**Unit 1**

**Basic Statistics and Calculator Use**

**Topic A: Average**

* Mean and range
* Median and mode

**Topic B: Graphs**

* Bar or column graph
* Line graph
* Circle or pie graph
* Create a circle graph

**Topic C: Using a calculator and estimating**

* Scientific calculator
* Basic functions of a scientific calculator
* Estimating and rounding

**Unit 1 Summary**

**Unit 1 Self-test**

**Topic A: Average**

**Mean and Range**

**Statistics:** the mathematical branch that deals with data collection, organization, description, and analysis to draw conclusions.

**Average:** it refers to the statistical [mean](http://en.wiktionary.org/wiki/mean), [median](http://en.wiktionary.org/wiki/median), [mode](http://en.wiktionary.org/wiki/mode), or range of a group of numbers or a set of data.

* Mean = average.
* Median = middle number.
* Mode = the number that occurs most often.
* Range = the difference between the largest and smallest values.

**Mean** (or arithmetic mean): the standard average value of a group of numbers or a set of data. It is the most common expression for the average.

* Determine the mean: add up all the numbers in the group and divide by the number of values.



* **Example:**  Find the mean of 2, 3, 4, 0, 1.

Mean  2 There are 5 numbers.

**Range:**  the difference between the highest and lowest values in a group of numbers.

* **Determine the range:**

Range = highest value lowest value

* **Example:** Find the range: 3, 5, 2, **9**, 4, 8, **1**

Range = 9 1 = 8

**Median and Mode**

**Mode:** the value(s) that occurs most frequently in a group of numbers.

**Example:** Find the mode:

2, ***4***, 5, 3, 7, 8, ***4***, 1 Mode = 4The value that occurs most frequently is 4.

* If no value is repeated, the mode does not exist.

**Example:** 13, 27, 30, 49, 47 No mode. No value is repeated.

* A bimodal has 2 modes in a group of numbers.

**Example:** 1, ***3***, ***8***, 17, 9, ***8***, 4, 6, 11, ***3*** Modes = 3 and 8It has two modes.

* If more than one value occurs the same number of times, each value is a mode.

**Median:** the ***middle*** number of an ordered group of numbers.

**Example:** 1, 3, ***5***, 7, 9

* Determine the median: arrange the [values](http://www.investorwords.com/5209/value.html) in [order](http://www.investorwords.com/3495/order.html) (ascending or descending).
* Ascending order: numbers are arranged from the smallest to the largest number.
* Descending order: numbers are arranged from the largest to the smallest number.
* If the total number of terms in the group is ***odd***, the median is the middle number.

**Example:** Find the median of 2, 8, 7, 1, 6, 5, 3, 4, 8, 1, 9 11 numbers (odd)

* Ascending order: 1, 1, 2, 3, 4, ***5***, 6, 7, 8, 8, 9
* Median = 5 5 is the middle number.
* If the total number of terms in the group is ***even***, the median is the average of the two values in the middle (add two middle numbers and divide by 2):



**Example:**  Find the median of 5, 4, 9, 0, 2, 6 6 numbers (even)

* Ascending order: 0, 2, ***4, 5***, 6, 9
* Median = = 4.54 and 5 are the middle numbers.
* Or descending order: 9, 6, ***5, 4***, 2, 0
* Median = = 4.5

**Topic B: Graphs**

**Bar or Column Graph**

**Bar or column graph:** a chart with rectangular bars whose heights or lengths display the values. (It used to compare information between different groups.)

A bar graph can be vertical (column graph) or horizontal (bar graph).

**Create a bar (or column) graph:**

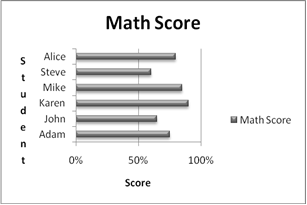
* Put data into tabular form (make a table).
* Label each axis and make up a title for the graph. Example
* Create a scale (number) for each axis starting from zero.

Example

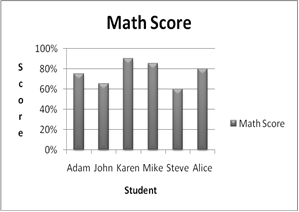
* Draw bars or columns (use the data from the table). Example: Bar’s height displays the student score.

**Table:** a group of numbers arranged in a condensed form of columns and rows. It is a more effective way to present information.

**Interpolate and extrapolate from the information provided:**

**Example**: Make a graph from the table and answer questions.

|  |  |
| --- | --- |
| **Student** | **Test score** |
| Adam | 75% |
| John | 65% |
| Karen | 90% |
| Mike | 85% |
| Steve | 60% |
| Alice | 80% |



Column graph Bar Graph

* 1. How many students earned 80% or greater? 3 students (80, 85, 90)
  2. How many students earned 60%? 1 student (60)
  3. How many more students earned between 59% and 81%? 4 students (60, 65, 75, 80)

**Line Graph**

**Line graph:** a chart that displays information by connecting lines between [data](http://www.webopedia.com/TERM/L/data.html) points.

It is used to track changes over periods of time.

**A line graph consists of** a horizontal *x-*axis and a vertical *y*-axis.

* Horizontal *x-*axis: represents the independent variable (such as time).
* Vertical *y*-axis: represents the dependent variable (such as temperature, population,

sales, rainfall, etc.).

**Create a line graph:**

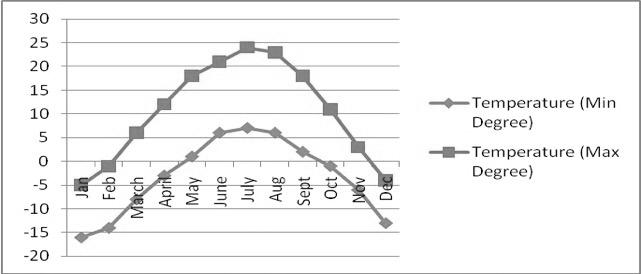
* Put data into tabular form (make a table).
* Label each axis and make up a title for the graph. Example
* Create a scale for each axis. Example
* Plot the data points (use the data from the table).
* Draw a curve (or a line) that best fits the data points (connect the points).

**Example of a line graph:**

**Average temperatures in Prince George**

|  |  |  |
| --- | --- | --- |
| **Month** | **Temperature 0C (Low)** | **Temperature 0C (High)** |
| **Jan** | -16 | -5 |
| **Feb** | -14 | -1 |
| **March** | -8 | 6 |
| **April** | -3 | 12 |
| **May** | 1 | 18 |
| **June** | 6 | 21 |
| **July** | 7 | 24 |
| **Aug** | 6 | 23 |
| **Sept** | 2 | 18 |
| **Oct** | -1 | 11 |
| **Nov** | -6 | 3 |
| **Dec** | -13 | -4 |

**Average Temperatures in Prince George (0C)**



**Circle or Pie Graph**

**Circle (or pie) graph:**  a chart made by dividing a circle into sections (parts) that each represent a percentage of the total.  It is used to compare parts of a whole.

* Entire pie: represents the total amount (3600).
* Sectors: represent percentages of the total. Example

**Create a circle graph:**

* Put data into tabular form (make a table).
* Calculate the total amount.
* Determine the percentage of each sector or part.

= or =

* Determine the angle of each sector (convert the percent to a decimal first).

Angle for each part = (Decimal) (3600)

* Draw a circle (use a compass) and a radius (*r*).

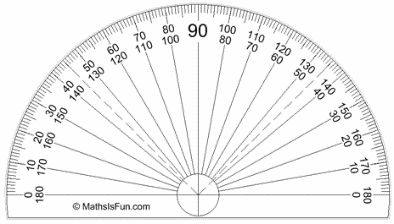
*r*

* Draw in the sectors of the circle (use a protractor), and add colors to the sectors (this will help to make them easier to distinguish).
* Label the sectors and make up a title for the graph.

**How to use a protractor**:

* Place the protractor on the circle so that the center mark of the protractor at the center of the circle.
* Ensure that the radius of the circle is lined up on the zero line at the end of the protractor.
* Draw the sector by using the calculated angle.

Each time you add a sector the radius changes to the line you just drew.



**Create a Circle Graph**

**Example**: Create a circle graph using the following table final grades in a math class.

|  |  |
| --- | --- |
| **Final grades in a math class** | **Number of students** |
| **D** | 1 |
| **C** | 2 |
| **B** | 4 |
| **A** | 3 |
| **Total number of students:** | 10 |

* The total number of students: 1 + 2 + 4 + 3 = 10 There are 10 students in the class.
* Determine the percentage of each sector (convert the percent to a decimal):
* First sector in the circle chart: = , = = 10% = 0.1
* Second sector in the circle chart: = , = = 20% = 0.2
* Third sector in the circle chart: = , = = 40% = 0.4
* Fourth sector in the circle chart: = , = = 30% = 0.3
* Determine the angle of each sector: Angle for each part = (Decimal) (3600)
* First sector in the circle chart: (Decimal) (3600) = (0.1) (3600) = 360
* Second sector in the circle chart: (Decimal) (3600) = (0.2) (3600) = 720
* Third sector in the circle chart: (Decimal) (3600) = (0.4) (3600) = 1440
* Fourth sector in the circle chart: (Decimal) (3600) = (0.3) (3600) = 1080

|  |  |
| --- | --- |
| **Percent Decimal** | **Angle** |
| 10% (0.1) | 360 |
| 20% (0.2) | 720 |
| 40% (0.4) | 1440 |
| 30% (0.3) | 1080 |
| Total: 100% (1) | Total: 3600 |

Check: The sum of the percentages = 100%. The sum of all the degrees should be = 3600.

* Draw the circle graph:

**Topic C: Using a Calculator and Estimating**

**Scientific Calculator**

**Scientific calculator:** a calculator with advanced functions that can solve mathematics, science, and engineering problems.

**Basic functions of a scientific calculator**

* Basic functions (+, , , )
* Parentheses
* Absolute values (abs)
* Order of operations
* Exponents or powers
* Pi problems (3.141592654...)
* Fractions
* Scientific notation
* Trigonometry functions (sine, cosine, tangent)
* Etc.

**Identify main keys:**

Mode key



Shift key

Clear key

On/off key

Fraction key

Negative key

**\**

Decimal point key

**Basic Functions of a Scientific Calculator**

**Basic features:**

|  |  |
| --- | --- |
| Operation | Function |
| + | Addition |
|  | Subtraction |
|  | Multiplication |
| ÷ | Division |
| () or neg | Negative number |
| *x*2 | Squaring |
| *xy* or yx  or^ | Exponent or power |
| √ or Sqrt | Square root |
|  | Cube root |
|  | nth root |
| ( ) | Parentheses |
| π | Pi |
| Mode | Converting between degrees and radians |
| Shift or 2nd F or INV | Converting between main and upper symbols |
| or d/c | Fraction |
| a or a b/c | Mixed number |
| Exp or 10*x* | Scientific notation |
| sin, cos, tan | Trigonometry functions |
| sin-1, cos-1, tan-1 | Inverse trigonometry functions |

**Determine what order you need to press the keys** (it may vary with different calculators).

**Examples:**

1. 21 + 34 5 = ?

21 + 34  5 = Display: 191

1. + = ?

432 6 + = Display: 75.14159…

1. 272 + 38 17 = ?

27 + 38 17 **=** Display: 1375

1. **+ 23 = ?**

Shift 27  2 3 = Display: 11

or 2nd F 27  2 3 =

**Rounding and Estimating**

**Rounding whole numbers:** choose an approximation for a whole number (making a number simpler).

**The method of rounding:**

* If the rounding digit (next digit) is ≥ 5 (greater than or equals to), round-up (add 1 to the left digit of the rounding digit and replace all the digits to the right of the rounding digit with 0).
* If the rounding digit is < 5 (less than), round down (do not change the left digit of the rounding digit, replace the rounding digit and all the digits to the right of it with 0).

**Example:** Rounding digit (*next digit*)

1. Round to the nearest ***largest place***. **3**,*4*59,567 ≈ 3,000,000 4 4 < 5 round down
2. Round to the nearest ***ten***.3**4***5* ≈ 350 5 5 5 round-up
3. Round to the nearest ***hundred***.3, **4***2*9 ≈ 3,400 2 2 < 5 round down
4. Round to the nearest ***thousand***.  2**7**,*6*56 ≈ 28,000 6 6 > 5 round-up

**Estimate:** find a value that can be used to check if an answer is reasonable (approximating).

**Method of estimating:** round to the largest place value.

* If the next digit is ≥ 5, round-up.
* If the next digit is < 5, round down.

**Example:** Estimate the following.

1. 7***6***56 ≈ 8000 The next digit of 7 is 6 (6 > 5, round-up).

+ 4***3***58 ≈ + 4000 The next digit of 4 is 3 (3 < 5, round down).  
  ≈ 12000

1. 8***7***56 ≈ 9000 The next digit of 8 is 7 (7 > 5, round-up).

5***4***32 ≈ 5000 The next digit of 5 is 4 (4 < 5, round down).  
  ≈ 4000

1. 5***3***78 × 3***6***7 ≈ 5000 2,000,000
2. 7***5***76 ÷ 2***3***7 ≈ 8000 ÷ 200 = 40

**Unit 1: Summary**

**Basic Statistics and Calculator Use**

**Graphs**

* Bar or column graph: a chart with rectangular bars whose heights or lengths display the values. (It used to compare values between different groups.)

Construct a bar or column graph: page 23.

* Line graph: a chart that displays information by connecting lines between [data](http://www.webopedia.com/TERM/L/data.html) points. (It is used to track changes over periods of time). Construct a line graph: page 24.
* Circle graph: a chart made by dividing a circle into sections (parts) that each represent a percentage of the total. (It is used to compare parts of a whole.)

Construct a circle graph: page 25-26.

* **Average:**

|  |  |
| --- | --- |
| **Average/Range** | **Description / Formula** |
| **Mean** | The "standard” average value of a group of numbers or a set of data. |
| **Median** | The middle number of an ordered group of numbers.   * Arrange the [values](http://www.investorwords.com/5209/value.html) in [order](http://www.investorwords.com/3495/order.html). * If the total number of terms in the group is **odd**, the median is the middle number. * If the total number of terms in the [sample](http://www.investorwords.com/4375/sample.html) is **even**: |
| **Mode** | The value(s) that occurs most frequently in a group of numbers.   * If no value is repeated, the mode does not exist. * If more than one value occurs with the same frequency, each value is a mode. * A bimodal has 2 modes in a group of numbers. |
| **Range** | The difference between the highest and lowest values in a group of numbers.  Range = highest value - lowest value |

**Scientific calculator**

* Scientific calculator: a calculator with advanced functions that can solve mathematics, science, and engineering problems.
* **Basic functions of a scientific calculator:**

|  |  |
| --- | --- |
| Operation | Function |
| + | Addition |
|  | Subtraction |
|  | Multiplication |
| ÷ | Division |
| () or neg | Negative number |
| *x*2 | Squaring |
| *xy* or yx | Exponent or power |
| √ or Sqrt | Square root |
|  | Cube root |
|  | nth root |
| ( ) | Parentheses |
| π | Pi |
| Mode | Converting between degrees and radians |
| Shift or 2nd F or INV | Converting between main and upper symbols |
| or d/c | Fraction |
| or a b/c | Mixed number |
| Exp or 10*x* | Scientific notation |
| sin, cos, tan | Trigonometry functions |
| sin-1, cos-1, tan-1 | Inverse trigonometry functions |
| … | … |

**Rounding**

* Rounding whole numbers:choose an approximation for a number.
* The method of rounding:
* If the rounding digit (next digit) is ≥ 5, round-up.
* If the rounding digit is < 5 (less than), round down.

**Estimating**

* Estimate: find a value that can be used to check if an answer is reasonable.
* Method of estimating: round to the largest place value.
* If the next digit is ≥ 5, round-up.
* If the next digit is < 5, round down.

**Unit 1: Self-Test**

**Basic Statistics and Calculator Use**

**Topic A**

1. Find the mean: 4, 0, 5, 10, 9, 2
2. Find the range: 11, 7, 2, 6, 9, 13, 3
3. Find the mode:

**a)** 12, 4, 7, 3, 9, 51, 6, 7

**b)** 21, 13, 4, 16, 54, 100

1. Find the median:

**a)** 4, 6, 7, 10, 9, 11, 3, 8, 5, 1, 14, 2, 23

**b)** 6, 14, 10, 11, 0, 19, 5, 4

**Topic B**

1. Create a column graph from the table and answer the following questions:

|  |  |
| --- | --- |
| **Student** | **Test score** |
| **Evan** | 85% |
| **Jon** | 75% |
| **Alice** | 90% |
| **Tom** | 65% |
| **Damon** | 95% |
| **Steve** | 70% |

1. How many students earned 85% or greater?
2. How many students earned 75%?
3. How many more students earned between 64% and 91%?
4. Create a line graph from the table (average temperatures in Vancouver):

|  |  |  |
| --- | --- | --- |
| **Month** | **Temperature 0C (High)** | **Temperature 0C (Low)** |
| **Jan** | 7 | 7 |
| **Feb** | 8 | 2 |
| **March** | 10 | 3 |
| **April** | 13 | 6 |
| **May** | 17 | 9 |
| **June** | 20 | 12 |
| **July** | 22 | 14 |
| **Aug** | 22 | 14 |
| **Sept** | 19 | 11 |
| **Oct** | 14 | 7 |
| **Nov** | 9 | 3 |
| **Dec** | 6 | 1 |

1. Create a circle graph from the table (Tom’s monthly expenses):

|  |  |
| --- | --- |
| **Tom** | **Monthly Expenses** |
| **Rent** | $600 |
| **Food** | $300 |
| **Transportation** | $60 |
| **Utilities** | $80 |
| **Clothing** | $85 |
| **Entertainment** | $165 |
| **Miscellaneous** | $35 |

**Topic C**

1. Complete the following with your calculator:
2. 78 + 4311
3. +
4. 422 + 43 25
5. +
6. + 35
7. Rounding:
8. Round to the nearest largest place. 6,345,789
9. Round to the nearest ***ten***.567
10. Round to the nearest ***hundred***. 8, 649
11. Round to the nearest ***thousand***.  47,567
12. Estimate the following:
13. 79,215 + 784
14. 11,345 372
15. 4,738 × 624
16. 8,345 ÷ 382