

## Course 3

### *Mystery - Estimation*

*SOL:* SOL 8.3 and 8.12

*Objective:* The Student will:

1. Use data from samples to estimate a characteristic found in a population
2. Use characteristics from a population to describe a sample
3. Apply knowledge about ratios to solve real world problems

*Pre-requisite*

*Skills:* Statistical Investigations  
Graphing  
Problem Solving with a variety of data contexts

*Materials:* Graphing calculators, computers, and grid paper

*Directions:* See attached sheets

Name \_\_\_\_\_

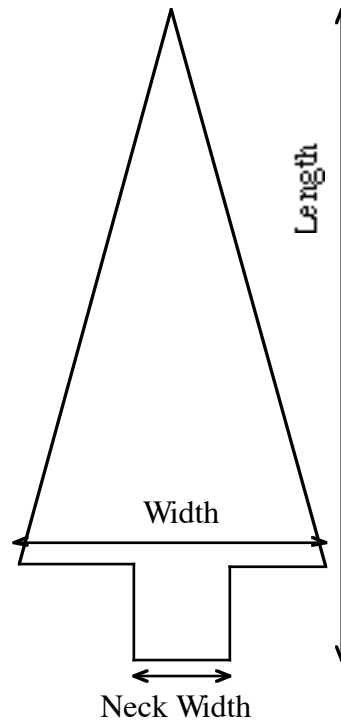
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### Student Information Sheet

Archaeologists study the past by excavating ancient settlements and artifacts. On digs in southeast Montana and north central Wyoming, archaeologists discovered the remains of two ancient Native American settlements. The excavated a number of arrowheads at both sites. The tables below list the length, width, and neck for each arrowhead that was found. All measurements are in millimeters. \*

Site 1: 15 arrowheads

Length	Width	Neck Width
62	26	14
31	32	16
40	25	16
63	29	18
37	23	11
24	19	8
29	22	12
38	22	12
29	19	11
45	22	11
27	19	10
31	16	12
38	26	14
45	28	15
55	22	13



Name \_\_\_\_\_

Date \_\_\_\_\_

### Student Information Sheet

Site 2: 36 arrowheads

Length	Width	Neck Width		Length	Width	Neck Width
16	13	7		15	11	7
13	10	6		25	13	7
22	14	10		43	14	9
19	12	8		22	13	8
24	11	8		24	13	8
20	12	7		21	11	7
26	15	11		28	11	6
19	13	9		16	12	8
25	15	10		24	14	10
17	15	9		25	24	7
22	13	9		28	13	9
22	13	9		20	12	9
27	14	8		18	12	10
23	14	9		32	12	8
26	14	10		24	13	8
24	15	9		23	15	9
25	13	7		24	12	7
26	14	11		24	15	8

\* Source: George C. Knight and James D. Keyer. "A Mathematical Technique for Dating Points Common to the Northwestern Planes." *Plains Anthropologist* 28, no.101 (1983): 199-207

Name \_\_\_\_\_

Date \_\_\_\_\_

### Student Problem Sheet Arrowheads from Two Other Sites

Little Still Water  
24 Arrowheads

Running Swift To Get Away  
18 Arrowheads

Length	Width	Neck Width		Length	Width	Neck Width
23	14	8		29	20	13
25	11	7		25	18	13
36	14	9		32	16	10
23	13	8		52	21	16
21	15	11		29	14	11
30	15	9		35	20	15
21	13	12		27	20	14
24	18	7		37	17	13
18	13	7		44	18	13
30	13	10		38	17	14
27	11	8		27	18	13
39	13	8		39	17	15
33	11	6		41	20	11
22	12	7		30	18	13
26	14	7		40	15	11
23	13	9		32	23	10
20	14	9		31	18	11
21	14	8		42	19	12
26	14	9				
16	11	10				
30	15	11				
23	14	8				
34	18	13				
27	14	7				

The archaeologists knew that Little Still Water was settled between 4000 BC and AD 500, and Running Swift To Get Away was settled between AD 500 and AD 1600.

Name \_\_\_\_\_

Date \_\_\_\_\_

## Student Problem Sheet

The archaeologist hypothesized that Native American inhabiting the same area of the country during the same time period fashioned similar tools.

1. Use what you know about statistics and data representation to compare the lengths of the arrowheads discovered at the two new sites with the length of the arrowheads from the known sites. Based on your comparisons, during which time period – 4000 BC to AD 500 or AD 500 to AD 1600 – do you think site 1 was settled? During which time period do you think site 2 was settled? Explain how your statistics and graphs support your estimation?
2. Compare the widths of the arrowheads discovered at the new sites with the widths of the arrowheads from the known sites. Do your findings support your answers in question 1? Explain?
3. If the archaeologist had collected only a few arrowheads from each site, could they have reached a different conclusion?
4. Select a random sample of 15 arrowheads from each of the four sites. For each arrowhead, find the ratio of length to width. Express each as a decimal rounded to the nearest thousandth place.
5. Compare the length-to-width ratio for the various sites. Do the ratios help you with your estimation of the new sites with the sites whose settlements time is known? Explain your answer?