

Introductory Astronomy**NAME:**

Homework 28: Galaxies: Homeworks and solutions are posted on the course web site. Homeworks are **NOT** handed in and **NOT** marked. But many homework problems (~ 50–70%) will turn up on tests.

Answer Table**Name:**

	a	b	c	d	e		a	b	c	d	e
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	37.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	38.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	39.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	40.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	41.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	42.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	43.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	44.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	45.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	46.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	47.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	48.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	49.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	50.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	51.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	52.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	53.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	54.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	55.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	56.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	57.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	58.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	59.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	60.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	61.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	62.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	63.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	64.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	65.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	66.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	67.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	68.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	69.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	70.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	71.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	72.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- Did you complete reading the Introductory Astronomy Lecture before the **SECOND DAY** on which the lecture was lectured on in class?
 - YYYesssss!
 - Jawohl!
 - Da!
 - Sí, sí.
 - OMG no!
- A characteristic nearest neighbor distance between galaxies is of order:
 - 1 Mpc.
 - 1 kpc.
 - 1 pc.
 - 1 cm.
 - 4283 Mpc.
- In the Hubble sequence of galaxies, the main types are:
 - O0 and G2.
 - Sa and SBa.
 - spiral and barred spiral.
 - elliptical and barred spiral.
 - elliptical, lenticular, unbarred spiral, barred spiral, and irregular.
- “Let’s play *Jeopardy!* For \$100, the answer is: They are the subtypes of the Hubble type barred spiral.”
What are _____, Alex?
 - Sa, Sb, and Sc
 - SBa, SBb, and SBc
 - E0, E1, E2, E3, E4, E5, E6, and E7
 - SO and SBO
 - Irr I and Irr II
- “Let’s play *Jeopardy!* For \$100, the answer is: It’s a common misconception that he/she originally theorized that galaxies evolved from ellipticals to unbarred spirals or barred spirals. In fact, he/she emphasized that his/her classification scheme was entirely empirical.”
Who is _____, Alex?
 - Henrietta Swan Leavitt (1868–1921)
 - Adriaan van Maanen (1884–1946)
 - Knut Lundmark (1889–1958)
 - Edwin Hubble (1889–1953)
 - Georges Lemaître (1894–1966)
- “Let’s play *Jeopardy!* For \$100, the answer is: Galaxies of this Hubble type range in size from about $10^5 M_{\odot}$ (small dwarfs) to $10^{13} M_{\odot}$ (large giants), consist mainly of Population II and old Population I stars, and have relatively little dust and gas.”
What is the _____ type, Alex?
 - irregular
 - lenticular
 - spiral
 - barred spiral
 - elliptical
- The 8 elliptical subtypes E0 through E7 do **NOT** give unambiguous information about the intrinsic properties of the ellipticals because they are assigned:
 - just on the basis of the shape of the galaxy projected on the sky.
 - on the basis of the 3-dimensional shape of the galaxy.
 - arbitrarily.
 - randomly.
 - whimsically.
- Lenticular (SO and SBO) galaxies have:
 - spiral arms, but no well-defined disks.
 - disks, but no well-defined spiral arms.
 - bulges, but no disks.
 - no bulges, disks, spiral arms, or halos.
 - no size whatsoever.
- Spiral galaxies are divided into ordinary spirals (or just spirals without qualification) and:
 - bulgeless spirals.
 - haloed spirals.
 - disked spirals.
 - barred spirals.
 - unbarred spirals.
- Based on the appearance of their spiral arms, spiral galaxies are divided into grand-design spirals and:
 - sheeplike spirals.
 - sheepish spirals.
 - woolly spirals.
 - fleecy spirals.
 - flocculent spirals.
- To see a spiral or lenticular galaxy parallel to the disk is to see it _____ and to see it perpendicular to the disk is to see it _____.
 - edge-on; face-on
 - face-on; edge-on
 - edge-on; obliquely
 - face-on; obliquely
 - obliquely; opaquely
- One can usually tell the subtype of a spiral or barred spiral seen **EDGE-ON** because a subtype indication is provided by:
 - the tightness of the winding of the spiral arms.
 - the darkness of the disk dust lane.
 - the relative size of the halo.
 - the relative size of the bulge.
 - the galaxy brightness

on the sky.

13. A well known example of an irregular galaxy (of subtype Irr I) is the:
- a) Whirlpool Galaxy (M51). b) Sombrero Galaxy (M104).
 - c) Large Magellanic Cloud (LMC). d) Milk Way (i.e., the Galaxy).
 - e) Andromeda Galaxy (M31).
14. Grand-design and flocculent spiral arms are believed to be caused by, respectively, _____ and _____.
- a) spiral density waves; self-propagating star formation plus differential rotation. b) self-propagating star formation plus differential rotation; spiral density waves
 - c) spiral density waves; flocculent waves d) grand-design waves; flocculent waves
 - e) galactic cannibalism; gravitational lensing
15. The Andromeda galaxy (M31), the Large Magellanic Cloud (LMC), and the Small Magellanic Cloud (SMC) are all:
- a) elliptical galaxies. b) dwarf elliptical galaxies. c) irregular galaxies. d) spiral galaxies.
 - e) naked-eye objects: i.e., they can all be seen by the naked eye.