Astronomy 1001           Midterm (100 pts)        Name:

Instructions:
Mark your answers on this test as you will NOT get your bubble sheet back.
One side of one page of notes is allowed. Calculators are NOT allowed.
Fill in your name and ID number on the bubble sheet.
Use a #2 pencil on the bubble sheet. Make your bubbles dark and neat.
There are 10 T/F questions each worth 2 pts., 30 multiple choice questions each worth 2 pts. and
your choice of 2 essay/picture answer questions worth 10 pts. each.

True/False ( True = A, False = B )

1. People in New Zealand can see constellations that people in Poland can not see
   ____

2. Rockets work by pushing against the ground
   ____

3. Smaller planets can have larger mountains
   ____

4. If the Earth’s orbit was a perfect circle we would not have seasons
   ____

5. You can see a 1st Quarter Moon at sunrise in St. Paul
   ____

6. Earth is the largest terrestrial planet
   ____

7. The Moon has less iron than the Earth because it gave the Earth its iron when it formed
   ____

8. The sky is blue because it is reflecting the color of the ocean
   ____

9. Astronauts in the International Space Station “float” because there is no gravity
   ____

10. Even ancient Greeks thought the Earth was round
    ____

Multiple Choice

11. Which one of these does not affect whether a planet can keep its atmosphere?  ____
    A) Magnetic field
    B) Planet Mass
    C) Distance to Sun
    D) Rotational Speed
    E) All of the above determine if the planet keeps its atmosphere

12. Mars is red because:
    ____
    A) it appears red because of an optical illusion
    B) its surface rocks have rusted
    C) it is primarily made of copper and copper compounds
    D) its atmosphere absorbs red light
    E) Aliens painted it that color
13. Ancient people could distinguish stars from planets because:

   A) Planets were always much brighter than the stars
   B) Planets twinkle more
   C) Planets move eastward relative to the stars over many months
   D) Stars are part of constellations, planets aren’t
   E) A and B

14. Which type of telescope do modern astronomers use and why?

   A) Refractors, because lenses are cheaper to make and easier to support
   B) Reflectors, because lenses are cheaper to make and easier to support
   C) Refractors, because mirrors are cheaper to make and easier to support
   D) Reflectors, because mirrors are cheaper to make and easier to support
   E) Astronomers don’t use telescopes because telescopes are lame

15. The terrestrial planet cores contain mostly metal because

   A) the entire planets are made of mostly metal
   B) radioactivity created metals in the core from the decay of Uranium
   C) convection carried the metals to the core
   D) metals condensed first in the solar nebula and the rocks then accreted around them
   E) metals sank to the center during a time when the interiors were molten throughout

16. Earth is closer to the Sun in January than in July. Using Kepler’s 2\textsuperscript{nd} law you know that:

   A) Earth travels faster in July
   B) Earth travels faster in January
   C) It is winter everywhere on Earth in January
   D) Earth travels the same speed year around
   E) F = m * a

17. The sky on Earth is blue because:

   A) the sky is reflecting the color of the ocean
   B) the atmosphere absorbs all of the colors except blue
   C) the atmosphere emits blue light
   D) blue light is scattered by the atmosphere
   E) none of the above

18. The order of the first six planets of the solar system is:

   A) Mercury, Venus, Earth, Mars, Saturn, Jupiter
   B) Earth, Mars, Jupiter, Uranus, Saturn, Mercury
   C) Mercury, Venus, Earth, Mars, Jupiter, Saturn
   D) Mercury, Earth, Mars, Jupiter, Saturn, Uranus
   E) Venus, Earth, Mercury, Mars, Uranus, Jupiter
19. When you hit a baseball with a bat, the ball (hopefully) goes flying because:

   A) it is scared that the bat will hit it again
   B) the force the bat exerts on the ball is greater than what the ball exerts on the bat
   C) The mass of you plus the bat is greater than the mass of the ball, so it accelerates more
   D) B and C
   E) None of the above

20. Which of the following worlds has the most substantial atmosphere?

   A) Mercury
   B) Venus
   C) Earth
   D) Moon
   E) Mars

21. Which of the following is NOT an acceleration?

   A) the Moon orbiting around the Earth
   B) a greyhound running around a track at a constant 35 km/hr
   C) you slowing down your car at a stop sign
   D) a bowl of petunias falling to the Earth
   E) sliding across frictionless ice in a straight line

22. Which latitude(s) on the Earth will not always have a sunrise and a sunset each day?

   A) North Pole
   B) 32.5 South from the North Pole
   C) 12.5 North from the South Pole
   D) A and B
   E) A and C

23. If there is going to be a solar eclipse today then the phase of the Moon must be

   A) New
   B) Waxing crescent
   C) Full
   D) Waning Gibbous
   E) The phase of the Moon could be anything during a lunar eclipse

24. Red light

   A) has a shorter wavelength than orange light
   B) has a higher frequency than green light
   C) has more energy than blue light
   D) travels faster than yellow light
   E) none of the above
25. Why isn't Pluto defined as a planet?  
   A) because it is too small  
   B) it is too far from the Sun  
   C) it has not cleared its orbit of “debris”  
   D) because it is not round  
   E) because scientists are meanies

26. Why is Jupiter denser than Saturn?  
   A) Jupiter's higher mass and gravity compress its interior more  
   B) Jupiter has a larger portion of rock  
   C) Jupiter is more compressed by the Sun's gravity.  
   D) Saturn is “puffed” by tidal interactions.  
   E) They are the same mass, but Jupiter has a smaller radius.

27. Venus's angular momentum:  
   A) is constant  
   B) is greatest at perihelion  
   C) is smallest at perihelion  
   D) is greatest at aphelion  
   E) is smallest at aphelion

28. How do asteroids differ from comets?  
   A) Asteroids are made of mostly icy material while comets are made of rocky material.  
   B) Asteroids and comets are both made of rocky and icy material, but asteroids are larger.  
   C) Asteroids and comets are both made of rocky and icy material, but comets are larger.  
   D) Asteroids are made of rocky material. Comets are made of mostly icy material.  
   E) Asteroids are made of metals while comets are made of mostly rocky material.

29. The color of the stripes on Jupiter can tell us what about the stripe:  
   A) its general temperature  
   B) its general altitude  
   C) its composition  
   D) all of the above  
   E) none of the above

30. Amongst these choices, your weight is greatest:  
   A) On the Moon  
   B) On Mars  
   C) In space  
   D) in the center of the Sun  
   E) your weight is constant everywhere
31. Which of these is not a greenhouse gas

A) Methane  B) Water  C) Nitrogen  D) Carbon Dioxide  E) They are all greenhouse gases

32. Why have less people seen an eclipse of the Sun than an eclipse of the Moon?

A) Eclipses of the Sun are much rarer than eclipses of the Moon.  B) The shadow of the Moon is smaller than the shadow of the Earth.  C) Anyone on the night side of Earth can see a total eclipse of the Moon.  D) Anyone on the day side of Earth can see a total solar eclipse.  E) B and C

33. According to Kepler's 3rd Law, which of these planets takes the longest to go around the Sun?

A) Neptune  B) Mercury  C) Saturn  D) Jupiter  E) Mars

34. The force of Saturn's gravity on Titan is:

A) the cause of Titan's awesomeness  B) greater than the force of Titan's gravity on Saturn  C) negligible  D) equal to the force of the Titan's gravity on Saturn  E) decreasing over time, causing Titan's rotation to slow

35. The Moon:

A) has greatest potential energy and smallest kinetic energy at apogee  B) has smallest potential energy and greatest kinetic energy at apogee  C) has smallest potential energy and smallest kinetic energy at perigee  D) has greatest potential energy and smallest kinetic energy at perigee  E) has no change in potential or kinetic energy throughout it's orbit

36. Radio waves are:

A) a sound  B) a low frequency light  C) faster than visible light  D) a high frequency light  E) slower than visible light
37. If a planet has few impact craters of any size then
A) the craters were eroded or erased by geological processes
B) its atmosphere stopped some impactors from reaching the surface
C) it was never hit by any impactors
D) the surface of the planet was too solid to make any craters
E) A and/or B

38. How do we think Earth got its Moon?
A) The Moon is debris from a giant impact
B) The Moon formed with the Earth
C) The Moon was flung off of a rapidly spinning Earth
D) The Moon was captured by the Earth
E) The Earth was the highest bidder on Ebay

39. How old is the solar system?
A) As old as the Universe
B) Older than the Sun
C) 4.5 billion years
D) 4.5 trillion years
E) impossible to tell

40. Why is Io more volcanically active than our own Moon?
A) Io is larger than our Moon.
B) Io is tidally heated by Jupiter.
C) Io has more radioactive metals
D) Our own Moon was cooled by impacting the Earth
E) Io isn't volcanically active.
Short Answer (pick 2, each worth 10 points)

Please explain how the greenhouse effect works. Draw a picture.

Why does an apple fall to the Earth, but the Moon falls around the Earth? Imagine firing a canon from a mountain top, what do you have to do to make the cannon ball that is fired orbit the Earth? Please draw pictures. Why won't the Moon ever fall into the Earth?
Please explain what the interior of the Earth looks like and how we know. Draw a picture.

Please explain stellar parallax and how it proves the Earth moves. (Draw pictures) Why wasn't this seen until the 1800's?
Explain how we currently think the solar system formed and how this theory explains what we observe about the solar system.

You want to purchase a telescope, please describe the 3 properties of a telescope and explain which one(s) you care most about and why. Please draw a sample picture of the telescope you would buy, with sample light rays and important parts labeled.