Physics Final Exam Review

Name: Date:

2011 - 2012

This Final Exam Review is NOT comprehensive. Anything we have learned this year is "fair-game" for inclusion on your final exam.

You may bring one 3x5" card to the exam to help you recall important formulae and units, etc. This card must be handwritten in your own writing.

Units of Measurement: *Please give the **S.I.** unit(s) for each*

	Name:	Abbreviation:
Distance (d):	_____	_____
Time (t):	_____	_____
Temperature (T):	Kelvin (Absolute)	**K**
	Celsius (Centigrade)	**°C**
Mass (m):	_____	_____
Density (ρ):	kilograms / meters^3	**kg/m^3**
Energy (*E*):	_____	_____
Force (F):	_____	_____
Power:	_____	_____
Work:	_____	_____
Heat (Q):	calorie	**c**
Specific Heat Capacity (c):	calorie/g°C	**c/g°C**
Elec. Charge:	Coulomb	**C**
Elec. Current (I):	Ampere	**A**
Elec. Resistance (R):	Ohm	**Ω**
Elec. Potential (V):	Volt	**V**
Elec. Capacitance :	Farad (1 Coulomb / Volt)	**F**
Frequency:	_____	_____
Sound Intensity:	decibel	**db**
Pressure:	Pascal (N/m^2)	**Pa**

Electricity: Chapters 32-37

Short Answer Review Questions:

1. How are **speed** and **velocity** different?

   _____

   _____

2. How does **acceleration** relate to **speed**?

   _____

3. What is the value of the constant ***g*** (acceleration due to gravity)?

   _____

4. **How far** will an object dropped from rest fall in 7 seconds? (Pg. 19-23)

   _____m

5. How are **scalar** and **vector quantities** different?

   _____

6. How can a **satellite** continue to orbit the earth if the force of gravity (***g***) is constantly pulling down down on it?

   _____

   _____

7. How can **air resistance** affect the speed of a projectile in motion?

   _____

8. How did **Aristotle** differ in opinion from **Copernicus** and **Galileo** regarding the principles of motion?

   _____

   _____

_____

9. Please give a brief, **adequate definition for each of Newton's Laws of Motion**:

   1st: _____

   2nd: _____

   3rd: _____

10. You can calculate the _____ of an object by multiplying its **mass** and **velocity** values together.

11. Distinguish between the terms **mass** and **weight:**

    _____

    _____

12. What is the **weight** of book with a **mass** of 5kg? (Pg. 50)

    _____ N

13. What is the **speed of the Earth** relative to the Sun? (Pg. 55)

    _____ km/s

14. If forces of **9 N** and **21 N** act in opposite directions on the same object, **what is the net force**?

    _____ N

15. One of the most elegant Physics formulas is **F=ma**. What is this formula useful for?

    _____

    Rearrange this formula to solve for **m** and **a**:

16. Pressure can be defined as the amount of _____ exerted per unit _____.

    The average **air pressure at sea level** on Earth is _____.

17. What is the **acceleration** caused by a net force of 2 N on a 2 kg mass? (Pg. 73 #35)

    _____ m/s^2

18. **Impulse** = Δ (_____ _____)

19. **Energy *in motion*** is _____ energy.

    Energy *held in readiness* is _____ energy.

20. To solve for an object's **gravitational potential energy**, you must multiply the following 3 values:

    PE_g = _____ x _____ x _____

21. How can the slightly elliptical orbit of the moon around the Earth illustrate the **law of the conservation of energy**? (pg. 203-204)

    _____

    _____

22. Why, specifically, must objects in close circular orbit around Earth attain a **minimum orbital speed of 8 km/s**?

    _____

    _____

23. Perform the following **temperature conversions**:

    30°C = _____K _____°F

    100K = _____°C _____°F

68°F = _____°C _____K

24. In theory, what happens to matter at the lowest point on the Kelvin temperature scale?

_____

This low point, øK is referred to as: _____ _____

25. Please briefly define each of the **3 laws of Thermodynamics**:

1st: _____

2nd: _____

3rd: _____

26. The 2nd Law of Thermodynamics introduces an important physical principle implicating **a universal tendency toward disorder**. What is this principle called?

_____

How could this principle conflict with evolutionary cosmologies (theories about the formation of the Universe)?

_____

_____

_____

27. Draw and label the Sun-Earth-Moon system during a **solar eclipse:**

Draw and label the Sun-Earth-Moon system during a **lunar eclipse:**

28. Astronauts experience **weightlessness** in space. Why?

_____

_____

29. Sir Isaac Newton's elegant formula expressing universal gravitational force is:

30. Objects topple when their _____ of _____ extends beyond their support base.

31. Solve for the resultant speed of an object with a speed of 1 m/s that experiences a 90° cross-wind at 1 m/s:

_____ m/s

32. Please list the states of matter in order of *increasing entropy*:

1. _____ 2. _____ 3. _____

33. Explain how a bullet shot at a certain horizontal speed could experience acceleration mid-flight:

_____

_____

34. What is unique about the **specific heat capacity of water**?

_____

_____

35. Water is most dense at _____°C.
Why is this important to aquatic life on Earth?

_____

_____

36. Briefly define the 3 methods by which objects can achieve thermal equilibrium:

Conduction:_____

Convection: _____

Radiation: _____

37. Calculate the gravitational attraction between two bodies of equal mass (you choose the mass) at a distance of 1 m apart:

F_g = _____N

38. A child on a playground swing experiences the physical principle of _____ _____ motion.

39. **Calculate the period** of the child's back-and-forth swing using the following factors:

Mass: 50 kg **Length**: 3 m ***g***: 9.8 m/s^2

T = _____ seconds

40. **Calculate the frequency** of the same swing:

f = _____ Hz

41. **Sound** waves are examples of _____ waves.

Light waves are examples of _____ waves.

42. **Calculate the speed of waves** in water that are 0.4 m apart and have a frequency of 2 Hz. (Recall **v = λ*f***) *Pg. 388 #24*

v = _____

43. Why can **light** travel through the empty void of outer space when **sound** waves cannot?

_____

_____

44. When two waveforms overlap, an _____ pattern is formed. (Pg. 379)

45. What is meant by **destructive interference**?

_____

46. Is **interference** common only to light waves or does it apply to all types of waves? Explain your answer…

_____

_____

47. According to the Doppler effect, the **apparent pitch** of an ambulance siren **as it approaches an observer** will be:

a. Higher than actual pitch b. Lower than actual pitch c. Zero

48. As stars move away from a point in space, their color spectrum will experience an apparent _____ shift as viewed from that point. (Pg. 383)

49. When an aircraft flies faster than the speed of sound, a _____ _____ can be heard by an earthbound observer.

50. What is the **average speed of sound waves in air**? _____m/s.

51. The speed of sound in dry air at 0°C is 330 m/s. **For every degree increase in temperature, the speed of sound will increase by 0.6 m/s**.

Knowing this, what would the speed of sound in dry air be at 20°C?

_____m/s.

52. What is the **average range (in Hz) of human hearing**? (Pg. 391)

_____ Hz → _____Hz

53. What are the **2 distinct regions in a longitudinal (ie. sound) wave**?

There are regions of _____ *and* _____.

54. In a vacuum, light travels at a speed of _____.

55. What portion of the electromagnetic spectrum does *visible light* occupy?

Visible light occupies the **3.5×10^{-7} m → 7.5×10^{-7} m λ range.**

56. What are the 2 parts of a **shadow**?

The **central** region is called the _____, while the outer

fringe region is called the _____.

57. List the following types of electromagnetic waves *in order of increasing energy*:

ULTRAVIOLET LIGHT 1. _____

RADIO WAVES 2. _____

GAMMA RAYS 3. _____

MICROWAVES 4. _____

VISIBLE LIGHT 5. _____

INFRARED LIGHT 6. _____

58. Why do plant leaves appear green to our eyes?

_____

_____

59. Why is the sky blue? (pg. 432)

_____

_____

Why are sunsets often brilliant shades of red? (pg. 433)

_____

_____

60. The **law of reflection** in optics defines how light reflects off of surfaces. This law states: (pg. 444)

    The angle of _____ = The angle of _____

61. What is **refraction**?

    _____

62. Distinguish between **centripetal** and **centrifugal force**. Which is a "fictional force"?

    _____

    _____

    _____

63. If you swing an object in a circle over your head – and then let go of the object – what path will the object take relative to its original circular path?

    _____

    _____

Memory Verses that may be included on your Final Exam:

Psalm 19:1

Psalm 102:25

Hebrews 11:3

Seniors,

Thank you for your hard work in Physics class this year. My hope and prayer is that you will use some of the principles from this class to further support your experience of being rooted and grounded in the truth of the Word of God. It is all that will remain of this quickly-passing world. You are greatly loved and frequently in our prayers. With diligent study, you will do valiantly on this upcoming assessment. Congratulations on a year well-done!

All the best,

Mr. Janssen