Candy Sort Data Collection Sheet—Page 1

Write the steps of your procedure below.

Step 1: _______________________________________________________________
Step 2: _______________________________________________________________
Step 3: _______________________________________________________________
Step 4: _______________________________________________________________
Step 5: _______________________________________________________________

How much time was required to complete the procedure? (in seconds): ______________________

Data Table #1:
Number of seconds required for each team to package their bags

<p>| | | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data Analysis: Data Ordering Box

Number of seconds required for packaging bags
Ordered from smallest number to largest number

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Median time: ______________________

Lower Quartile (Q1): _____________

Upper Quartile (Q3): ______________

- If your speed was Q1 or lower, you get 1 point
- If your speed was between Q1 and Q3, you get 2 points
- If your speed was Q3 or higher, you get 3 points

Number of points earned for speed
### Candy Sort Data Collection Sheet—Page 2

#### Data Table #2:
Numbers of each color candy in each bag

<table>
<thead>
<tr>
<th>Color Candy</th>
<th>Bag #1</th>
<th>Bag #2</th>
<th>Bag #3</th>
<th>Bag #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purple</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total number in bag</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Analysis of color distribution data from Data Table #2**

Median: _________  Minimum:_______  Maximum: ______
Q1: ____________  Range: ____________
Q3: ____________  Interquartile Range: __________

#### Bag Size

Range in total number of candies in bags (Maximum—Minimum)

- Range= 0-2  3 points
- Range= 3-8  2 points
- Range= > 8  1 point

Number of points earned for range in candy number

#### Color Consistency

Interquartile Range (IR) (Q3-Q1)

- IR= 0-3  3 points
- IR= 4-8  2 points
- IR= > 8  1 point

Number of points earned for consistency

#### Dot Plot
Number of individual color candy in bag

Data Ordering Box

Number of individual color candy in bag
Ordered from smallest number to largest number

1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16

Analysis of color distribution data from Data Table #2

Median: _________  Minimum:_______  Maximum: ______
Q1: ____________  Range: ____________
Q3: ____________  Interquartile Range: __________

---

This curriculum is produced by Advanced Manufacturing & Prototyping Integrated to Unlock Potential (AMP-IT-UP), National Science Foundation Award #1238089. Georgia Institute of Technology’s Center for Education Integrating Science, Mathematics, and Computing (CEISMC). Copyright © Georgia Institute of Technology All Rights Reserved 2017.
Box and Whisker (Box Plot) Sheet

Analysis of color distribution data from Data Table #2

Median: _______    Minimum:_______    Maximum: ______
Q1: ____________
Q3: ____________

Draw a box and whisker plot on the number line below using the five-number summary from your candy sort.
## Automated Packaging Challenge 6DMM

### Packaging Company Machines Specifications

**Company #1:**
*Robotic Machines, Inc.*

- Maximum # of one color: 18
- Minimum # of one color: 6
- Median # of each color: 12
- Q1: 9
- Q3: 15
- Minimum # of candies per bag: 47
- Maximum # of candies per bag: 49
- Bags packaged per minute: 90
- Cost for the machine: $65,000

**Company #2:**
*Quick Machine, Inc.*

- Maximum # of one color: 28
- Minimum # of one color: 4
- Median # of each color: 16
- Q1: 8
- Q3: 25
- Minimum # of candies per bag: 42
- Maximum # of candies per bag: 56
- Bags packaged per minute: 100
- Cost for the machine: $40,000

### Instructions

1. Draw the box and whisker plot below.
2. Calculate the Interquartile Range for color consistency and bag size range.

**Color Consistency**
- Interquartile Range:

**Bag Size Range:**
### Packaging Company Machines Specifications

#### Company #3: Packaging ‘R Us Specifications

| Maximum # of one color: | 13 |
| Minimum # of one color: | 10 |
| Median # of each color: | 12 |
| Q1: | 11 |
| Q3: | 12 |
| Minimum # of candies per bag: | 48 |
| Maximum # of candies per bag: | 48 |
| Bags packaged per minute: | 36 |
| Cost for the machine: | $18,500 |

Color Consistency

Interquartile Range: ________________

Bag Size Range: ________________

#### Company #4: Machine Depot Specifications

| Maximum # of one color: | 26 |
| Minimum # of one color: | 3 |
| Median # of each color: | 14 |
| Q1: | 7 |
| Q3: | 20 |
| Minimum # of candies per bag: | 43 |
| Maximum # of candies per bag: | 53 |
| Bags packaged per minute: | 56 |
| Cost for the machine: | $45,000 |

Color Consistency

Interquartile Range: ________________

Bag Size Range: ________________
Automated Packaging Challenge 6DMM

NAME: ___________________________ DATE: ___________________________

STUDENT #: _________________________ TEACHER: _________________________

Decision Matrix

<table>
<thead>
<tr>
<th></th>
<th>Company #1</th>
<th>Company #2</th>
<th>Company #3</th>
<th>Company #4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Robotic Machines, Inc.</td>
<td>Quick Machines, Inc.</td>
<td>Packaging 'R Us</td>
<td>Machine Depot</td>
</tr>
<tr>
<td>Speed: Bags per minute</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy of candy number (Range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consistency of color mix (Interquartile Range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price of machine ($)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rules for color shading

Speed: Greater than 75—color green
      Between 50 and 75—color yellow
      50 or less—color red

Range: 0-2—color green
       3-8—color yellow
       Larger than 8—color red

Interquartile range:
       0-3—color green
       4-8—color yellow
       Larger than 8—color red

Cost: Less than $25,000—color green
      Between $25,000 and $50,000—color yellow
      Larger than $50,000—color red
Pitch Planning

The following questions should be considered as you plan a pitch to investors.

Which machine are you planning to buy?
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

Why is this particular decision right based on the evidence?
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

How much money do you need?
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

Why should an investor loan money to you and your candy factory?
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________