Software = Computer Programs

- **Software**, are a set of **programs**, that tells the computer what tasks to perform
  - **System Software**
    - **Operating System** = Delivers hardware and software resources
      Windows, MacOS, Linux, BSD, Chrome, iOS, Android
    - **Utility Programs** = Performs maintenance-type tasks
      Virus Scanner: McAfee, NAV, Bitdefender, AVG, Avast,
  - **Applications Software**
    - **Word Processing:** MS Word, LibreOffice Write
    - **Spreadsheets:** MS Excel, LibreOffice Calc
    - **Presentation Graphics:** MS PowerPoint, LibreOffice Impress
    - **Database:** MS Access, LibreOffice Base
    - **Office Suites:** Microsoft Office, LibreOffice, OpenOffice
    - **Browsers:** Brave, Chrome, Firefox, Opera, Safari, ~~IE, Edge~~
    - **Code Editor:** VS Code, Atom, Notepad, TextEdit

 1

Functions of an Operating System

- **Booting the Computer**
  - Loads operating system into RAM memory
  - **Kernel** is opening batch of instructions of OS
- **Accesses hardware connected to computer**
  - Configures Hardware Devices
  - Device drivers are **firmware** for hardware
  - Plug and Play devices are recognized automatically and their drivers are loaded by OS
- **Provides User Interface (UI)**
  - Displays the **desktop** as your starting point
  - Desktop Background image called **wallpaper**
  - **Icons** to represent programs, folders, and files

 2

Functions of an Operating System

- **Security**
- **Passwords**
- **Managing Network Connections**
  - Manages wired connections to network
  - Manages wireless connections Wifi, 4G
- **Memory Management**
  - Optimizing the use of main memory (RAM)
  - Virtual memory uses hard drive storage when RAM is full
- **Manage and Monitor Resources & Jobs**
  - Detects problems and attempts recovery
  - Schedules jobs tasking
- **File Management**
  - Windows Explorer
  - Files usually viewed in hierarchical folder (directory) structure
- **Firewall**

 3

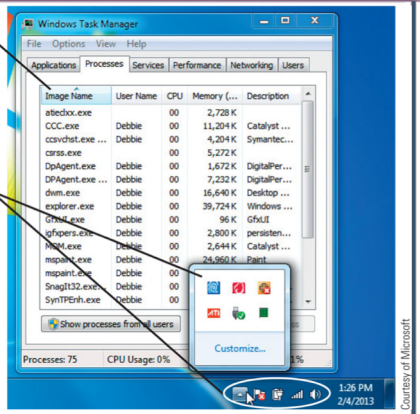
Task Manager and Tray

Win
[Ctrl]
[Alt]
[Del]

MacOS
[Option]
[Command]
[Esc]

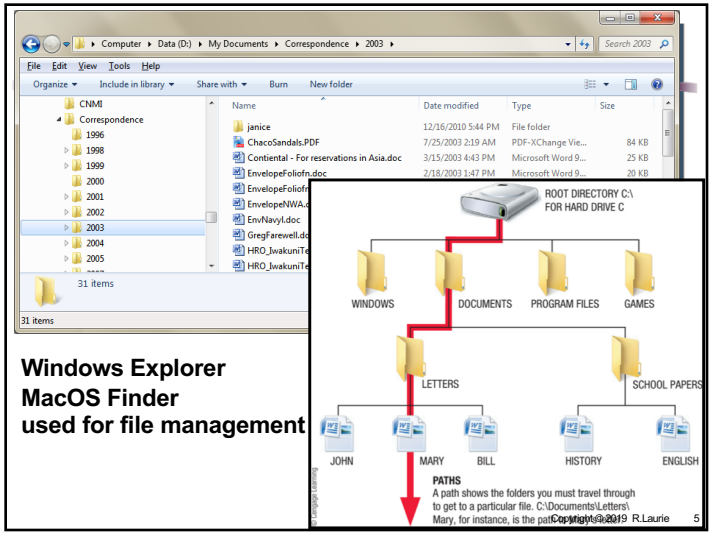
TASK MANAGER
These programs are running, even before any application programs are launched by the user.

NOTIFICATION AREA ICONS
These programs were launched during the boot process and will show in the notification area unless they are closed by the user (right-click an icon to see if you can close that program).



Courtesy of Microsoft

 4

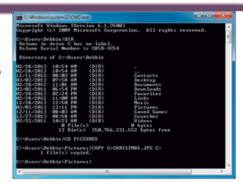


Windows Explorer
MacOS Finder
used for file management

 5

Differences Among Operating Systems

- Command Line Interface
  - Requires user to communicate instructions to computer via typed commands
  - DOS = Single-User, Single Task OS
- Graphical User Interface
  - Graphics based interface
  - Single-User, Multi Task OS
  - Most OS's today use GUI
    - Windows 95, 98, 2000, NT, ME, XP
    - Windows Vista, 7, 8, 10
    - Mac OSX, MacOS Mojave
    - Linux Desktops



COMMAND LINE INTERFACE
Commands are entered using the keyboard.

GRAPHICAL USER INTERFACE
Icons, buttons, menus, and other objects are selected with the mouse to issue commands to the computer.

 6

Types of Operating Systems

- Standalone (Personal) Operating Systems
  - Designed for single computer installation
  - Desktop, laptop, notebook, tablet, or smartphone
- Server (Network) Operating Systems
  - Designed for network server computer
  - Many client computers make requests
  - Controls access to network resources
  - MS Windows Server, Apple Server, Linux Server
- Embedded (Mobile) Operating Systems
  - Smart phones: iOS, Android, Kindle
  - Appliances: Cars, Microwaves, DVD player

 7

Unix and Linux

- UNIX: AT&T and Sun Microsystems
  - Intended for workstations and servers
- Linux
  - Developed by Linus Torvalds in 1991 grad project
  - Open-source software: usually free without support
  - http://distrowatch.com/
  - My favorites are: Zorin, Ubuntu Mate, Mint
- Strong support from mainstream companies
  - Google, Oracle, IBM, HP, and Novell
  - Android OS is a derivative of Linux
  - MacOS is a derivative of UNIX

 8

Utility Programs

- Software that is usually related to managing or maintaining the computer
- Many utilities are built into operating systems
  - Control Panel accesses common utilities
  - File management program = Windows Explorer
  - Search Tools = integrated into Windows Explorer
  - Diagnostic and Disk Management Programs
  - Uninstall and Cleanup Utilities
  - File compression programs = iZarc and Windows Explorer
  - Backup and Recovery Utilities
- Can be stand-alone products
  - Antivirus Scanner = BitDefender, AVG and Avast
  - Spyware Scanner = Spybot Search and Destroy
  - VirtualBox.org = Virtualization running an OS within an OS

 9

Application Software Distribution

- Commercial software, mass-produced for purchase
  - Microsoft, Adobe, AutoDesk
  - Software license (Copyright)
    - Specifies the conditions software can be used
    - installations, concurrent-use, single-user, multi-user
  - EULA – End User Licensing Agreement
    - Usually absolves software maker of liability
    - Terms agree to when you purchase and accept the license
- Shareware, copyrighted software = free for trial period
- Web app software, hosted on Web site uses browser
  - Subscription purchase but sometimes free
- Open source software = free
  - provided for use, modification, and redistribution
- Public-domain software
  - Freeware and no copyright restrictions

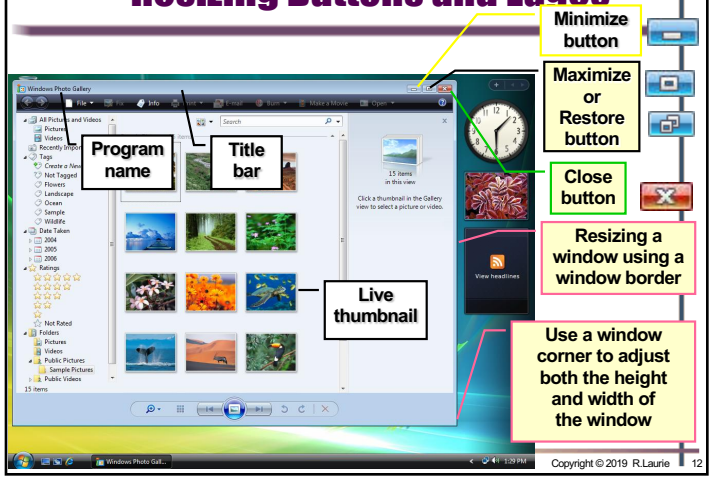
 10

Application Software

- Productivity Software
  - Microsoft Office
    - Word Processing = MS Word
    - Spreadsheets = MS Excel
    - Presentation Graphics = MS PowerPoint
    - Database = MS Access
  - Accounting = MS Money
  - Project Management = MS Project
  - LibreOffice or OpenOffice are OpenSource and Free
- Graphics and Video Editing
- Communications: Email, IM, Web, VOIP
- Home: Tax, Personal Finance, Education

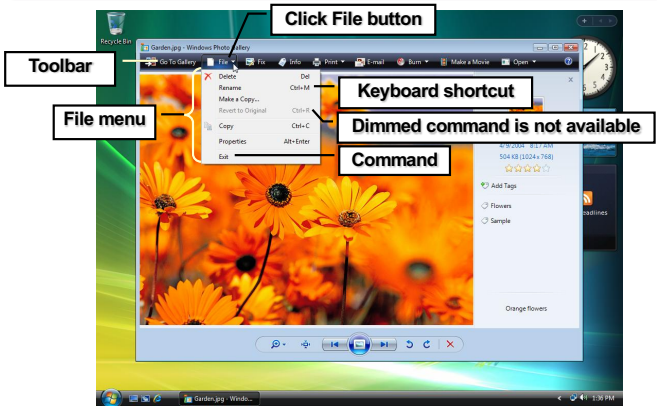
 11

Resizing Buttons and Edges



 12

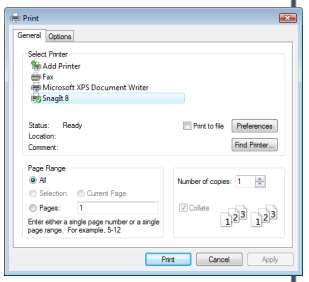
Using Toolbars, Menus, and Shortcuts



 13

Using Dialog Boxes

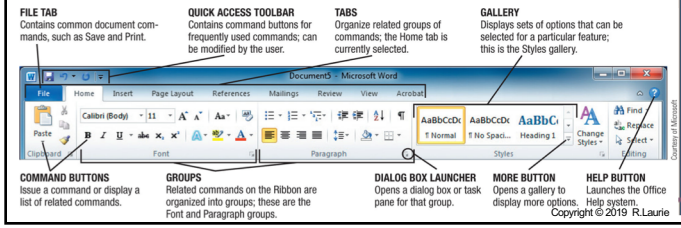
- Some menu or ribbon commands automatically display a dialog box
- A dialog box is a type of window in which you specify how to complete an operation
- A dialog box may have one or more tabs for organizing related settings together on a single sheet



 14

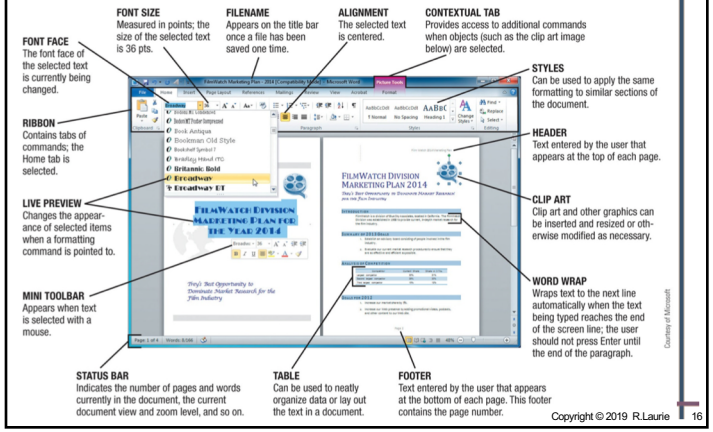
Office Suite Software

- Programs designed to make users more productive and assist them with tasks
- Microsoft Office = packaged software
  - Core applications: Word, Excel, PowerPoint, Access
  - Personal Information Manager – Outlook



 15

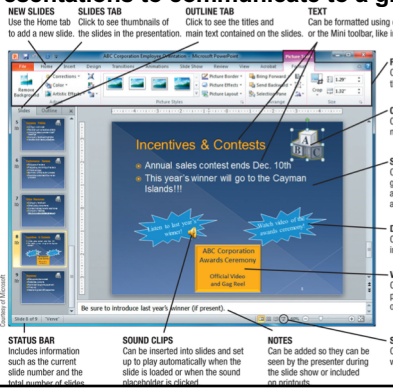
Word Processing



 16

Presentation Graphics

- **Presentation software** is used to create visual aids for presentations to communicate to a group



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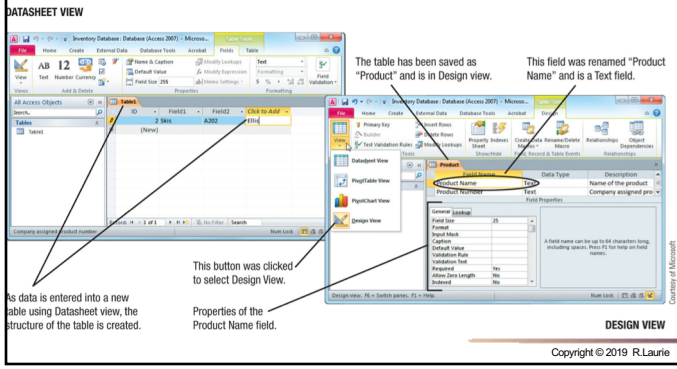
Database

- **A database** is a collection of data organized in a manner that allows access, retrieval, and use of data



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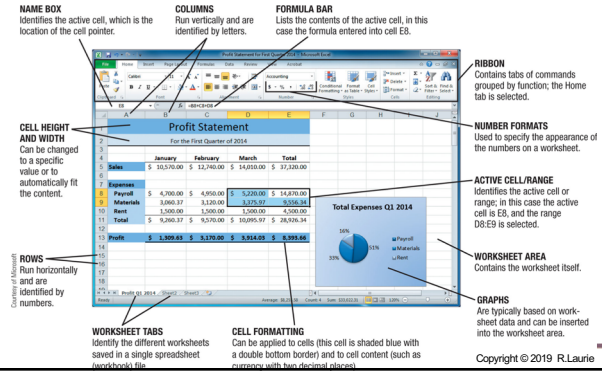
Spreadsheet

- **Spreadsheet software** allows users to organize data, perform calculations, and **chart** data as graphic



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Spreadsheets

- A spreadsheet is an electronic version of a business ledger
- Organizes information in a 2-D Tabular grid
- Performs Calculations based on grid position

	JAN.	FEB.	MAR.	APR.	TOTAL
SALES	1750	1501	1519	1430	6200
COST OF GOODS SOLD	964	980	932	943	3819
GROSS MARGIN	786	521	587	487	2381
NET EXPENSE	98	93	82	110	383
ADM EXPENSE	77	79	69	88	313
MISC EXPENSE	28	45	31	31	135
TOTAL EXPENSES	203	217	182	229	831
AVERAGE EXPENSE	68	72	61	76	277
NET BEFORE TAXES	583	304	405	258	1550
FEDERAL TAXES	303	158	211	134	806
NET AFTER TAX	280	146	194	124	744

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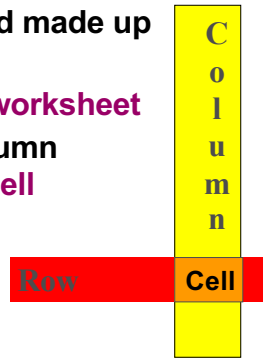
Spreadsheet Uses and Advantages

- Spreadsheets Uses
  - Home: Budgets, Loans, Investments
  - Education: Calculate Grades
  - Business:
    - Accounting, Payroll, Sales, Taxes, Inventory
    - Statistical data analysis and forecasting
  - Scientific and Engineering: Data Analysis
- Advantages of Spreadsheets
  - Save time and fewer errors
  - Automatically recalculate values
    - Formulas can be entered for cells
    - If cell value changes recalculates values in dependent cells
  - Can represent data trends visually using *Charts*
  - Allows "what if" analysis for decision making

 21

Worksheet

- Data appears in a grid made up of rows and columns
- This grid is called a worksheet
- Where a row and column intersect is called a cell



 22

Cell Address and Active Cell

- Cell Address
  - Identified by the column letter and the row number
  - Each cell has a unique address

	A	B	C
1	A1		C1
2		B2	C2
3			C3

 23

Cell Address and Active Cell

- Cell Address
  - Identified by the column letter and the row number
  - Each cell has a unique address
- Active Cell C2
  - Changes can only take place in the active cell
  - Selected using mouse cursor or arrow keys

	A	B	C
1	A1		C1
2		B2	C2
3			C3

 24

Cell Address and Cell Range

- Cell Address
  - Identified by the column letter and the row number
  - Each cell has a unique address
- Active Cell
  - Changes can only take place in the active cell
  - Selected using mouse cursor or arrow keys
- Cell Range **A1:C2**
  - Select using mouse drag or Shift and Arrow keys

	A	B	C
1	A1		C1
2		B2	C2
3			C3

 25

Cell Contents

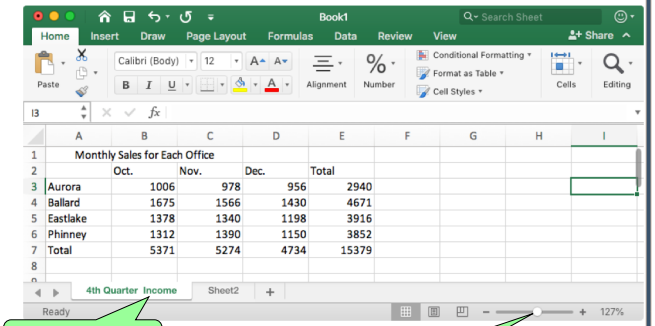
- Contains 1 of 3 types of information
  - Label
    - Text Information
  - Value
    - Number
  - Formula
    - Calculation
    - Dependent on other cells
  - Can use *Functions* which are
    - =B2-B3
    - =SUM(B2:B4) to calculate the sum of a range
    - =AVERAGE(B2:B4) to calculate the average of a range

	A	B	C
1		Jan.	Feb.
2	Sales	1750	1328
3	Cost	964	625
4	Gross	786	703

 26

Excel Workbook and Worksheets

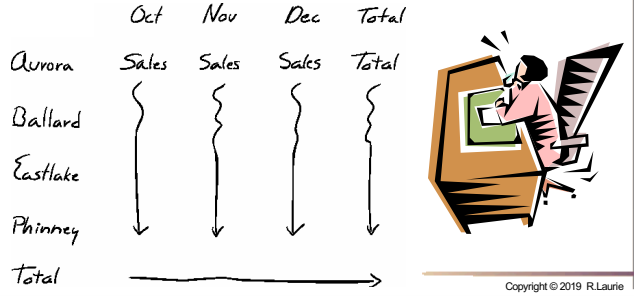
- Workbook contains one or more worksheets



 27

Plan your Spreadsheet

- Put your first draft on paper, planning what will go into the rows and columns.
- Decide what labels you will need.



 28

Enter Labels

- Create a title and label columns and rows appropriately with text

Montly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora				
Ballard				
Eastlake				
Phinney				
Total				

 29

Enter Values

- Enter data into appropriate cells

Montly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora	1006	978	956	
Ballard	1675	1566	1430	
Eastlake	1378	1340	1198	
Phinney	1312	1390	1150	
Total				

 30

Enter Formulas

- Create formulas that reference cells
  - Absolute references B4 $B4 B$4
  - Relative references B4

=SUM(B3:D3)

Montly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora	1006	978	956	2940
Ballard	1675	1566	1430	
Eastlake	1378	1340	1198	
Phinney	1312	1390	1150	
Total	5371			

=SUM(B3:B6)

 31

Copy and Paste Formulas

- When copy and paste into new cells
  - Absolute references uses same cell reference
  - Relative references use incremented cell reference

Monthly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora	1006	978	956	2940
Ballard	1675	1566	1430	4671
Eastlake	1378	1340	1198	3916
Phinney	1312	1390	1150	3852
Total	5371	5274	4734	15379

=SUM(B4:D4)
=SUM(B5:D5)
=SUM(B6:D6)

Fill Handle
=SUM(C3:C6)
=SUM(D3:D6)
=SUM(E3:E6)

 32

Automatic Recalculation

- When a data value changes all dependent formulas are recalculated immediately

Montly Sales for Each Office				
	Oct.	Nov.	Dec.	Total
Aurora	1006	978	956	2940
Ballard	1675	1566	1502	4743
Eastlake	1378	1340	1198	3916
Phinney	1312	1390	1150	3852
Total	5371	5274	4806	15451

 33

Formatting Spreadsheets

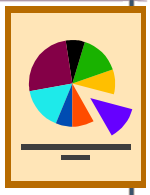
- Spreadsheets have formatting features that allow worksheet layout customization
  - Font Face, Size, and Color
  - Column width
  - Row height
  - Clip Art
  - Number format
    - $1357
    - $1,356.75
    - ($22.50)
    - -$22.50
    - 150%

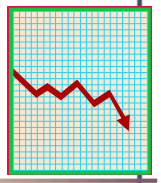
Catapult Coffee 4th Quarter Sales	Oct.	Nov.	Dec.	Total
Aurora	$ 1,006	$ 978	$ 956	$ 2,940
Ballard	$ 1,675	$ 1,566	$ 1,502	$ 4,743
Eastlake	$ 1,378	$ 1,340	$ 1,198	$ 3,916
Phinney	$ 1,312	$ 1,390	$ 1,150	$ 3,852
Total	$ 5,371	$ 5,274	$ 4,806	$ 15,451

 34

Visualizing Data

- Spreadsheets organize numerical data and calculations in tabular form
- Numerical information contained in a worksheet can be expressed visually in the form of a *chart*
  - Charts allow the user to show numerical data in ways that are meaningful and quickly understood
  - Easy to see trends both historical and predictive
  - Easy to compare data series and identify patterns

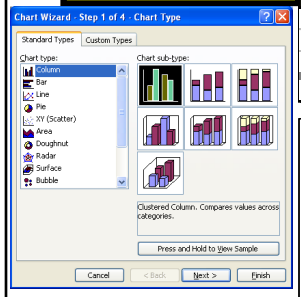




 35

Selecting a Range and Chart

First, the cells to be charted are selected



Catapult Coffee 4th Quarter Sales	Oct.	Nov.	Dec.	Total
Aurora	$ 1,006	$ 978	$ 956	$ 2,940
Ballard	$ 1,675	$ 1,566	$ 1,502	$ 4,743
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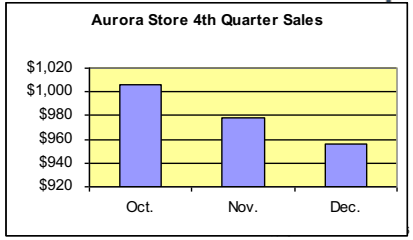
Total	$ 5,371	$ 5,274	$ 4,806	$ 15,451

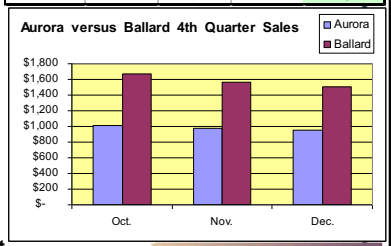


Multiple Series Column Charts

- What is represented?
- Chart elements
  - *Category Labels* – descriptive text entries (Aurora, Ballard, Oct)
  - *Data Points* – numeric values (cell data)
  - *Data Series* – grouping of data points (2 data series exist in this chart specified by the row data)
- This is Column Chart
  - Compares two series
  - Multiple Data Series Chart

Catapult Coffee 4th Quarter Sales

	Oct.	Nov.	Dec.	Total
Aurora	$ 1,006	$ 978	$ 956	$ 2,940
Ballard	$ 1,675	$ 1,566	$ 1,502	$ 4,743
Eastlake	$ 1,378	$ 1,340	$ 1,198	$ 3,916
Phinney	$ 1,312	$ 1,390	$ 1,150	$ 3,852
Total	$ 5,371	$ 5,274	$ 4,806	$ 15,451



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Stacked Bar Chart

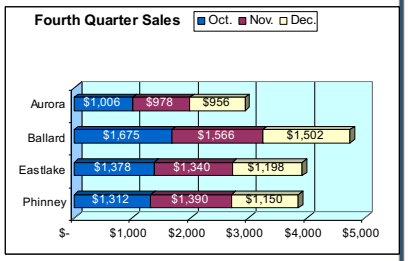
- What is represented?

cells to be charted

Catapult Coffee 4th Quarter Sales

	Oct.	Nov.	Dec.	Total
Aurora	$ 1,006	$ 978	$ 956	$ 2,940
Ballard	$ 1,675	$ 1,566	$ 1,502	$ 4,743
Eastlake	$ 1,378	$ 1,340	$ 1,198	$ 3,916
Phinney	$ 1,312	$ 1,390	$ 1,150	$ 3,852
Total	$ 5,371	$ 5,274	$ 4,806	$ 15,451

Stacked Bar Chart
- Best for comparing multiple data series with a total value
- Compares Total Quarterly Sales for each location
- This chart also displays values



 38

Pie Charts: Parts of a Whole

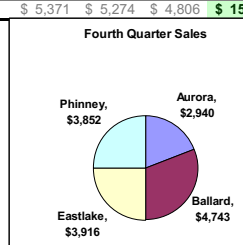
- What is represented?

cells to be charted

Catapult Coffee 4th Quarter Sales

	Oct.	Nov.	Dec.	Total
Aurora	$ 1,006	$ 978	$ 956	$ 2,940
Ballard	$ 1,675	$ 1,566	$ 1,502	$ 4,743
Eastlake	$ 1,378	$ 1,340	$ 1,198	$ 3,916
Phinney	$ 1,312	$ 1,390	$ 1,150	$ 3,852
Total	$ 5,371	$ 5,274	$ 4,806	$ 15,451

- Pie Chart
  - Best for comparing Parts of a Whole
  - Represent just a single value and shows parts of the whole
  - Percentage of Sales by location
  - This chart also displays values



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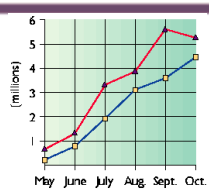
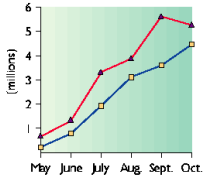
Line Charts: Trends

- Line Charts are the best way to visualize trends or cycles over a period of an extended period of time
- Line graphs are usually used when there are many values or complex data
- Examples:
  - Stock Price versus Time
  - Corporate Revenue versus Time
  - Sales versus Time





PROJECTED SALES (—),
ACTUAL SALES (—)

 40