

Reach for the Stars Key

Part 1

1.
 - a) NGC 6357
 - b) Scorpius
 - c) Lobster Nebula OR War and Peace Nebula
 - d) True

2.
 - a) Tucana
 - b) The Small Magellanic Cloud (or SMC)
 - c) Dwarf galaxy OR Irregular galaxy
 - d) X-ray binaries

3.
 - a) Image 3
 - b) 4000 stars a year. This rate is 400 times as much as our galaxy's rate
 - c) In the traditional model, galaxies slowly get bigger by absorbing pieces of other galaxies, but this galaxy is growing from the inside

4.
 - a) Image 8
 - b) Aquila
 - c) It rotates very quickly
 - d) Delta Scuti Variable Star

5.
 - a) Image 2
 - b) It is the oldest and most distant galaxy known
 - c) 32 billion light years (or 9.8 billion parsecs) away, and 13.4 billion years old.
 - d) Ursa Major
 - e) Z means redshift, so the 11 is the redshift number

6.
 - a) Ophiuchus
 - b) Zeta Ophiuchi
 - c) True
 - d) The Rho Ophiuchi Cloud Complex
 - e) Dark nebula OR Absorption nebula

7.
 - a) Centaurus
 - b) NGC 5128
 - c) Starburst galaxy
 - d) It collided with a galaxy in the past
 - e) Black hole
 - f) X-ray and radio

8.
 - a) Vega
 - b) Lyra
 - c) Summer Triangle
 - d) Class M
 - e) CNO Cycle
 - f) The UBV Photometric System

9.
 - a) NGC 4555
 - b) Field galaxies
 - c) Coma Berenices
 - d) Elliptical
 - e) Dark matter
 - f) This galaxy has a halo of gas. Large amounts of matter are necessary to prevent this gas from escaping. The visible mass is not enough to do this, so there has to be dark matter.

10.
 - a) Rigel
 - b) Pollux
 - c) Polaris
 - d) Procyon
 - e) Spica

Part 2

1.
 - a) OBAFGKM
 - b) G
 - c) A

2.
 - a) H-R Diagram
 - b) Absolute magnitude or luminosity
 - c) Temperature or spectral class
 - d) White dwarfs
 - e) Sirius B OR Procyon B

3.
 - a) Protostar, Main sequence, Red Giant, White Dwarf (also accept planetary nebula, then white dwarf), Black Dwarf
 - b) A type 1a supernova occurs in a binary star system. A white dwarf accretes material from another star, and when it's mass reaches the Chandrasekhar limit, its core collapses (Only give credit if it mentions the limit). A type II supernova occurs when nuclear fusion isn't enough to combat gravity, so the core collapses, and an explosion follows.

4.
 - a) Hubble Tuning Fork
 - b) True

- c) Lenticular Galaxy
- 5. a) Spiral galaxy
b) False
c) In the arms
d) Globular clusters
- 6. a) Irregular galaxies
b) LMC, SMC, GN-z11 (only need 2 of them)
c) True
- 7. a) Elliptical galaxy
b) False
c) NGC 4555 or NGC 5128
- 8. a) IV
b) I
c) D
d) III
e) V
f) II

Part 3

- 1. a) Star A is more luminous by a factor of 16
b) Star A is more luminous by a factor of 4
- 2. a) B
b) Blue, white, OR Blue-white
c) Medium
- 3. a) Star B
b) Star A is brighter by a factor of 100
c) Star B is brighter by a factor of 10000
- 4. a) 1
b) Yes
- 5. 25 parsecs
- 6. -5