Q3 FINAL REVIEW

_____	+	_____	=	_____
10		10		20
Bucket ?		Problems		Total
p. 1-3		p. 4-6		

≈60 points Short answer and problems on <u>WEDNESDAY 3/30</u>

6-7 of the following types of problems:
- Angled/Horizontal projectile
- conservation of momentum/energy
- Force and g-forces
- Circular motion and gravity
- Work/Horsepower
- Mirror/Lens diagram/equations
- Sound

≈35 points Multiple choice (no math) from the bucket questions on <u>THURSDAY 3/31</u>

10 points for filling out the bucket questions (p. 1-3)
10 points for review problems (p. 4-6)

<u>POSSIBLE BUCKET QUESTIONS: - Answer all for 10 pts!</u>
1. How many centimeters are in one inch?
2. How many meters are in one mile?
3. How many centimeters are in 1 meter?

<u>Motion in One-Dimension</u>
4. What is Δx?
5. What unit is Δx measured in?
6. What is Δy?
7. What unit is Δy measured in?
8. What is the unit for velocity?
9. What is the unit for acceleration?
10. What unit is Δt typically measured in?
11. What quantity does the slope of a **distance vs. time** graph give you?
12. What quantity does the slope of a **velocity vs. time** graph give you?
13. What does a straight line (horizontal) on a **distance vs. time** graph mean?
14. What does a straight line (horizontal) on a **velocity vs. time** graph mean?
15. What does the **area** under a velocity vs. time graph give you?
16. If you throw an object straight up, what is the speed at the top of its flight?
17. If you throw an object up and it takes 4 seconds to reach the top, how long is it in the air?
18. If you throw an object straight up and it is in the air for 3 seconds, how long did it take to reach the top of its flight?

<u>Vectors:</u>
19. Something that has only magnitude is known as a   scalar / vector.
20. Something that has both magnitude and direction is known as a   scalar / vector.
21. Which quantity is scalar?   Mass   /   acceleration
22. Which quantity is a vector?   Mass   /   acceleration
23. What is the sum of two or more vectors called?

<u>Projectile Motion</u>
24. What is v_x ?
25. What is v_{iy}?
26. Because there is no _____ in the x-direction, you can't interchange Δx and Δy in 2-D motion
27. If an object is shot horizontally, what does v_{iy} equal?
28. A projectile is an object that can't control its own _____ in the air
29. Give an example of a projectile.

30. What happens to the velocity of a projectile in the x direction throughout its flight?
31. What happens to the Vy as the Δy increases during the flight of an angled projectile?
32. What happens to the Vy as the Δy decreases during the flight of an angled projectile?
33. What unit are v_{iy} and v_x measured in?

Newton's Laws and Forces
34. A force is a push or a _____
35. What is the unit of force?
36. Which one of Newton's Laws says that for every action there is an equal and opposite reaction?
37. Which one of Newton's Laws says F=ma?
38. Which one of Newton's Laws is the law of inertia?
39. Inertia is the property of matter to resist changes in _____.
40. If an object is in equilibrium, what is the sum of all of the forces acting on it?
41. A 400-N woman sits on the floor. What force does the floor exert on her?
42. Which has more mass, a kilogram of feathers or a kilogram of iron?
43. The amount of matter in an object is the definition for _____.
44. What **unit** is mass measured in?
45. How much gravity pulls on your mass is the definition for _____
46. What **unit** is weight measured in?
47. What **variable** do you get when you divide force by acceleration?
48. What **UNIT** do you get when you divide force by acceleration?
49. What is the acceleration of an object equal to when it reaches terminal velocity?
50. What is a g force?
51. 1 g is equal to your mass multiplied by what number?
52. What does it mean if you are feeling 3 g's of force?

Work and Energy
53. What is the unit for work?
54. How many Watts are in a kilowatt?
55. How many Watts are in one horsepower?
56. What is one of the three units we use to measure power?
57. What unit for power will come out in the equation $P = W / \Delta t$?
58. Potential energy is the energy of _____
59. Kinetic energy is the energy of _____
60. What is the **kinetic energy** of a cat that is sitting still and is 2 meters off the ground?
61. The conservation of energy states that the total energy remains _____.
62. What unit is energy measured in?
63. A baseball is dropped off a roof. As it falls, what happens to its **potential** energy?
64. A baseball is dropped off a roof. As it falls, what happens to its **kinetic** energy?

Momentum and Collisions
65. What is the variable (the letter) for momentum?
66. What is the unit momentum is measured in?
67. What is the momentum of a school bus parked outside?
68. What two variables does momentum depend on?
69. The conservation of momentum states the total momentum remains _____ during a collision.
70. The collision when two objects collide and bounce apart is   elastic   /   inelastic
71. The collision when two objects collide and stick together is   elastic   /   inelastic

Circular Motion and Gravity
72. What does "T" stand for in circular motion equations?
73. What does "T" stand for in the pendulum equation?
74. What is the variable (the letter) for period?
75. What **unit** is the period measured in?
76. What happens to the value of gravity as you move further away from the earth's surface?
77. The Universal Law of Gravitation states that all things _____ each other.

78. The gravitational force depends on what 2 things?
79. In order for an object to stay in a consistent orbit, what two forces must be equal?
80. In the pendulum equation, what is the letter L?
81. When you increase the length of a pendulum, how does it affect the period?
82. When you increase the mass of a pendulum, how does it affect the period?
83. An object moving at constant speed in a circle is accelerating because it is changing ___

Waves and Sound

84. What do you call a transfer of energy from one point to another with no transfer of mass?
85. The type of wave in which particles vibrate perpendicularly to the direction of the motion.
86. The type of wave in which particles vibrate parallel to the direction of the motion.
87. What is the high point of a transverse wave known as?
88. What is the low point of a transverse wave known as?
89. What is the unit for frequency?
90. What other unit is the same as a Hertz?
91. What is the name of the letter for wavelength?
92. What is the distance from one part of a wave until it repeats known as?
93. What do we call the time it takes for one wave to pass a given point?
94. What unit is loudness of sound measured in?
95. What occurs when the freq of an applied force matches the natural freq of the object?
96. What is the part of a standing wave where little or no vibrations occur?
97. What is the part of a standing wave where the maximum vibrations occur?
98. What does FM stand for?
99. What does AM stand for?
100. What are the frequency units for FM radio stations?
101. What are the frequency units for AM radio stations?
102. What is the name for the material through which a wave is traveling?
103. What is the number of waves that pass a given point each second known as?
104. What is another way to say twice the speed of sound?
105. A car drives by honking its horn. The pitch sounds high and then goes lower. What is the name of the effect that causes this?
106. What is the loud noise made when objects travel faster than sound?
107. What is the lowest frequency of vibration for a standing wave known as?

Light, Mirrors and Lenses

108. What is the speed of light?
109. What is the variable (the letter) for the speed of light?
110. What is the equation for speed of a light wave?
111. If you increase the frequency of light, what happens to the wavelength?
112. What type of relationship (direct or inverse) do frequency and wavelength have?
113. Which type of **mirror** has a negative focal length?
114. Which type of **lens** has a negative focal length?
115. What is the variable for focal length?
116. What is the variable for **object distance** to a mirror or lens?
117. What is the variable for **image distance** to a mirror or lens?
118. What is the variable for image height?
119. What is the variable for object height?
120. What is the variable for magnification?
121. q is negative for **mirrors** when the image is   in front of /   behind   the mirror
122. q is negative for **lenses** when the image is on the   same / opposite   side of lens as the starting object.
123. Which type of lens makes light rays come together?
124. Which type of lens spreads light rays out?
125. What does refraction mean?
126. What does reflection mean?
127. What does a magnification of 0.5 mean?
128. What does a magnification of 10 mean?

Name _____ Hour _____

PROBLEMS:

Projectile Motion:

1. A stomp rocket travels at an unknown angle for 14.5 m (that's Δx) in 2.44 sec. Calculate the **velocity** and the **angle** the rocket left with. (Find Vx, Viy first!)

*$Vx = Δx / Δt$ *$a_y = \frac{\cancel{Vfy} - Viy}{Δt}$ (use ½ time!)   *$V^2 = Vx^2 + Viy^2$

$Vx =$ _____

$Viy =$ _____

$V =$ _____

$\theta =$ _____

2. You squeeze the pig popper's tummy to pop the ball out of its mouth as a horizontal projectile and it travels 1.45 m horizontally and 1.25 m vertically. Determine the **velocity** (Vx) the ball leaves the pig's mouth in **mph**.

*$Δy = ViyΔt + ½ a_yΔt^2$ (Viy = 0)   *$Vx = Δx / Δt$

$Vx =$ _____m/s, _____ mph

Newton's Laws of Motion, Forces, Work:

3. You make the fastest balloon car in class-so of course Mrs. B makes you calculate its horsepower. If it travels 2.0 m in 1.1 sec and has a mass of 125 **grams**, what is its horsepower? (find a first!) (0.001 hp)

*Solve a using $Δx = ViΔt + ½ aΔt^2$ *Solve power $P = mad/Δt$ *Convert to hp

hp = _____

Name _____ Hour _____

Sound/Waves:
4. You scream from the back of the 72 °F auditorium. If the people in the front are 20 meters away, how long will it take them to hear you scream? (0.058 sec)

5. Calculate the frequency of yellow light (λ = 600 nm). (5 x 10¹⁴ Hz)

6. A child drops a rock down a well that is 120 m deep. If the temperature is 19 °C, how soon after dropping the rock will she hear the sound of the rock hitting the bottom of the well?
    (5.3 sec)   *time for the rock to fall*   +   *time for the sound to travel back up*
    $$\Delta y = v_i\Delta t + \tfrac{1}{2}\, a\Delta t^2 \qquad\qquad v = \Delta x/\Delta t$$

Momentum/Energy:
7. You (m=100 kg) climb to the top of 10 m tall diving board. Calculate your velocity **after falling 6 m** using the conservation of energy equation. (10.8 m/s)

hi=_____   hf=_____

What is your **potential energy** before you jump? _____

What is your **kinetic energy** after falling 6m? _____

How much **momentum** will you have after falling 6m? (use V_f from above) _____

   Answers to previous: (9800 J)   (5832 J)   (1080 kg m/sec)

Gravity and **Circular Motion:**
8. You (mass = 75 kg) are riding the swings at MOA. If the swings have a radius of 15 m and spin with a velocity of 18 m/s, find your **centripetal force** and **how many g's** you will experience. (1620 N and 2.2 g's)

9. What is the value of gravity (g) at a point 400,000 m above the earth's surface? **Don't forget to add the radius of the earth!** *(8.7 m/s²)*

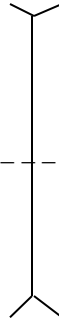*g= $\dfrac{Gm}{r^2}$

Name _____ Hour _____

Mirrors and Lenses:

10. A 1.0 cm tall plastic pig is placed 2 cm from a lens. If the focal length is 3 cm, find q and hi using a **DIAGRAM and EQUATIONS** if the lens is:

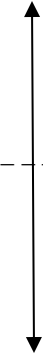**Diverging:** (-1.2 cm, 0.6 cm)

Scaled Ray Diagram: Equations:

$q =$ _____

$hi =$ _____

$q =$ _____

$hi =$ _____

Converging: (-6 cm, 3 cm)

$q =$ _____

$hi =$ _____

$q =$ _____

$hi =$ _____

11. A 1.5 cm tall plastic toy is placed a distance of 3 cm from a mirror which has a focal length of 2.0 cm. Determine q and hi using both a **diagram AND equations** if the mirror is:

Concave: (6 cm, -3 cm)   Equations:

Scaled Ray Diagram:

$q =$ _____

$hi =$ _____

$q =$ _____

$hi =$ _____

Convex (-1.2 cm, 0.6 cm)

$q =$ _____

$hi =$ _____

$q =$ _____

$hi =$ _____

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