

Name: _____

Intro Astro Prep Quiz: Lab 3: Telescopes

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

003 qmult 00110 1 1 1 easy memory: the telescopes: reflectors and refractors

1. Telescopes are divided into two main categories: _____ and _____. The distinction is based on the nature of the telescope primary (or objective): for the former it is a lens; for the latter a mirror.

- a) refractors; reflectors b) reflectors; refractors c) diffractors; integrators
d) integrators; diffractors e) detractors; reenactors

SUGGESTED ANSWER: (a)

Wrong answers:

- e) These are in a totally different realm.

Redaction: Jeffery, 2013jan01

003 qmult 00130 1 1 3 easy memory: Galilean and Keplerian telescopes

2. Refractor telescopes are divided into Galilean and _____ telescopes. The former give an upright image and latter a point inverted image. With point inversion each point of the source is rotated by 180° in the image about the optical axis of the telescope. The _____ telescope quickly became favored for astronomy since it gives much wider field of view and the inversion is just accepted and adapted to. The inversion can be corrected for if you want to as in most binoculars. The _____ telescope was invented theoretically by Johannes Kepler (1571–1630), but he never built one to our knowledge.

- a) Scheinerian b) Dutch c) Keplerian d) Newtonian e) Schmidt-Cassegrain

SUGGESTED ANSWER: (c)

Wrong answers:

- a) Christoph Scheiner (1573 or 1575–1650) built the first Keplerian telescope to our knowledge.
b) Another name for the Galilean telescope.
d) This was the first functional reflector. It was invented in practice by Isaac Newton (1643–1727). The idea of reflectors had been around for some years before Newton's work.

Redaction: Jeffery, 2013jan01

003 qmult 00150 1 4 5 easy deducto-memory: Schmidt telescope

3. “Let’s play *Jeopardy!* For \$100, the answer is: This kind of reflector telescope typically uses a spherical primary and a corrector plate (a kind of lens) to correct for spherical aberration. The setup gives it a wide field of view.”

What is a _____ telescope, Alex?

- a) Galilean b) Keplerian c) Newtonian d) Cassegrain e) Schmidt

SUGGESTED ANSWER: (e)

Wrong answers:

- a) As Lurch would say AAAARGH.

Redaction: Jeffery, 2013jan01

003 qmult 00160 1 4 1 easy deducto-memory: Schmidt-Cassegrain telescope

4. The _____ telescope combines the defining features of the Schmidt telescope and the Cassegrain telescope.

- a) Schmidt-Cassegrain b) Galilean-Keplerian c) Gregorian-Newtonian
d) Galilean-Newtonian e) Gregorian-Cassegrain

SUGGESTED ANSWER: (a)

Wrong answers:

- b) Oh, c’mon.

Redaction: Jeffery, 2013jan01

003 qmult 00220 1 4 4 easy deducto-memory: eyepiece defined

5. “Let’s play *Jeopardy!* For \$100, the answer is: The optical device closest to the eye in a telescope. It is used to magnify the image created by the primary (AKA objective) of a telescope. The device is rated by its focal length which for small telescopes is usually given in millimeters.”

What is a/an _____, Alex?

- a) finderscope b) reticule c) tube d) eyepiece e) star diagonal

SUGGESTED ANSWER: (d)

Wrong answers:

- a) As Lurch would say AAAARGH.

Redaction: Jeffery, 2013jan01

003 qmult 00300 1 1 5 easy memory: focused meaning

6. For most optical devices, “focused” means the light rays from a point source are converged to a/an _____ image.

- a) circle b) oval c) donut d) blurry e) point

SUGGESTED ANSWER: (e)

Wrong answers:

- c) This is what an out-of-focus Schmidt-Cassegrain usually gives.

Redaction: Jeffery, 2013jan01

003 qmult 00310 1 4 2 easy deducto-memory: focal length defined

7. “Let’s play *Jeopardy!* For \$100, the answer is: It is the distance along the optical axis of a lens or mirror to the point where light rays (originally parallel to the optical axis) converge (i.e., are focused) after interacting with the lens or mirror. It is among other things a measure of the light ray bending power of the lens or mirror. The shorter it is, the greater that power.”

What is _____, Alex?

- a) angular resolution (AKA resolving power) b) focal length c) image distance
d) object distance e) focusing length

SUGGESTED ANSWER: (b)

Wrong answers:

e) Oh, c'mon.

Redaction: Jeffery, 2013jan01

003 qmult 00330 1 1 4 easy memory: telescope magnification

8. The magnification M of common telescopes with an eyepiece is given by

$$M = \frac{f_p}{f_e},$$

where f_p is the primary (AKA objective) focal length and f_e is the eyepiece focal length. If $f_p = 2$ m and $f_e = 40$ mm, then

a) $M = 1$. b) $M = 20$. c) $M = 40$. d) $M = 50$. e) $M = 0.05$.

SUGGESTED ANSWER: (d)

Behold:

$$M = \frac{f_p}{f_e} = \frac{2000}{40} = 50.$$

Wrong answers:

a) A nonsense answer.

Redaction: Jeffery, 2013jan01

003 qmult 00440 1 1 2 easy memory: Schmidt-Cassegrain star diagonal inversions

9. In a Schmidt-Cassegrain telescope with a star diagonal, the telescope itself gives a _____ around the optical axis of the telescope and the star diagonal gives a _____ around the axis perpendicular to the optical axes of the telescope and eyepiece.

a) axis reflection; point inversion b) point inversion; axis reflection
c) translation; axis reflection d) point inversion; translation e) translation; point inversion

SUGGESTED ANSWER: (b)

Wrong answers:

a) Exactly wrong.

Redaction: Jeffery, 2013jan01

003 qmult 00550 1 1 4 easy memory: field of view and magnification

10. Field of view (FOV) is the angular diameter of the circular region seen through a telescope. As magnification increases, field of view _____. Another meaning of field of view is just the region seen through the telescope. Context as usual must decide the meaning meant.

a) fluctuates b) stays the same c) increases d) decreases e) fluctuates wildly

SUGGESTED ANSWER: (d) A sad trade-off between magnification and field of view.

Wrong answers:

a) A nonsense answer.

Redaction: Jeffery, 2013jan01