopic binaries, wide binaries, close binaries are, respectively:

   a) detected by eye only, spectrumless, transferring light, affectionate.
   b) detected by spectroscopy, detected by imaging, always transferring mass, gravitiationally interacting only.
   c) detected by imaging, detected by spectroscopy, always transferring mass, gravitiationally interacting only.
   d) detected by spectroscopy, detected by imaging, gravitationally interacting only, sometimes transferring mass.

e) detected by imaging, detected by spectroscopy, gravitationally interacting only, sometimes transferring mass.

SUGGESTED ANSWER: (e)

Wrong answers:
a) A nonsense answer.

Redaction: Jeffery, 2013jan01

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009 qmult 00200 1 1 3 easy memory: angular resolution and Rayleigh criterion @ prep

4. In one meaning the term angular resolution is the ability to tell two objects apart in a optical imaging device. However, a precise meaning for the angular resolution for optical imaging device with a circular apperature is the angle

$$\theta_{\mathrm{R}} \begin{cases} = 1.219669891\ldots \text{ radians} \times \dfrac{\lambda}{D} \\ \approx 1.220 \text{ radians} \times \dfrac{\lambda}{D} \\ \approx 25.16'' \times \dfrac{\lambda_{\mu\mathrm{m}}}{D_{\mathrm{cm}}} \\ \approx 9.905'' \times \dfrac{\lambda_{\mu\mathrm{m}}}{D_{\mathrm{in}}} \\ \approx 4.952'' \times \dfrac{(\lambda_{\mu\mathrm{m}}/0.5\,\mu\mathrm{m})}{D_{\mathrm{in}}} \end{cases} ,$$

where λ is wavelength, D is the diameter of the aperature, $\lambda_{\mu\mathrm{m}}$ is wavelength in microns (μm), D_{cm} is the diameter of the aperature in centimeters, and D_{in} is the diameter of the aperature in inches. If two point sources at optical infinity are farther apart in angle than about θ_{R}, they can usually be resolved. If they are closer than about θ_{R}, then in practice they often cannot be resolved. If you have very high quality observations, you might be able to resolve them if they are somewhat closer than θ_{R}. The angle θ_{R} is set by the diffraction of light. The angle θ_{R} is called the _____ criterion.

a) Kelvin. b) Raleigh c) Rayleigh d) Born e) Newton-John

SUGGESTED ANSWER: (c)

Wrong answers:
d) Max Born coauthored a famous book on optics, but no it's not him.
e) Max Born's granddaughter Olivia Newton-John did not coauthor a famous book on optics, but it's still not her.

Redaction: Jeffery, 2013jan01

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009 qmult 00300 1 1 4 easy memory: Kepler's 3rd law @ prep

5. The word formulation of _____ is period squard is proportional semi-major axis cubed.

a) Newton's 2nd law b) Rayleigh's 3rd law c) Rayleigh's criterion d) Kepler's 3rd law e) Newton's 3rd law

SUGGESTED ANSWER: (d)

Wrong answers:
a) Oh, c'mon.

Redaction: Jeffery, 2013jan01

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009 qmult 00310 1 1 1 easy memory: Kelper's 3rd law in small mass ratio approximation @ prep

6. Kepler's 3rd law (which applies to gravitationally bound two-body systems) in modern equation formulation is

$$P = \sqrt{\frac{4\pi^2}{G(M+m)}} \times a^{3/2} ,$$

where P is orbital period, G is the gravitational constant, M is the mass of the more massive body, m is the mass of the less massive body, and a is the semi-major axis of the relative elliptical orbit. If $m << M$, the formula can be approximated to good accuracy by replacing $(M + m)$ by

a) M. b) m. c) M/m. d) m/M. e) $\sqrt{Mm}$.

SUGGESTED ANSWER: (a)

Wrong answers:
c) Not dimensionally correct.

Redaction: Jeffery, 2013jan01