

Name: KEY

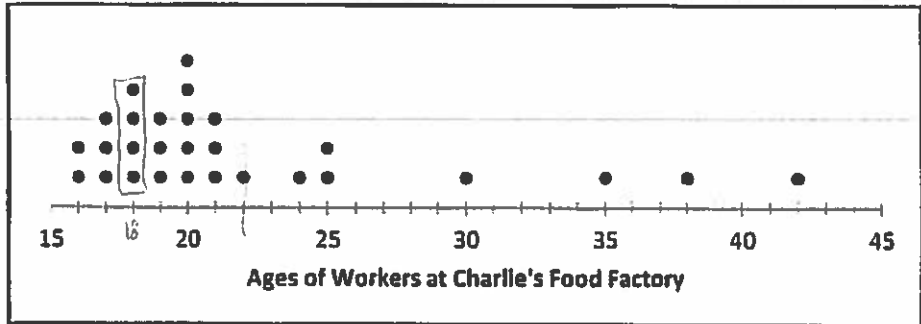
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### GRAPHICALLY REPRESENTING DATA



Quantitative data on a single variable is often collected in order to understand how a characteristic of a group differs amongst the group members or between groups. When we ask a question like "How old is a typical fast food worker?" it is helpful to take a survey and then see graphically how the ages differ amongst the group.

**Exercise #1:** Charlie's Food Factory currently employs 28 workers whose ages are shown below on a dot plot. Answer the following questions based on this plot.



(a) How many of the workers are 18 years old?

4

(b) What is the range of the ages of the workers?

$$42 - 16 = 26$$

(c) Would you consider this distribution symmetric?

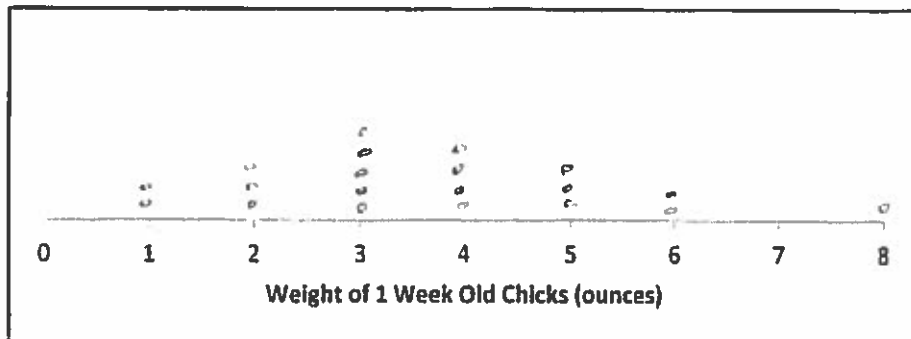
NO - more spread  
out to the right

(d) The mean (average) age for a worker is 22 years old. Why is this average not representative of a typical worker?

Most of the workers  
are less than 22

**Exercise #2:** A farm is studying the weight of baby chickens (chicks) after 1 week of growth. They find the weight, in ounces, of 20 chicks. The weights are shown below. Construct a dot plot on the axes given.

2, 1, 3, 4, 2, 2, 3, 1, 5, 3, 4, 4, 5, 6, 3, 8, 5, 4, 6, 3



**Exercise #3:** The following histogram shows the ages of the workers at Charlie's Food Factory (from Exercise #1) but in a different format.

(a) How many workers have ages between 19 and 21 years?

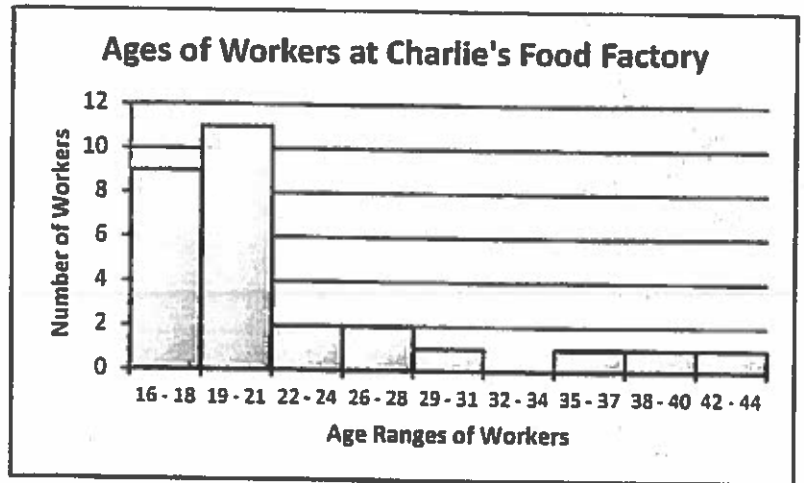
11

(b) What is the disadvantage of a histogram compared to a dot plot?

not specific data

(c) Does the histogram have any advantages over the dot plot?

easier to look at



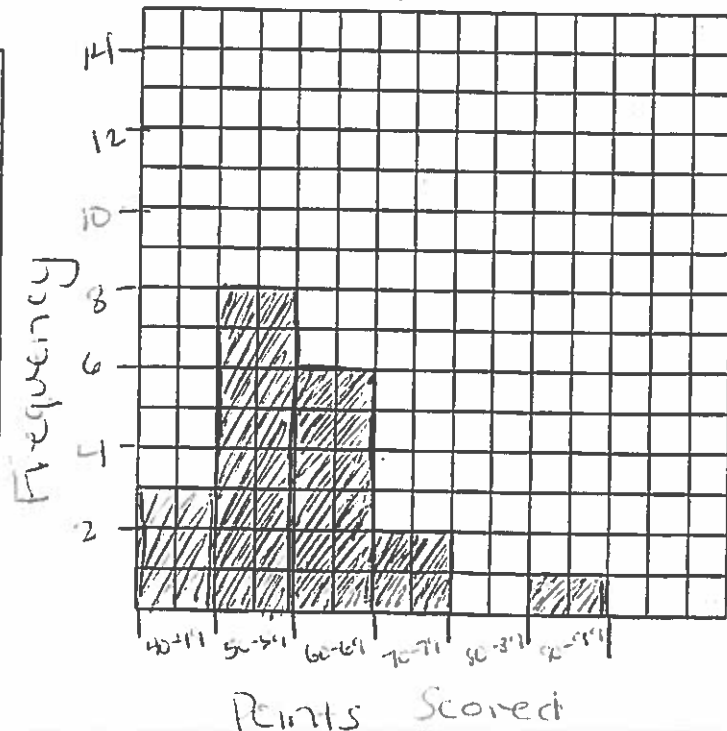
**Exercise #4** The 2006 - 2007 Arlington High School Varsity Boy's basketball team had an excellent season, compiling a record of 15 - 5 (15 wins and 5 losses). The total points scored by the team for each of the 20 games are listed below in the order in which the games were played:

76, 55, 76, 64, 46, 91, 65, 46, 45, 53, 56, 33, 37, 67, 58, 64, 67, 52, 58, 62

(a) Complete the frequency table below.

POINTS SCORED	TALLY	FREQUENCY
40 - 49		3
50 - 59	<del>    </del>	8
60 - 69	<del>    </del>	6
70 - 79		2
80 - 89		0
90 - 99		1

(b) Construct the histogram below.



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## QUARTILES AND BOX PLOTS



Another visual representation of how a data set is distributed comes in the form of a box plot. We create box plots by dividing the data up roughly into quarters by finding the quartiles of the data set.

**Exercise #1:** Shown below are the scores 16 students received on a math quiz.

52, 60, 66, 66, 68, 72, 72, 73, 74, 75, 80, 82, 84, 91, 92, 98

(a) What is the median of this data set?

$$\frac{73+74}{2} = 73.5$$

(b) Find the range of the data set (defined as the difference between the largest data value and the smallest data value).

$$98 - 52 = 46$$

(c) What is the median of the lower half of this data set (known as the first quartile,  $Q_1$ )?

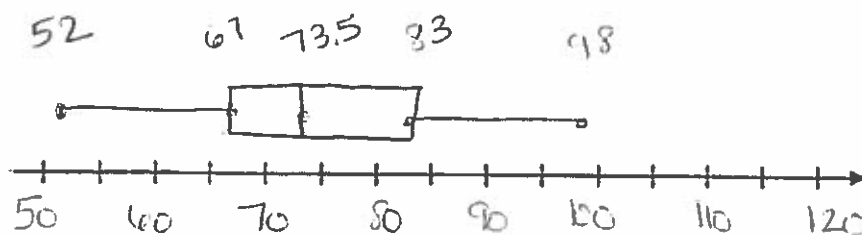
$$\frac{66+68}{2} = 67$$

(d) What is the median of the upper half of this data set (known as the third quartile,  $Q_3$ )?

$$\frac{82+84}{2} = 83$$

The first and third quartiles are sometimes known as the lower and upper quartiles, respectively. The quartiles, the median, and the lowest and highest values in a data set comprise what is known as the **five number summary** and can be graphically represented on a **box plot**. This type of plot is also sometimes known as a **box and whiskers plot**.

**Exercise #3:** Using the same data set construct a box plot on the number line given below.



$$IQR: 83 - 67 = 16$$

Outliers: Smaller than  $Q_1 - 1.5(IQR)$

larger than  $Q_3 + 1.5(IQR)$

$$67 - 1.5(16) = 67 - 24 = 43$$

$$83 + 1.5(16) = 83 + 24 = 107$$

no outliers

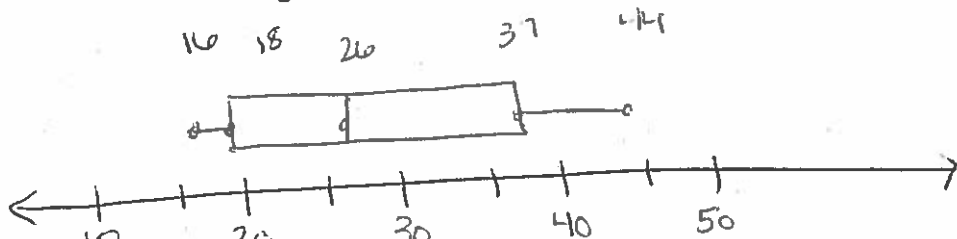
**Exercise #4:** The ages of the 15 employees of the Red Hook Curry House are given below.

16, 17, 17, 18, 19, 22, 25, 26, 29, 33, 33, 37, 40, 42, 44

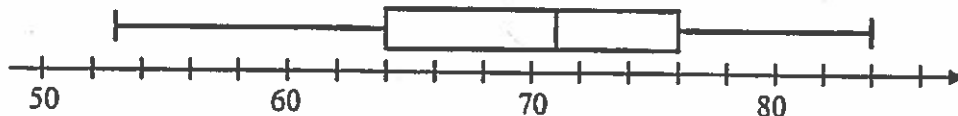
(a) Determine the median and quartile values for this data set.

Med = 26       $Q_1 = 18$        $Q_3 = 37$

(b) Create a box-and-whiskers diagram below.



**Exercise #5:** Twenty of Mr. Ouimet's physics students recently took a quiz. The results of this quiz are shown in the following box-and-whiskers diagram. Assume that all scores are whole numbers.



(a) What was the median score on Mr. Ouimet math quiz?

71

(b) What was the range of the scores on Mr. Ouimet's physics quiz?

$84 - 53 = 31$

(c) What score was greater than or equal to 75% of all other scores on this quiz?

$Q_3$

76

(d) Mr. Ouimet regularly sets the passing grade on his quizzes to be the score of the lower quartile. What is the passing grade on this quiz?

64

**Exercise #6:** Which of the following box plots shows a data set with the greatest median?

