

- 1 Because mirrors only use one surface, they have a big advantage over lenses: They can be
 - a. thicker and stronger.
 - b. filled with more holes.
 - c. thinner and larger in diameter.
 - d. made more accurately.
 - e. made out of metal.

- 2 Compared to the frequency of photons emitted during a transition from a -4eV state to a -5eV state, transitions from a -3eV state to the -5eV state would emit photons whose frequency is
 - a. 3 times as high.
 - b. 4 times as high.
 - c. the same.
 - d. 2 times as high.
 - e. 5 times as high.

- 3 Which one of the following statements about the Theory of Evolution is definitely wrong?
 - a. The Theory has not yet been disproved.
 - b. The Theory is wrong.
 - c. The Theory is well-established.
 - d. The Theory might be right.
 - e. The Theory is a proven fact.

- 4 Freely falling objects with different masses fall with the same acceleration because
 - a. there is no air resistance.
 - b. they have the same amount of inertia.
 - c. gravity acts with less force on more massive object.
 - d. gravity acts with the same force on both objects.
 - e. gravity acts more strongly on the more massive object.

- 5 In Newton's Theory of planetary motion,
 - a. the Earth moves around the unmoving Sun.
 - b. the Sun and Earth move around each other.
 - c. the Sun and Earth do not really move at all.
 - d. the Sun moves around the unmoving Earth.

- 6 A likely limitation on the usable life of an ultraviolet observatory would be
 - a. its supply of electric power.
 - b. the decay of its orbit.
 - c. its supply of coolant.
 - d. obsolescence.

- 7 The wavelength of the sound waves that correspond to middle-C is about 4 feet. If you are standing 8 feet away from a piano that is playing that note, then between you and the piano there will usually be
- two regions of maximum pressure.
 - three regions of maximum pressure.
 - maximum pressure every four seconds.
 - one region of maximum pressure.
 - maximum pressure every two seconds.
- 8 Which of the following can be seen everywhere on the night side of the Earth?
- A partial eclipse of the Sun.
 - A total eclipse of the Moon.
 - A New Moon.
 - A waxing quarter Moon.
 - A total eclipse of the Sun.
- 9 Kepler was an early advocate of the Copernican Theory. When he applied it to Tycho's observations, it
- worked perfectly.
 - failed and was completely discarded.
 - failed but led to a better theory.
 - was as accurate as the observations.
- 10 Which of Kepler's Laws governs how a particular planet speeds up and slows down?
- The Law of Averages.
 - The Period-Radius Relation.
 - The Equal Area Law.
 - Orbits are Ellipses.
 - The Law of Inertia.
- 11 Light with an absorption spectrum is usually generated by
- light from hot dense material passing through a rarefied gas.
 - a hot, rarefied gas.
 - a cold, rarefied gas.
 - hot, dense material.
- 12 A converging lens will send the light from a distant star through a point
- on the side of the lens opposite the star.
 - at one edge of the lens.
 - on the same side of the lens as the star.
 - in the center of the lens.
 - infinitely far away from the lens.
- 13 Kepler's Laws
- are explained by a force in the direction of each planet's motion.
 - are explained by a force that attracts each planet to the Sun.
 - are explained by the action of magnetic fields on each planet.
 - have never been explained.
 - are explained by a force that repels each planet from the Sun.

- 14 The problem of stars "twinkling" due to atmospheric turbulence
- can be corrected by using a more powerful eyepiece.
 - can only be corrected by putting telescopes in space.
 - can be corrected by using a guide star.
 - can be corrected by going to larger telescope mirrors.
 - cannot be corrected.
- 15 The summer solstice occurs when the Sun is
- closest to the Earth.
 - farthest South of the Celestial Equator.
 - farthest from the Earth.
 - farthest North of the Celestial Equator.
 - on the Celestial Equator.
- 16 You hear a 1000Hz tone from a radio that is 20 feet away from you and listen for 4 seconds. How many pressure maxima pass by your ear?
- 5000.
 - 50.
 - 100.
 - 20.
 - 4000
- 17 Compared to stars of other colors, a blue star will have a surface temperature that is
- in the middle of the range.
 - among the highest.
 - among the lowest.
- 18 Suppose that only the force of gravity and the force that you, personally, exert are acting on an object with a mass of one kilogram. How much upward force must *you* exert on the object to cause it to accelerate upward at 2 meters per second per second?
- 11.8 Newtons.
 - 2 Newtons.
 - 7.8 Newtons.
 - 1 Newton.
 - 9.8 Newtons.
- 19 The declination of a celestial object is measured in terms of
- years, months, and days of time.
 - light-minutes and light-seconds.
 - degrees, minutes, and seconds of arc.
 - parsecs and megaparsecs.
 - hours, minutes, and seconds of time.
- 20 Compared to a proton, an electron has
- about the same mass.
 - much less mass.
 - much more mass.

- 21 If the frequency of electromagnetic radiation goes from $3 \times 10^{14} \text{ Hz}$ to $9 \times 10^{14} \text{ Hz}$, the energy of each individual photon in the radiation
- is divided by 2.
 - does not change.
 - is multiplied by 3.
 - is divided by 3.
 - is multiplied by 2.
- 22 Which of the following types of radiation has the lowest frequency on this list.
- Radio waves.
 - red light.
 - infrared light.
 - green light.
 - heat radiation.
- 23 Mercury is closer to the Sun than Earth. Which of the following statements is true?
- Mercury takes less time to go around the Sun and moves faster than the Earth.
 - Mercury takes more time to go around the Sun but moves faster than the Earth because it keeps getting confused.
 - Mercury takes more time to go around the Sun and moves slower than the Earth.
 - Mercury takes less time to go around the Sun but moves slower than the Earth because it does not have as far to go.
- 24 Galileo was arrested for arguing that
- Ptolemy's System of Planetary Motion was wrong.
 - Aristotle's Laws of Motion were wrong.
 - Aristotle's Laws of Motion were right.
 - Ptolemy's System of Planetary Motion was right.
- 25 Which of the following light sources would you expect to give polarized light?
- Electric charges moving at random.
 - The glowing phosphor coating in a fluorescent lamp.
 - The hot filament of a light bulb.
 - Electric charges forced to move along magnetic field lines.
- 26 The most severe problem facing a radio telescope is
- chromatic aberration.
 - atmospheric turbulence.
 - the diffraction limit.
 - atmospheric absorption.
 - spherical aberration.
- 27 You see a waxing Gibbous Moon directly south. What time might it be?
- midnight.
 - sunrise.
 - about 3am.
 - about 10pm.
 - sunset.

- 28 Suppose that there is a cannon which can fire shells at any speed. If this cannon is located on the earth's surface, its shells
- could never go into earth orbit.
 - could go into earth orbit if fired at a high enough speed.
 - always return to the earth.
- 29 The closest star to the North Celestial Pole that is visible to the naked eye is
- Altair.
 - Mizar.
 - Sirius.
 - Alcor.
 - Polaris.
- 30 When the Moon's shadow falls on the Earth, the result is a
- eclipse of the Sun.
 - New Moon.
 - eclipse of the Moon.
 - winter.
 - harmonic convergence.
- 31 The sun sets in the
- East.
 - South.
 - Ocean.
 - North.
 - West.
- 32 Eclipses happen when the Full or New Moon occurs on the
- Winter Solstice.
 - Ecliptic.
 - Vernal Equinox.
 - Horizon.
 - Celestial Equator.
- 33 Which of the following is a scientific statement (as defined by Popper)?
- There is beauty in a sunset.
 - The Moon is made entirely of cheese.
 - Isaac Newton was the greatest scientist.
 - There is intelligent life on other stars.
 - There is cheese on the Moon.
- 34 A unit of mass is the
- Newton.
 - meter per second.
 - kilogram.
 - meter per second per second.
 - meter.

- 35 One argument in favor of a moving Earth is
- that Venus has phases like our Moon.
 - that the Sun has spots.
 - that the Earth has a Moon.
 - that Jupiter has satellites.
- 36 You see a reflecting telescope with a short, stubby tube and the eyepiece at the back. This telescope uses the
- Coudé Focus
 - Newtonian Focus.
 - Prime Focus.
 - Cassegrain Focus.
- 37 The mirror of an X-Ray telescope is
- made from nested cylinders.
 - parabolic like the mirror of an optical telescope.
 - spherical.
 - made from flat sheets.
- 38 The red line of a spectrum is normally at a wavelength of 656 nm. In the light of a star that is moving away from us, we might expect to see that red line at a wavelength of
- 650nm.
 - 660nm.
 - 656nm.
- 39 How long will it take for a star that is near the Celestial Equator to move by one degree relative to the earth?
- 30 minutes.
 - 4 minutes.
 - 6 2/3 minutes.
 - 5 minutes.
 - 15 minutes.
- 40 Aristotle said that a moving object with nothing pushing or pulling on it will always
- follow a circular path.
 - speed up.
 - keep moving at the same speed.
 - slow down and stop.
- 41 Retrograde Motion refers to the
- westward motion of the planets relative to the horizon.
 - westward motion of the planets relative to the stars.
 - eastward motion of the Sun relative to the stars.
 - westward motion of the Moon relative to the horizon.
 - eastward motion of the planets relative to the stars.
- 42 Popper's description of how science works suggests that the Copernican Theory was not accepted at first because
- Ptolemy's Theory had not yet been proven wrong.
 - it was hard to understand.
 - it contradicted Church doctrine.

- 43 Which of the following tasks would *require* a non-science discipline?
- Finding a cure for cancer.
 - Repairing a motorcycle.
 - Sentencing a criminal.
 - Designing an airplane.
 - Programming a computer.
- 44 By making extensive observations of planetary motion, Tycho Brahe
- proved that Copernicus was right.
 - explained how planets move.
 - provided only a lot of accurate data.
 - discovered new planets.
 - disproved Ptolemy's theory of planetary motion.
- 45 Kepler found that planetary orbits are
- ellipses with the Sun at one focus.
 - ellipses with the Sun at the center.
 - circles with the Sun at the center.
 - circles with the Sun off-center.
- 46 An automobile with a mass of 1000kg is moving at 30m/s when it goes off the road and hits the safety rail, stopping in just one second. How much force did the safety rail exert on the car in order to stop it?
- 30N
 - 0.03N
 - 1000N
 - 1030N
 - 30,000N
- 47 A problem that is peculiar to infrared telescopes is a need for
- cooling to low temperature.
 - large reflector sizes.
 - grazing incidence mirrors.
 - very long exposure times.
- 48 Suppose that a sound wave has a wavelength of 12 meters and a frequency of 100Hz. What is the speed of sound?
- 12 m/s
 - 8.34 m/s
 - 100 m/s
 - 1200 m/s
 - 0.012 m/s
- 49 Electrons that are bound to the nucleus of an atom (so that energy is needed to remove them) can have
- only certain isolated negative energies.
 - only certain isolated positive energies.
 - any positive energy at all.
 - any negative energy at all.

- 50 Copernicus said that the retrograde motion of the planets was caused by the
- planets moving on epicycles.
 - earth turning on its axis.
 - planets speeding up and slowing down.
 - earth and the planets orbiting the Sun.
 - planets turning on their axes.
- 51 From his observations of the phases of Venus, Galileo concluded that
- The Copernican Model is wrong.
 - Venus has moons.
 - Tycho Brahe's Model is wrong.
 - The Ptolemaic Model is wrong.
 - Venus is rotating.
- 52 The Law of Inertia states that a moving object will
- stop if no force acts on it.
 - never stop.
 - keep moving if no force acts on it.
 - keep moving if a force pushes it.
 - always stop.

Answers: Exam 1, Preview 1, Fall 2004

- 1 Choice c. (thinner and larger in diameter.)
- 2 Choice d. (2 times as high.)
- 3 Choice e. (The Theory is a proven fact.)
- 4 Choice e. (gravity acts more strongly on the more massive object.)
- 5 Choice b. (the Sun and Earth move around each other.)
- 6 Choice d. (obsolescence.)
- 7 Choice a. (two regions of maximum pressure.)
- 8 Choice b. (A total eclipse of the Moon.)
- 9 Choice c. (failed but led to a better theory.)
- 10 Choice c. (The Equal Area Law.)
- 11 Choice a. (light from hot dense material passing through a rarefied gas.)
- 12 Choice a. (on the side of the lens opposite the star.)
- 13 Choice b. (are explained by a force that attracts each planet to the Sun.)
- 14 Choice c. (can be corrected by using a guide star.)
- 15 Choice d. (farthest North of the Celestial Equator.)
- 16 Choice e. (4000)
- 17 Choice b. (among the highest.)
- 18 Choice a. (11.8 Newtons.)
- 19 Choice c. (degrees, minutes, and seconds of arc.)
- 20 Choice b. (much less mass.)
- 21 Choice c. (is multiplied by 3.)
- 22 Choice a. (Radio waves.)
- 23 Choice a. (Mercury takes less time to go around the Sun and moves faster than the Earth.)
- 24 Choice a. (Ptolemy's System of Planetary Motion was wrong.)
- 25 Choice d. (Electric charges forced to move along magnetic field lines.)
- 26 Choice c. (the diffraction limit.)
- 27 Choice d. (about 10pm.)
- 28 Choice a. (could never go into earth orbit.)
- 29 Choice e. (Polaris.)
- 30 Choice a. (eclipse of the Sun.)
- 31 Choice e. (West.)
- 32 Choice b. (Ecliptic.)
- 33 Choice b. (The Moon is made entirely of cheese.)
- 34 Choice c. (kilogram.)
- 35 Choice d. (that Jupiter has satellites.)
- 36 Choice d. (Cassegrain Focus.)

- 37 Choice a. (made from nested cylinders.)
- 38 Choice b. (660nm.)
- 39 Choice b. (4 minutes.)
- 40 Choice d. (slow down and stop.)
- 41 Choice b. (westward motion of the planets relative to the stars.)
- 42 Choice a. (Ptolemy's Theory had not yet been proven wrong.)
- 43 Choice c. (Sentencing a criminal.)
- 44 Choice c. (provided only a lot of accurate data.)
- 45 Choice a. (ellipses with the Sun at one focus.)
- 46 Choice e. (30,000N)
- 47 Choice a. (cooling to low temperature.)
- 48 Choice d. (1200 m/s)
- 49 Choice a. (only certain isolated negative energies.)
- 50 Choice d. (earth and the planets orbiting the Sun.)
- 51 Choice d. (The Ptolemaic Model is wrong.)
- 52 Choice c. (keep moving if no force acts on it.)

Where to find these questions in the notes

- 1 Module 012 Focal Point of a Mirror: Question 012.24
- 2 Module 011 The Reason for Spectra: Question 011.43
- 3 Module 003 Scientific Proof: Question 003.11
- 4 Module 008 Unifying Physical Law: Question 008.23
- 5 Module 008 Making New Predictions: Question 008.31
- 6 Module 013 Ultraviolet: Question 013.32
- 7 Module 009 Wavelength: Question 009.12
- 8 Module 002 Lunar Eclipses: Question 002.32
- 9 Module 006 Death of a Theory: Question 006.11
- 10 Module 006 Equal Area Rule: Question 006.32
- 11 Module 010 Spectra: Question 010.33
- 12 Module 012 Focal Point of a Lens: Question 012.11
- 13 Module 008 Explaining Kepler's Laws: Question 008.11
- 14 Module 012 Telescope Limitations: Question 012.43
- 15 Module 001 The Path of the Sun: Question 001.55
- 16 Module 009 Frequency: Question 009.23
- 17 Module 010 Temperature and Color: Question 010.22
- 18 Module 007 Definitions of Force and Mass: Question 007.33
- 19 Module 001 Celestial Coordinates: Question 001.23
- 20 Module 011 The Building Blocks: Question 011.12
- 21 Module 011 Photons: Question 011.26
- 22 Module 010 The Electromagnetic Spectrum: Question 010.13
- 23 Module 006 The Period-Radius Relation: Question 006.42
- 24 Module 005 The Science Writer: Question 005.42
- 25 Module 009 Polarization: Question 009.41
- 26 Module 013 Radio Telescopes: Question 013.11
- 27 Module 002 Phases of the Moon: Question 002.17
- 28 Module 008 Artificial Satellites: Question 008.41
- 29 Module 001 The Celestial Sphere: Question 001.12
- 30 Module 002 Solar Eclipses: Question 002.24
- 31 Module 001 Apparent Motion of the Sun: Question 001.42
- 32 Module 002 Predicting Eclipses: Question 002.43
- 33 Module 003 How to test a statement : Question 003.21
- 34 Module 007 Definitions of Force and Mass: Question 007.23
- 35 Module 005 Advocate for Copernicus: Question 005.34
- 36 Module 012 Telescope Designs: Question 012.32

- 37 Module 013 X-Rays: Question 013.42
- 38 Module 010 The Doppler Effect: Question 010.43
- 39 Module 001 Star Motions: Question 001.34
- 40 Module 005 The First Physicist: Question 005.11
- 41 Module 004 Wandering Planets: Question 004.12
- 42 Module 004 Why Copernicus Lost: Question 004.33
- 43 Module 003 Non-science: Question 003.32
- 44 Module 004 Tycho Brahe's Role: Question 004.42
- 45 Module 006 Orbits are Ellipses: Question 006.21
- 46 Module 007 The Law of Force and Mass: Question 007.41
- 47 Module 013 Infrared: Question 013.21
- 48 Module 009 Speed of a Wave: Question 009.34
- 49 Module 011 Atomic Energy Levels: Question 011.31
- 50 Module 004 The Copernican System: Question 004.21
- 51 Module 005 The First Astrophysicist: Question 005.23
- 52 Module 007 The Law of Inertia: Question 007.12