Discussion Review Test #2

Units 12-19:

(1) For an elliptical orbit, which of the following is true:
   a. Orbital speed varies
   b. Orbital speed is constant
   c. Kepler’s laws no longer apply
   d. Force of gravity scales as distance^4

(2) Why are tidal bulges on opposite sides of the Earth?
   a. Earth’s rotation
   b. Sun’s gravity
   c. Differential Forces
   d. Earth’s elliptical orbit

(3) Which one of these is true regarding Earth’s Escape velocity?
   a. If Earth’s radius increases, escape velocity decreases
   b. If Earth’s radius increases, escape velocity increases
   c. A small object has a higher escape velocity in a no-atmosphere environment
   d. A small mass object has a lower escape velocity in a dense atmosphere environment

(4) Which law could you use to find out how much further Jupiter is from the sun than Mars?
   a. Kepler’s 1st law
   b. Newton’s 1st Law
   c. Kepler’s 3rd Law
   d. Wien’s Law

(5) Which is one of Kepler’s laws:
   a. For every action there is an equal and opposite reaction
   b. Planets move in elliptical orbits
   c. F=ma
   d. Planets move in perfect circles around the sun

(6) All of the following are included in Kepler’s laws except:
   a. Planets move in elliptical orbits with the sun at one focus points.
   b. A line drawn between a planet and the sun sweeps out equal areas in equal times.
   c. Planets move with constant orbital velocities.
   d. The orbital period of a planet around the sun is related to the distance between the planet and the sun.
Galileo used his observations of the changing phases of Venus to demonstrate that

a. the sun moves around the Earth
b. the universe is infinite in size
c. the Earth is a sphere
d. the Moon orbits the Earth
e. Venus follows an orbit around the Sun

If Mars has an orbital period of 150 years, how large is the orbit’s size around the sun?

a. ~28 AU  
b. ~280 AU  
c. ~0.28 AU  
d. ~14 AU

I go out observing tonight for 3 hours. Which of the following would I most likely be able to notice with my naked eye?

a. Retrograde motion of a planet  
b. Precession of the Earth  
c. Stars movement around the celestial sphere  
d. The sun’s motion around the Milky Way

Galileo used his observations of the changing phases of Venus to demonstrate that

a. the sun moves around the Earth  
b. the universe is infinite in size  
c. the Earth is a sphere  
d. the Moon orbits the Earth  
e. Venus follows an orbit around the Sun

What would happen to the force of gravity between a sun and Earth if the distance to the Earth was decreased to 0.5 AU?

a. The force stays the same  
b. The force becomes 4 times stronger  
c. The force becomes 2 times bigger  
d. The force becomes 4 times smaller

Which of the following is not one of Newton’s laws?

a. A body maintains the same velocity unless forces act on it  
b. $P^2 = A^3$  
c. While you exert a force on an object, the object exerts a force back on you  
d. $F = ma$

If the distance between 2 astronomical bodies is tripled, what effect does this have on the force of gravity between the 2 bodies?

a. The force increases by a factor of 9  
b. The force increases by a factor of 3  
c. The force decreases by a factor of 9  
d. The force decreases by a factor of 3
A brother and his older sister are fighting over some “Fun Dip ®.” Push comes to shove, and the two both pushed each other with the same force. Unfortunately, the determined yet little skinny boy fell back faster than his fat older sister. Which of the following laws of physics explains this difference in their acceleration?

a. Newton’s third law  
b. Newton’s second law  
c. Newton’s first law  
d. None. It’s best explained by Kepler’s laws.

If a force of 600 N is exerted on an object and it gets accelerated by 60 km/s, what is the object’s mass?

a. $10^{-4}$ kg  
b. $10^{-2}$ kg  
c. 10 kg  
d. $10^2$ kg  
e. $10^4$ kg

During a period of 10 seconds, a horse accelerates from 0 m/s to 10 m/s. What is the acceleration of the horse during this time?

a. 0.1 m/s^2  
b. 1 m/s^2  
c. 10 m/s^2  
d. 100 m/s^2

What is the difference between “weight” and “mass”?

a. Weight is not measured in the metric system  
b. Weight is a measure of gravitational force, not mass  
c. Weight is a measure of acceleration, not mass  
d. There is no difference

What is the Law of Inertia?

a. A body at rest stays at rest unless acted on by an outside force  
b. $F=ma$  
c. $P^2=A^3$  
d. $F_g=mMG/R^2$

How much would you weigh on the sun?

a. The same, because your mass is the same  
b. Less because the Sun has more mass than the Earth  
c. More because the Sun has more mass than the Earth  
d. The same, because weight is independent of mass
(19) What happens to the force of gravity as two objects move farther apart?
   a. They no longer exert any force on each other
   b. The force stays the same, since their masses stay the same
   c. The force increases to maintain conservation of energy
   d. The force decreases by a factor of distance^2

(20) If an object moves along a curved path at a constant speed, you can infer that
   a. a force is acting on it
   b. it is accelerating
   c. it is in uniform motion
   d. Both (a) and (b)
   e. Neither (a) nor (b)

(21) The mass of a 5 kg bowling ball would be __________ if it were located in deep space
   a. zero
   b. much smaller
   c. slightly smaller
   d. the same

(22) Gravity
   a. is the result of the pressure of the atmosphere on us
   b. occurs between objects that are touching
   c. is the force larger objects exert on smaller ones
   d. is the attraction between all objects that have mass
   e. is caused only by the planets and the Sun

(23) The Moon’s escape velocity is smaller than the Earth’s because
   a. its radius is smaller
   b. its mass is smaller
   c. its distance from the Earth is greater
   d. it has no atmosphere
   e. All of the above

Units 20-29

(24) A brick falls to the ground. It has a mass of 4 kg and is traveling 25 m/s at impact. What is the kinetic energy of the brick just before impact?
   a. 100 J
   b. 50 J
   c. 500 J
   d. 1250 J
(25) A volleyball has about half the mass of a basketball. If they are both moving at the same speed, the volleyball’s kinetic energy would be ________ the basketball’s.
   a. 2 times more than
   b. ½ as much as
   c. 4 times more than
   d. ¼ as much as
   e. the same as

(26) Why do stars at greater distances appear less bright? (assume the same total light output)
   a. photons lose energy as they travel
   b. photons spread out as they travel
   c. interference from the wave nature of light
   d. all of the above

(27) Consider two stars with the same luminosity. Star ‘A’ is twice the distance from Earth as star ‘B’. How does their brightness compare?
   a. B is 2 times as bright
   b. A is 2 times as bright
   c. B is 4 times as bright
   d. B is 16 times as bright
   e. They are the same brightness

(28) Which type of electromagnetic radiation has the longest wavelength?
   a. Visible
   b. Ultraviolet
   c. X-ray
   d. Infrared
   e. Radio

(29) Which kind of photon has the highest energy?
   a. Ultraviolet
   b. Visible
   c. X-ray
   d. Infrared
   e. Radio

(30) Describing an atom’s orbitals as being quantized refers to the fact that
   a. the atom is made of individual electrons, protons, and neutrons.
   b. Orbits resemble a planet in orbit about the sun
   c. Only some orbits are allowed corresponding to allowed energies.
   d. The electron’s electric change has a fixed value
(31)
Star A’s spectrum peaks at a bluer wavelength than Star B’s spectrum
   a. A is hotter than B
   b. B is hotter than A
   c. Star are not blackbodies, therefore we cannot tell.

(32)
Imagine you are observing a star with a molecular cloud between the Earth and star.
What type of spectrum do you expect to observe?
   a. emission
   b. absorption
   c. continuous

(33)
If the sun’s temperature is doubled what would its expected luminosity be?
   a. 2 times more
   b. 4 times more
   c. 2 times less
   d. 16 time more

(34)
Most stars have spectra showing dark lines against a continuous background of color.
This observation indicates that these stars
   a. are made almost entirely of hot, low-density gas
   b. are made almost entirely of cool, low density gas
   c. have a warm interior that shines through hotter, high-density gas
   d. have a hot interior that shines through cooler, low-density gas

(35)
If an object’s spectral lines are shifted to longer wavelengths, the object is
   a. moving away from us
   b. moving toward us
   c. very hot
   d. very cold
   e. emitting x-rays

(36)
Which of the following is NOT a reason that astronomers seek to build larger telescopes?
   a. Larger telescopes can resolve greater detail
   b. Larger telescopes collect more photons
   c. Larger telescopes can detect fainter objects
   d. Larger telescopes are less affected by the Earth’s atmosphere

(37)
Which of the following is an important difference between radio waves and other electromagnetic radiation for the design of astronomical instrumentation?
   a. Radio waves are detected as sounds, not light
   b. Radio wavelengths travel much more slowly than other electromagnetic radiation
   c. Radio photons have very small energies
   d. Radio waves cannot be focused
   e. All of the above
(38)
A telescope’s resolution measures its ability to see
a. fainter sources
b. more distant sources
c. finer details in sources
d. larger sources
e. more rapidly moving sources

(39)
Why are mirrors on optical telescopes parabolic?
a. spherical mirrors are harder to make
b. parabolic mirrors focus parallel beams of light
c. parabolic mirrors filter out atmospheric effects

(40)
When designing a telescope which would be the most important consideration
a. amount of magnification
b. diameter to telescope
c. both are equally important

(41)
What makes x-ray telescopes unique?
a. x-rays are not electromagnetic radiation
b. x-rays have higher energy than visible light
c. x-rays pass through normal mirrors
d. all of the above
e. b & c

(42)
What is dispersion?
a. described by the wave nature of light; passing through a small opening a plane
   wave will emerge circular.
b. effect caused by different wavelengths of light traveling at slightly different
   speeds in most materials
c. describes the ability of transparent substances to alter the path of electromagnetic
   waves

(43)
What is refraction?
a. described by the wave nature of light; passing through a small opening a plane
   wave will emerge circular.
b. effect caused by different wavelengths of light traveling at slightly different
   speeds in most materials
c. describes the ability of transparent substances to alter the path of electromagnetic
   waves
What is diffraction?

a. described by the wave nature of light; passing through a small opening a plane wave will emerge circular.

b. effect caused by different wavelengths of light traveling at slightly different speeds in most materials

c. describes the ability of transparent substances to alter the path of electromagnetic waves