

Geiger Counter Readings

| <u>NO. OF PARTICLES</u> | <u>PERCENT FREQUENCY</u> | <u>CLASS BOUNDARIES</u> | <u>% / PARTICLE</u> |
|-------------------------|--------------------------|-------------------------|---------------------|
| 5 – 9 | 1 | 4.5 – 9.5 | $1/5 = 0.2$ |
| 10 – 14 | 10 | 9.5 – 14.5 | $10/5 = 2.0$ |
| 15 - 19 | 37 | 14.5 – 19.5 | $37/5 = 7.4$ |
| 20 – 24 | 36 | 19.5 – 24.5 | $36/5 = 7.2$ |
| 25 – 29 | 13 | 24.5 – 29.5 | $13/5 = 2.6$ |
| 30 – 34 | 2 | 29.5 – 34.5 | $2/5 = 0.4$ |
| 35 – 39 | 1 | 34.5 – 39.5 | $1/5 = 0.2$ |

Pick 1 particle as common unit:

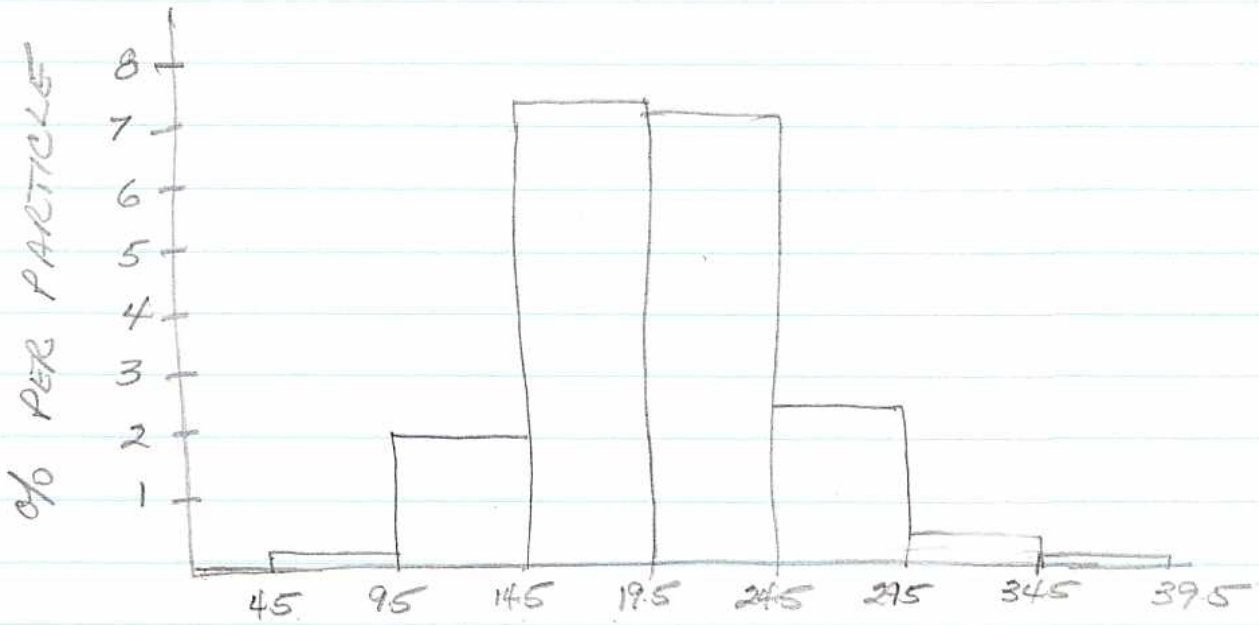
$$\text{Class width (1}^{\text{st}} \text{ class)} = 9.5 - 4.5 = 5$$

* Similar for other classes

* There are 5 “particles” in each class

* Note: you could pick 5 as a common unit. Each class has 1 “5 particle” unit so the last column should be labeled “% per 5-particles”, and the last column would become $1/1 = 1$, $10/1 = 10$, $37/1 = 37$, etc.

GEIGER COUNTER.



We want to :

- reach an understanding of statistical ideas,
- deal with numerical ideas.

Some people are unduly credulous when numerical arguments are used - impressed by the solid appearance of a few numbers, instead of looking at the substance of the argument.

Others are unduly cynical - they think numbers are liars by nature and never trust them.

The increase in the use of statistics is dramatic:

- the percentage of articles in a leading political science journal that use numerical data was 12% in 1940's
- now it is more than 65%

Collecting Data

- Before numbers can be used we must collect them.
- Many statistical studies are based on available data, i.e. data not gathered specifically for the study, but found in records kept for other reasons.
- Available data must be used with caution.
- The advantage of experimentation is specific treatments can be studied:
 - ✚ study the effects of sleeplessness on reaction time, or
 - ✚ study the effects of hours awake and noise level on reaction time and score on test of manual dexterity

Units

- To get the height of a block over the interval \$7,000 to \$10,000 we divide 15% by 3 (thousand dollars – the common units), so:

$$\text{units} = \frac{\text{percent}}{\text{thousand dollars}}$$

or

percent per thousand dollars

- The height of the block over the interval \$7,000 to \$10,000 is 5% per thousand dollars – in each thousand dollar interval between \$7,000 and \$10,000 there are about 5% of the families.