AP Physics C Assignment 1

Name: _____

Part V: Solving equations with one unknown (Be sure to show all work on the separate page)

51. 37-x=98 $x = -61$

52. -53+y=141 $y = 194$

54. -72+t=-40 $t = 32$

58. $\frac{x}{4} = -45$ $x = -180$

59. 3x+5x=48 $x = 6$

$x(3+5) = 48$

61. 5a-4=26 $a = 6$

64. 6x+5-2x=-19 $x = -6$

70. 6x+5x-4=2x-8 $x = -\frac{4}{9}$

Part VI: Solving the following formulas for the given variable

Example: Solve for **a**: P=2**a**+3b+4c

P-3b-4c=2**a**

$\frac{P-3b-4c}{2} = \boldsymbol{a}$

71. p=mv ; for m $= \frac{p}{v}$

72. $v = \frac{d}{t}$; for t $t = \frac{d}{v}$

73. $x_f = x_i + v_i t + (0.5)at^2$; for a $= \frac{2(x_f - x_i) - V_i t}{t^2}$

74. $Ft = m(v_f - v_i)$; for v_i $= \frac{mv_f - Ft}{m}$

75. W=fx(cos(θ)) ; for x $= \frac{W}{f\cos\theta}$

76. $E = (0.5)kx^2$; for x $= \sqrt{\frac{2E}{k}}$

77. $P = \frac{Fx}{t}$; for F $F = \frac{Pt}{x}$

78. $v_f = v_i + at$; for v_i $= V_f - at$

79. $v_f^2 = v_i^2 + 2ax$; for v_i $= V_f - \sqrt{2ax}$

80. W=fx(cos(θ)) ; for θ $= \cos^{-1}\left(\frac{W}{fx}\right)$

Part VII: Pythagorean Theorem: Using the formula $a^2 + b^2 = c^2$ solve for the unknown triangle side

81. a=3, b=4, c=5

82. a=6, c=10, b=8

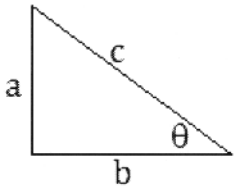
83. b=12, c=13, a=5

Part VIII: Using the formulas for a right triangle solve for the given variable:

Formulas: $\text{Sin}\,\theta = \frac{a}{c}$

$\text{Cos}\,\theta = \frac{b}{c}$

$\text{Tan}\,\theta = \frac{a}{b}$



$\sin\theta = \frac{a}{c}$

91. a=5, c=8, sinθ=$\frac{5}{8}$

92. a=9, θ=20, b=24.7

93. b=18, c=30, cosθ=$\frac{18}{30}$

$\tan\theta = \frac{a}{b}$

94. c=2, θ=5, a=1.99

95. θ=50, b=6, a=7.15

96. a=19, b=10, tanθ=$\frac{19}{10}$

$\tan\theta = \frac{a}{b}$

Part IX: solving for angles

97. c=20, b=15, θ=$\cos^{-1}\left(\frac{15}{20}\right)$

98. a=5, c=10, θ=$\sin^{-1}\left(\frac{5}{10}\right)$

99. b=23, c=7, θ=$\cos^{-1}\left(\frac{23}{7}\right)$

100. a=7, b=6, θ=$\tan^{-1}\left(\frac{7}{6}\right)$

Part X: Substitution: Solve one equation for y in terms of x and then substitute the result to solve for x

Example:

4x+y=18	x-2y=-9
y=18-4x	x-2(18-4x)=-9
	x-36+8x=-9
	9x=27
	x=3

101. x-y=4

3x+y=36

x=8

102. 2x-y=14

-x+y=-11

x=8.33

106. 16(x-y)=15x+30

-x+4y=5y

x=1.76

108. 2(x-3)+4(y-2)=4

3(x-10y+2)=6(x-2y)

x=12.5

Part XI: Rewrite the following numbers in scientific notation with 2 significant figures

111. 938200000=_____

112. 892=_____

113. 0.000283=_____

114. 0.7536=_____

115. 1050000=_____

116. 29799523=_____

117. 0.000295=_____

118. 8987887=_____

119. 99999999=_____

120. 89=_____

Part XII: Converting SI units

Table 3
Some Prefixes for Powers of 10 Used with Metric Units

Power	Prefix	Abbreviation	Power	Prefix	Abbreviation
10^{-18}	atto-	a	10^{-1}	deci-	d
10^{-15}	femto-	f	10^{1}	deka-	da
10^{-12}	pico-	p	10^{3}	kilo-	k
10^{-9}	nano-	n	10^{6}	mega-	M
10^{-6}	micro-	μ (Greek letter *mu*)	10^{9}	giga-	G
			10^{12}	tera-	T
10^{-3}	milli-	m	10^{15}	peta-	P
10^{-2}	centi-	c	10^{18}	exa-	E

121. (1.5 cm) = .015 m

122. (6.9 km) = 6900 m

123. (800 mm) = .8 m

124. (92 m) = 92×10^{6} μm

125. (28 ns) = 28×10^{-6} ms

126. (7 Mg) = 7×10^{3} kg

127. (23.4 mL) = 23.4×10^{-3} L

128. (90.0 g) = 9,000 cg

129. (5×10^{4} pm) = 50 nm

130. (2.3×10^{-9} s) = 2.3 ns

Part XIII: Solving one dimensional motion problems (For these problems be sure to show all of your work)

The following equations are used to solve problems in one dimensional motion analysis. In this class you will be solving many word problems. Isolate the given variables and using these equations solve for the unknowns.

Variables:

x_i – initial position
x_f – final position
v_i – initial velocity
v_f – final velocity
a – acceleration
t – time
Δx – change in position
$\bar{v}$ - average velocity

Equations:

$$\bar{v} = \frac{\Delta x}{t} \qquad v_f = v_i + at$$

$$\Delta x = v_i t + \frac{1}{2} a t^2 \qquad v_f^2 = v_i^2 + 2a\Delta x$$

136. $\Delta x = 50m$, $V_i = 30m/s$ $\quad V_f^2 = V_i^2 + 2a\Delta x$

$-\frac{V_i^2}{2\Delta x} = a$ $\quad \frac{-V_i}{a} = t$ $\quad V_f = V_i + at$

Example:

If a vehicle is traveling at 2 m/s and accelerated at a rate of 0.4 m/s2 for 10 s how far will it travel?

Known	Want	Equation
vi = 2 m/s a = 0.4 m/s2 t = 10 s	Δx =	$\Delta x = v_i t + \frac{1}{2}at^2$ $\Delta x = \left(2\frac{m}{s}\right)(10s) + \frac{1}{2}\left(0.4\frac{m}{s^2}\right)(10s)^2$ $\Delta x = 40m$

77.25m + 143.17

Problems: $V_f^2 = V_i^2 - 2g\Delta y$ $\quad \frac{V_i^2}{2g} = \Delta y$

140.

131. How fast would a vehicle be traveling if it started from rest and accelerated uniformly at a rate of 1.2 m/s^2 for a total of 5 s? $V_f = V_i + at$

132. How long would it take for a vehicle to accelerate from 5 m/s to 8 m/s if it accelerated at a constant rate of 0.75 m/s^2?

133. What would the rate of acceleration for a bus be if it slowed from 21 m/s to a stop in 20 second?

134. How far would the bus in the previous problem travel in the stated amount of time? $X_f = X_i + V_i t + \frac{1}{2}at^2$

135. How fast would something be going if it were to be dropped from rest 10 m above the ground and fell with free-fall acceleration of 9.8 m/s^2? $\Delta y = V_i t - \frac{1}{2}gt^2$ $\quad -10m = -\frac{1}{2}gt^2$ $\quad t = \sqrt{\frac{20}{9}}$

136. If a boat can stop in 50 m after traveling at 30 m/s what is the rate of acceleration?

137. How long would it take for the boat in the previous problem to stop?

138. How long would it take for a ball being dropped from rest off of a roof that is 15 m tall to hit the ground?

139. A speeder passes a police officer traveling at a constant velocity of 30 m/s. Then the police car starting from rest accelerated at 2.44m/s^2. How much time will pass until the police car is even with the speeder?

140. A model rocket is launched straight up with an initial velocity of 50 m/s. It accelerates with a constant acceleration of 2 m/s^2 until the engine cuts out. When that happens it is in freefall and accelerating at -9.8 m/s^2. What is the maximum height that the rocket will reach?

engine off after $t = 1.5s$

$V_f = 0m/s$, $a = -g$, $V_i = 5?m/s$, $t = 1.5s$, $a = 2m/s^2$, $V_i = 50m/s$

Answers:

131. 6 m/s

132. 4s

133. $-1.05m/s^2$

134. 210 m

135. $-14s$

136. $-9m/s^2$

137. 3.33s

138. 1.73s using $10m/s^2$ for g

139. 24.6s

140. 220.42 m

139. 10m, 30m/s, 0m/s, $a = 2.44m/s^2$ $\quad X_f = X_i + V_i t + \frac{1}{2}at^2$ $\quad V_i t = X_f = \frac{1}{2}at^2$

$X_f = X_i + V_i t + \frac{1}{2}at^2$ $\quad \frac{2V_i}{a} = t = 24.6s$