Physics Millikan Prep Lab

1. All of these numbers are the product of a random integer and approximately the same non-integer.

40.9475	45.9661	16.2458	29.9228	27.2959
35.538	35.1581	18.9561	35.1041	32.482
27.3335	27.1694	29.9297	40.6765	24.413
27.2691	24.4337	38.0671	19.0247	21.6272
30.0691	24.411	10.9304	21.8267	29.7689
35.1612	27.028	24.4105	27.233	38.0465
29.7615	29.8704	40.6529	29.9329	35.0964
38.3087	29.8171	29.9978	19.1271	46.3732
37.9816	27.29	30.0056	35.4709	27.0478
38.0714	16.3893	32.7231	21.8214	24.3537

•On the reverse I have sorted them and made a histogram of them
•What is the step size? (The non-integer) (High step-low step divided by the # of upward transitions or steps)
•What is the uncertainty in your guess? (•The uncertainty will be the range/2 of the most populous step, divided by the number of steps you used to determine the step size.)

2. •Show the derivation of an equation for **q** - the charge on a sphere in terms of **ρ** - the density of the sphere, **r** - the radius of the sphere, **d** - the separation of the plates, **V** - the voltage applied to the plates, and **g** - the acceleration of gravity. •Use dimensional analysis (plug in the units to show they cancel) to check your answer. Show this

Useful formulas:
F = m**g**, F = E**q**, **V** = E**d**, Volume of a sphere = $4/3\pi \mathbf{r}^3$, **ρ** = m/Volume

$$\rho(\tfrac{4}{3}\pi r^3)g = \left(\frac{V}{d}\right)q$$

Units for Dimensional analysis: (ρ:kg/m^3)(r:m)(g:N/kg)(V:Nm/C)(q:C)(d:m)

3. •Show the derivation of an equation for **r** - the radius of a sphere in terms of **η** - the viscosity of air, **v** - the terminal velocity of a sphere, **g** - the acceleration of gravity, and **ρ** - the density of a sphere. •Use dimensional analysis (plug in the units to show they cancel) to check your answer. Show this

Useful formulas:
F = m**g**, F = 6πη**rv**, Volume of a sphere = $4/3\pi \mathbf{r}^3$, **ρ** = m/Volume

$$\rho(\tfrac{4}{3}\pi r^3)g = 6\pi\eta rv$$

Units for Dimensional analysis: (ρ:kg/m^3)(r:m)(g:N/kg)(η:Ns/m^2)(v:m/s)

	Sorted
1	10.9304
2	16.2458
3	16.3893
4	18.9561
5	19.0247
6	19.1271
7	21.6272
8	21.8214
9	21.8267
10	24.3537
11	24.4105
12	24.411
13	24.413
14	24.4337
15	27.028
16	27.0478
17	27.1694
18	27.233
19	27.2691
20	27.29
21	27.2959
22	27.3335
23	29.7615
24	29.7689
25	29.8171
26	29.8704
27	29.9228
28	29.9297
29	29.9329
30	29.9978
31	30.0056
32	30.0691
33	32.482
34	32.7231
35	35.0964
36	35.1041
37	35.1581
38	35.1612
39	35.4709
40	35.538
41	37.9816
42	38.0465
43	38.0671
44	38.0714
45	38.3087
46	40.6529
47	40.6765
48	40.9475
49	45.9661
50	46.3732