SUMMER TASKS – GCSE TO A-LEVEL TRANSITION

Subject: A-Level Physics
Title: AQA A Level Physics Summer Work
Task: **Please complete the work set below**
How long should I spend on this? 1hr
How will I get feedback?
Contact email:

Student name: _____

AQA A Level Physics Summer Work

1. Orders of magnitude and estimation

1. How long would it take you to walk to New York from here in seconds?

2. How many words are there in your physics text book?

3. What is the total mass in kg of the human population of the earth?

2. Powers of 10

Calculate the following using the EXP or x10^x button on your calculator.

1. $8 \times 10^3 \times 9 \times 10^6 =$

2. $\frac{3.00\times10^8}{550\times10^{-9}} =$

3. $\frac{5.5\times10^3}{4.7\times10^6} =$

4. $\frac{6.63\times10^{-34}\times3.00\times10^8}{720\times10^{-9}} =$

5. $\frac{196\times10^{-3}\times80\times10^{-2}}{\pi\times(5.0\times10^{-3})^2\times6.0\times10^{-3}} =$

3. Prefixes

Prefix	Symbol	Name	Multiplier
femto	f	quadrillionth	10^{-15}
pico	p	trillionth	10^{-12}
nano	n	billionth	10^{-9}
micro	µ	millionth	10^{-6}
milli	m	thousandth	10^{-3}
centi	c	hundredth	10^{-2}
deci	d	tenth	10^{-1}
deka	da	ten	10^{1}
hecto	h	hundred	10^{2}
kilo	k	thousand	10^{3}
mega	M	million	10^{6}
giga	G	billion	10^{9}
tera	T	trillion	10^{12}
peta	P	quadrillion	10^{15}

When you are given a variable with a prefix you should convert it into its numerical equivalent before you use it in an equation.

Always start by replacing the prefix symbol with its equivalent multiplier.
For example: 0.16 µA = 0.16 x 10^{-6} A
10 ns = 10 x 10^{-9} s

Replace the prefix with the equivalent multiplier:

e.g. 12.0 mm = 12.0**x10^{-3}** m = 1.2x10^{-2} m

1. 1.4 kW =

2. 10 µC =

3. 24 cm =

4. 340 MW =

5. 46 pF =

Express these with an appropriate prefix (Use the ENG button on your calculator where appropriate:

e.g. 5.6×10^{-11}m = 56×10^{-12}m = 56pm

6. 6.4×10^{-3} W =

7. 82.3×10^{8} m =

8. 2.0×10^{-5} m =

9. 1000×10^{-9} A =

10. 0.520×10^{4} Ω =

Change the prefix to the one required using the ENG and SHIFT+ENG buttons on your calculator:

11. 0.0063 kA = mA

12. 300 Mms^{-1} = Gms^{-1}

13. 6×10^{3} km = Mm

14. 657,000 μm = cm

15. 2,112,000μs = ms

4. Rearranging Equations

Formula	Rearrangements		
$\rho = \frac{m}{V}$	$V =$	$m =$	
$G = \frac{\sigma A}{l}$	$A =$	$\sigma =$	$l =$
$v = u + at$	$u =$	$a =$	$t =$
$E_s = \frac{1}{2}k\Delta l^2$	$\Delta l =$	$k =$	
$v^2 = u^2 + 2as$	$u =$	$a =$	$s =$

5. Base and Derived Units

The following quantities have the following base units:
s, L & r = m, v = ms^{-1}, u = ms^{-1}, a & g = ms^{-2}, t & T = s, m & M = kg, V = m^3

Identify whether the following equations are homogenous with respect to units:

1. $v = u + at^2$

2. $s = ut + \frac{1}{2}at$

3. $2s = (v^2 + u^2)t^2$

4. $s + \frac{1}{2}at^2 = ust$

5. $T = 2\pi\sqrt{\frac{L}{g}}$

Express the following quantities in terms of their base units:

6. Force, F in Newtons(N), given that F = ma

7. Work done, W in Joules(J), given that $W = F \times s$

8. Power, P in Watts(W), given that $P = \frac{W}{t}$

9. Momentum, p, given that $F = \frac{p}{t}$

10. The gravitational constant G, given that $g = \frac{GM}{r^2}$

Activity:

Design a simple experiment for one of the followings:
1. Measure the gravitational field strength (g).
2. Find the refractive index of glass.
3. Find the speed of sound wave in air.