2005 San Diego County Regional Tournament Practical Data Gathering Exam

Participant Names: _____ & _____

<u>Instructions</u>: Write your answers on the response sheet. Show your work on the spaces after each question. Ties will be determined based on clarity of work on question pages.

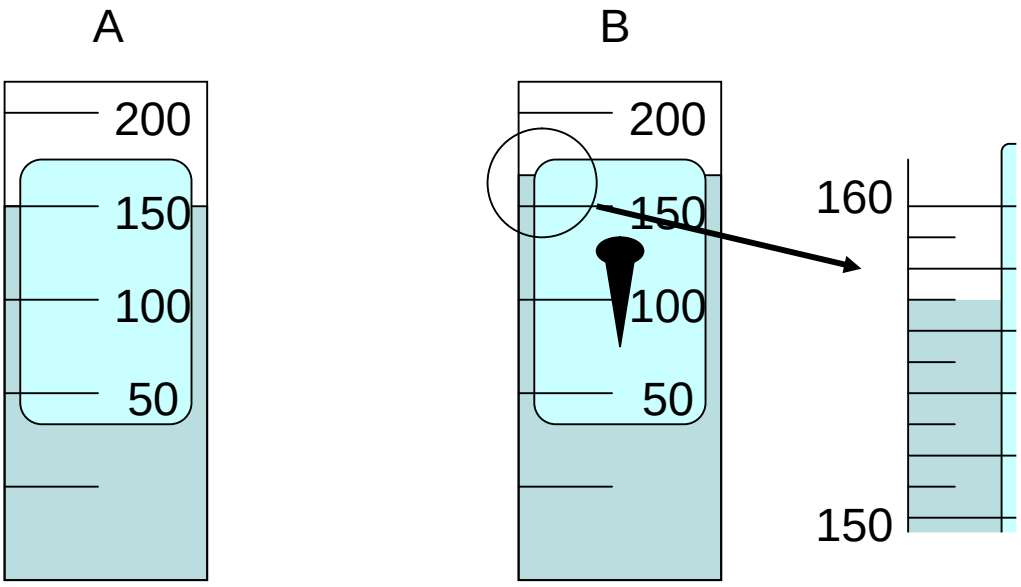
1. Find the mean (μ), median, standard deviation (σ) and 25th and 75th percentiles for population A and population B. Do the data seem to be drawn from a normally distributed population? Why or why not?

$\sigma 2=(\sum(x-\mu)2)/N$

A=Height of Martians	B=Height of Saturnians
70.5	69.3
52.2	23.3
21.9	79.3
63.3	55.9
69.1	103.7
40.1	40.5
77.3	54.3
42.9	56.1
25.6	10.2
75.9	43.9
14.0	98.7
78.3	45.5
79.3	34.0

2. You are a homeowner and need to recarpet your part of your house. You are charged based on 3 things. 1) Length of perimeter of the carpet ($10/m) 2) length of seam (carpet/carpet) ($20/m) and 3) total amount of carpet required to cover area (including waste that you do not use) ($30/m2). Carpet is provided in strips 1.5m wide. This carpet has a directionality, so can only be laid in one orientation. What is the minimum cost to recarpet the space below? Please provide the area of this space, the area of the carpet (including waste), as well as the perimeter.
Scale= 2.5 cm=1 m. Provide calculations.

3. You are provided with two frozen ice cubes, each contains the same amount of water. In one ice cube, a screw is frozen in the middle. You place the ice cubes into a metric graduated cylinder (containing 100 mL of water) and observe figures A and B when the samples are first put in the water. Knowing that the density of the metal used to make the screw is 3500 kg/m3, what will the levels of the water be once the two ice cubes have defrosted? Provide all calculations. Note, only the water levels are drawn to scale.



4. a. You are one of two daughters in your family. Your mother is pregnant. What are the chances that you are going to have another sister?

4. b. Your aunt and uncle have recently gotten married and are planning on starting a family. Assuming they will also have 3 children, what are they chances that they will also have 3 girls?

5. The US mint just released the 21st state quarter into circulation-- the California Quarter! Please calculate the smallest area rectangle that you could display the current 21 quarters in?

What is the smallest rectangle you will be able to display them in once all 50 have been released in 2008?

Please describe each configuration on the answer sheet.

Note: the Diameter of a quarter is: 24 mm.

6. Two 3 cm balls are attached to 25 cm strings as shown. One of the balls is raised to the horizontal and released. Assuming that 20% of the energy is lost with each collision, how many times will the balls collide before they stop moving? Please explain solution, as it may be used for partial credit. Note: kinetic energy=1/2*mv2; potential energy=mgh; g=9.81 m/s2