Sec " 1 , 2 "

DESCRIBING DATA WITH TABLES AND GRAPHS

Statistics:

- Statistics is the study of the collection, analysis, interpretation, presentation, and organization of data. In other words, it is a mathematical discipline to collect, summarize data.

Samples and Populations:

The terms population and samples are defined in statistics as follows:

- **Population:** It is a collection of all possible individuals, about which we require information.

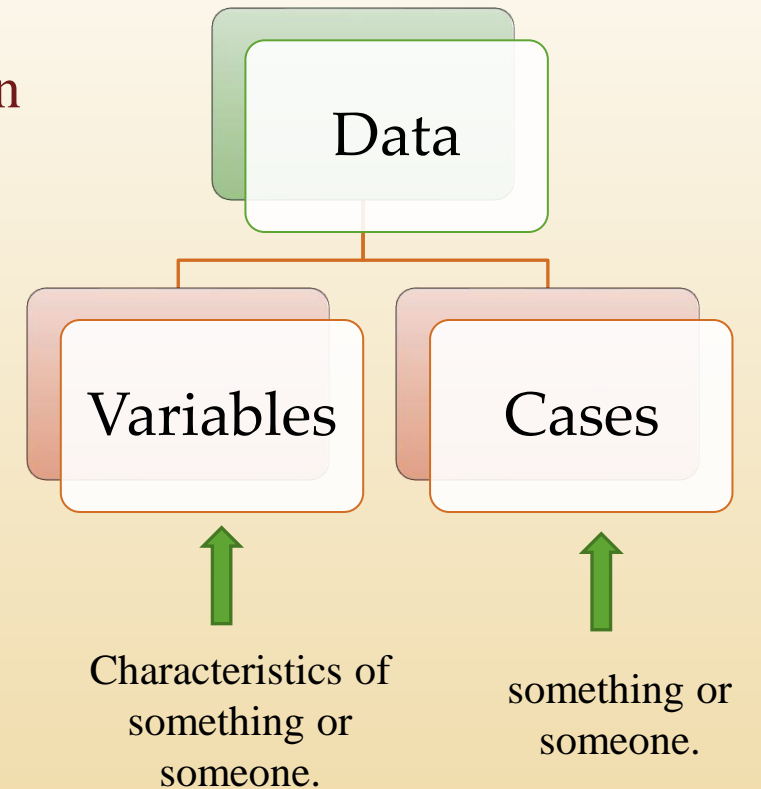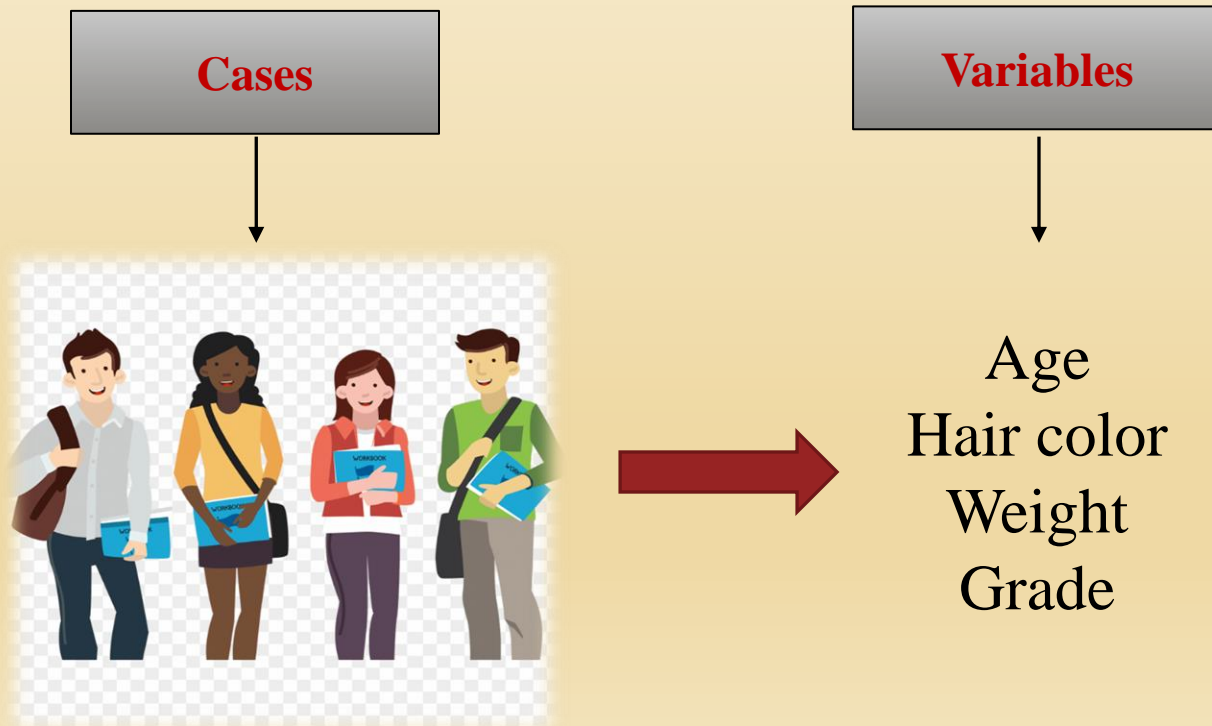- **Sample:** A sample is a portion of the population of interest.

Random Sample:

- A random sample of n observations $x_1, x_2, \ldots, x_n$ is a sample that is chosen in such a way that each member of the population has the same chance of being selected for the sample.

Cases and Variables:

If you're conducting a study, you should think about your data in terms of cases and variables.

- **Cases:** Cases are the persons, animals, or things in your study.

- **Variables:** variables are the characteristics of interest.

Data

Variables

Cases

Characteristics of something or someone.

something or someone.

Cases

Variables

Age
Hair color
Weight
Grade

Data Matrix:

Data matrix is the tabular format representation of cases and variables of your statistical study.
Each row of a data matrix represents a case and each column represent a variable.

Variables

Name	Age	Hair Color	Weight	Grade
Ahmed	15	Black	54	90
Mona	13	Black	50	50
Sara	20	Brown	45	65
Ali	23	Blond	60	83

Cases

- **Numerical or Quantitative Data:**

    Data can be measured, deals with numbers. Some examples of numerical data are height, length, size, weight, number of children in a family, minutes remaining in a class, and so on. The two different classifications of numerical data are:

    (a) **Discrete Data** :

    Discrete data can take only discrete values. Discrete information contains only a finite number of possible values.
Example: Number of students in the class (30, 35, 60, 42, …, etc.)

    (b) **Continuous Data :**

    Continuous data is data that can be calculated. It has an infinite number of probable values that can be selected within a given specific range.
Example: Temperature range ($30 - 35$)
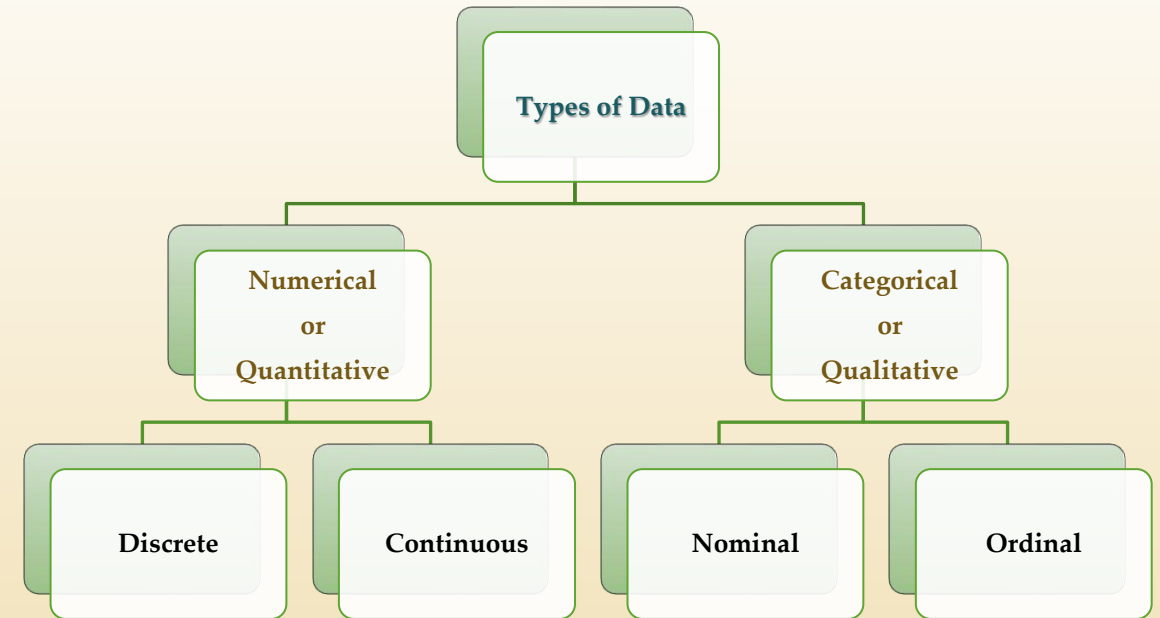
- **Categorical or Qualitative Data:**

    Data cannot be measured, describe characteristics. Some examples of categorical data are type of a car, eye color, hair color, hometown, person's gender, and so on. Sometimes categorical data can hold numerical values (quantitative value), but those values don't have mathematical sense (birthdate). The two different classifications of categorical data are:

    (a) **Nominal Data** :

        It cannot be ordered and measured.

Example: Names of people, gender, and nationality.

    (b) **Ordinal Data** :

        Ordinal data is a type of categorical data with an order. The variables in ordinal data are listed in an ordered manner.

Example: Ranking, and a position in class.

Graphic Presentation of Data

- The graphic presentation of data and information offers a quick and simple way of understanding the features and drawing comparisons. There are different types of graphical representation. Some of them are as follows:

[1] Dot – Plot (Dot – Chart) :

- A dot – plot is a graphical display of data using dots. It shows the frequency of data on a given number line. ' • ' is placed above a number line each time when that data occurs again.

- X – axis ⟶ what is being measured.

Example : How long does it take to eat breakfast

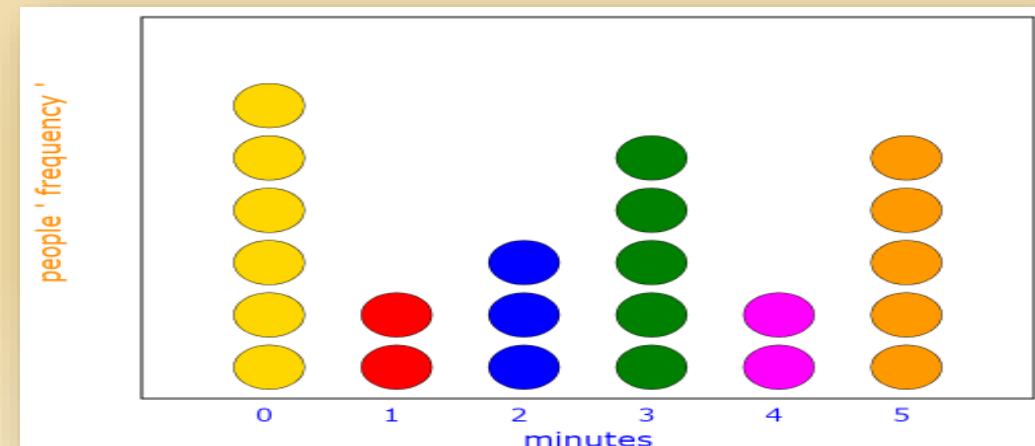| Minutes	0	1	2	3	4	5
people	6	2	3	5	2	5

(a) What is the sample size ?
(b) construct a dot – plot graph?

Answer

(a) Sample size = The sum of all people ' Total frequencies '
= 6 + 2 + 3 + 5 + 2 + 5
= 23

(b)

Sheet (1)

1. The following measurements were recorded for the drying time, in hours, of a certain brand of latex paint.

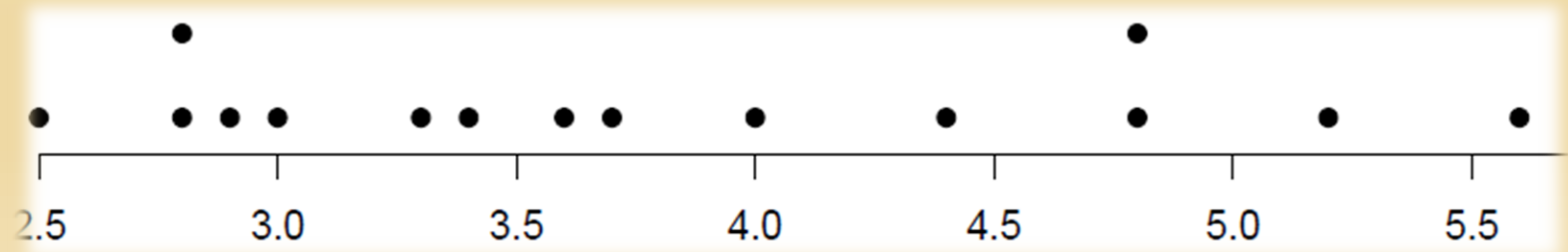| 3.4	2.5	4.8	2.9	3.6
2.8	3.3	5.6	3.7	2.8
4.4	4.0	5.2	3.0	4.8

(3)   (5)

Assume that the measurements are a simple random sample.

(a) What is the sample size for the above sample?
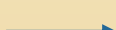
(b) Plot the data by way of a dot plot.

Answer

(a) Sample size $5 \times 3 = 15$.

(b)

[2] Bar – Graph (Bar – Chart) :

- A bar – graph is a graphical display of data using bars ' rectangles ' of different heights. A bar – graph can be used to show something change over time or to compare items.

- X – axis $\longrightarrow$ What is being measured.

  Y– axis $\longrightarrow$ Frequency (the number for the amount of stuff being measured).

- There exist gaps between the bars.

Example (1) : Imagine you just did a survey of your friends to find which kind of movie they liked best ?

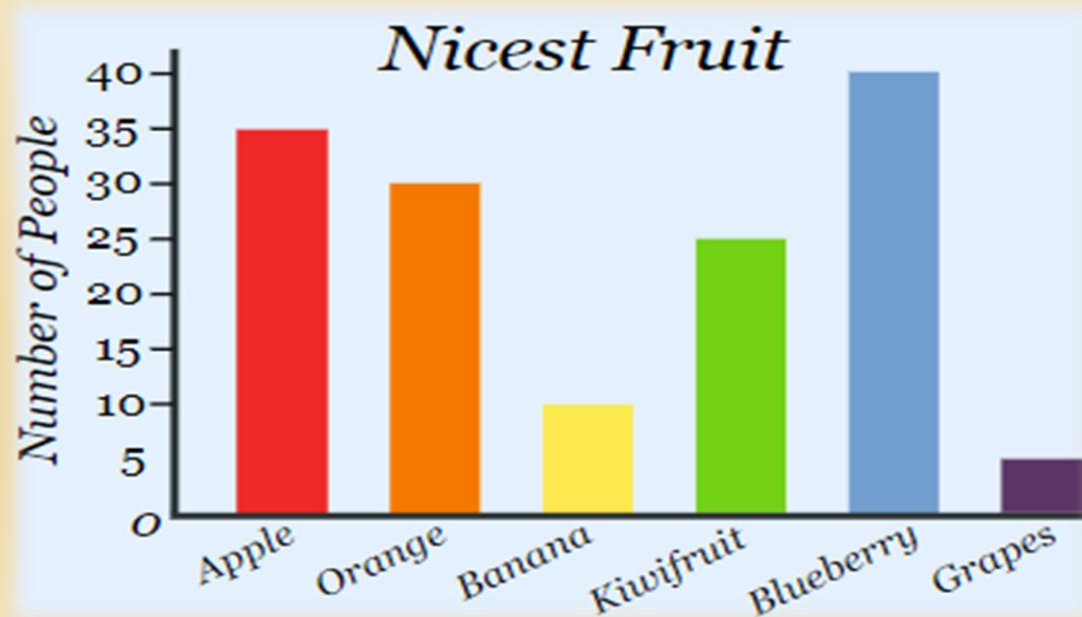| Movie	Comedy	Action	Romance	Drama
People	4	5	6	1

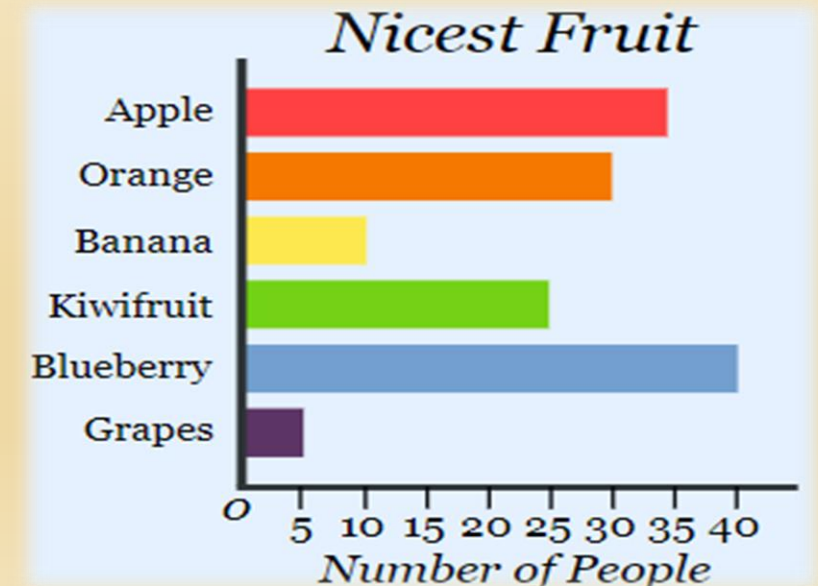Plot the data by way of a bar – graph ?

Favorite Type of Movie
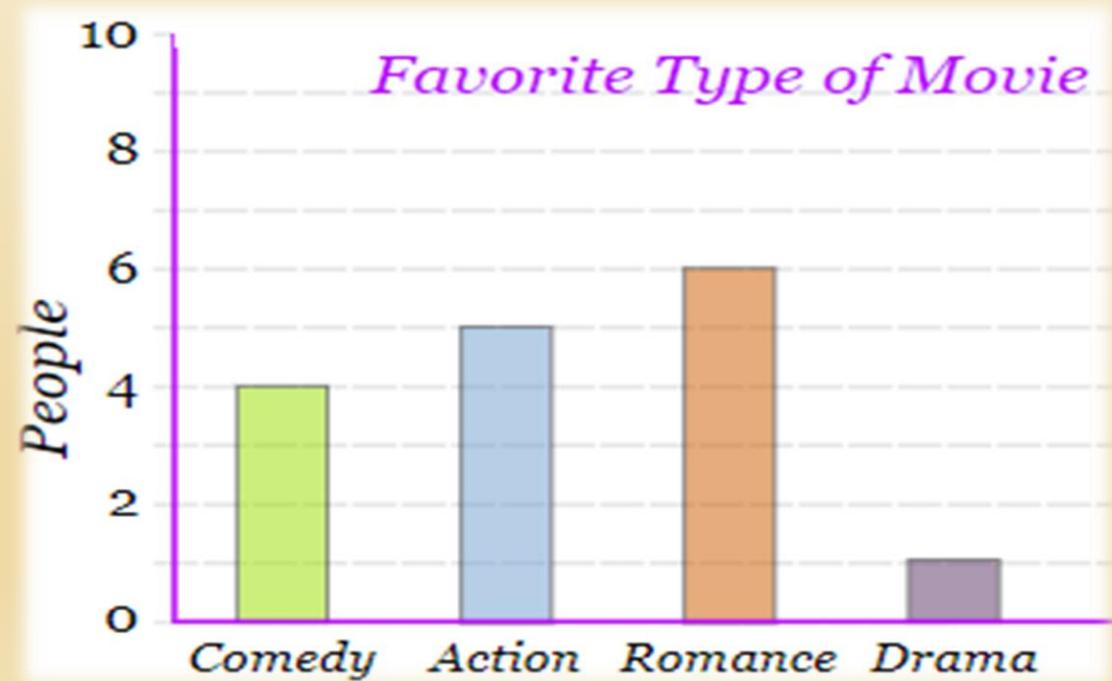
Example (2) : A survey of 145 people asked them "Which is the nicest fruit"?

Fruit	Apple	Orange	Banana	Kiwifruit	Blueberry	Grapes
People	35	30	10	25	40	5

Plot the data by way of a bar – graph ?

Bar Graphs can also be **Horizontal**, like this:

[3] Pie – Chart (Circle – Chart) :

- a special chart that uses "pie slices" to show relative sizes of data.

Example (1) : Imagine you just did a survey of your friends to find which kind of movie they liked best ?

Movie	Comedy	Action	Romance	Drama
People	4	5	6	1

Plot the data by way of a Pie – chart ?

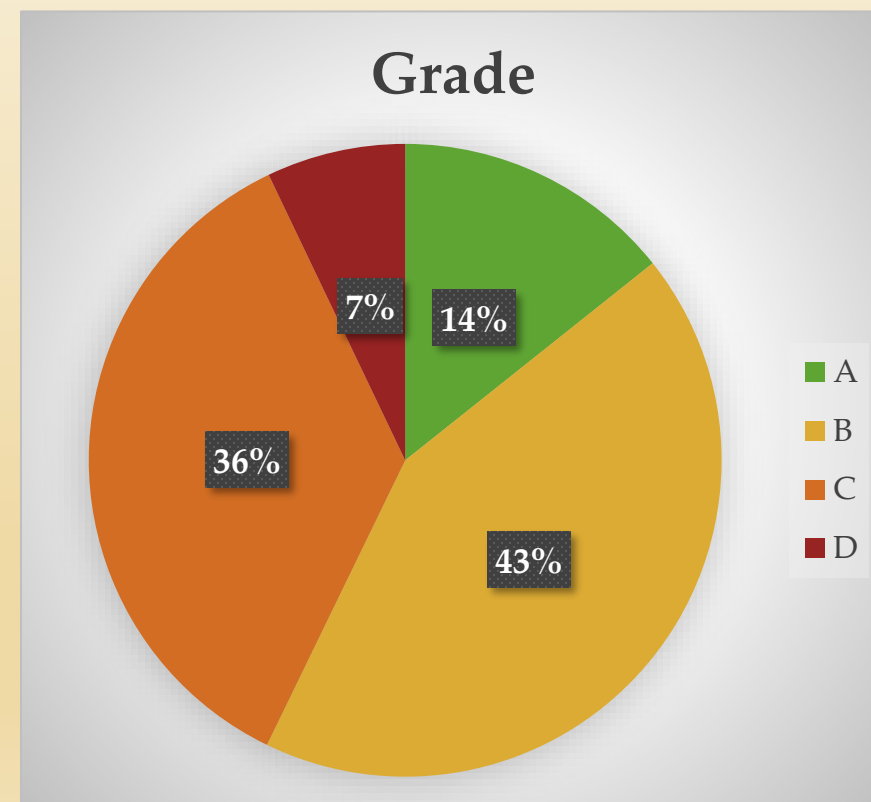| Movie	Comedy	Action	Romance	Drama	Total
People	4	5	6	1	16
Relative size	$\frac{4}{16} \times 100$ $= 25\%$	$\frac{5}{16} \times 100$ $= 31.25\%$	$\frac{6}{16} \times 100$ $= 37.5\%$	$\frac{1}{16} \times 100$ $= 6.25\%$	

Favorite type of movie
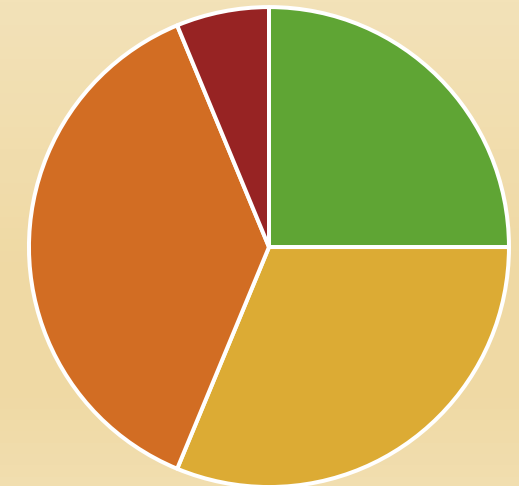
■ Comedy ■ Action ■ Romance ■ Drama

Example (2) : Here is how many students got each grade in the recent test:

A	B	C	D
4	12	10	2

Plot the data by way of a Pie – chart ?

A	B	C	D	Total
4	12	10	2	28
$\frac{4}{28} \times 100$ $= 14.3\%$	$\frac{12}{28} \times 100$ $= 42.9\%$	$\frac{10}{28} \times 100$ $= 35.7\%$	$\frac{2}{28} \times 100$ $= 7.1\%$	

Grade

Sheet (1)

7. According to the pie graph, which of the following statements is false ?

a) More than half the animals on the farm are cows.

   True

b) One quarter of the animals on the farm are

   chickens. False

c) There are more pigs than cats on the farm. True

d) Fewer than one quarter of the animals on the

   farm are pigs. True

e) No cats on the farm have given birth to cows.

   True