

# Building a Quarterly Financial Model



April 2024

# The Marquee Group

## Leaders in Financial Modeling Since 2002

- We believe that spreadsheet-based financial models are the most important decision-making tools in modern finance
- We have developed a framework and discipline for model design, structure and development that leads to best-in-class, user-friendly financial models
- We help finance professionals use this framework to turn their models into powerful communication tools that lead to better, more effective decisions

### The Marquee Group Offering

INSTRUCTOR LED TRAINING	ONLINE SELF STUDY TRAINING	MODELING SOLUTIONS
<ul style="list-style-type: none"><li>✓ Instructors have real-world experience and a passion for teaching</li><li>✓ Topics include: Modeling, Valuation, Excel, Python</li><li>✓ Courses are interactive</li><li>✓ Clients include banks, corporations, business schools and societies</li></ul>	<ul style="list-style-type: none"><li>✓ Industry leading self paced learning management system</li><li>✓ Broad library with targeted job learning paths</li><li>✓ Over 80 hours of video-based instruction through:<ul style="list-style-type: none"><li>– <a href="#">Marquee Group Self Study</a></li><li>– <a href="#">Training The Street Academy</a></li></ul></li></ul>	<ul style="list-style-type: none"><li>✓ Services include:<ul style="list-style-type: none"><li>– Model Development</li><li>– Model Re-builds</li><li>– Model Reviews</li><li>– Model Audits</li></ul></li><li>✓ Clients include a wide range of companies in various industries</li></ul>

# Training The Street



## Acquired The Marquee Group in April 2023

- [Training The Street](#) (“TTS”) is a leading professional development training provider headquartered in New York
- Paired with Marquee’s world-class instructor team and content, the TTS team adds a wealth of learning assets, trainer capabilities and creates a unique global training provider

### Enhanced Global Presence, Local Resources

60+ experienced instructors across major markets  
5,000+ training days per year

■ TTS and Marquee instructor presence  
■ Region of delegates trained



# Global Leader in Content and Capabilities



## Our Combined Advantage



### Customer Focused

Full spectrum of service both inside and outside the classroom



### Industry Experience

Proven track record since our founding which dates back to 1997



### Instructor Quality

Practitioners with a passion for teaching and adjunct credentials



### Expanded Content Capabilities

Content customized for finance professionals across several business areas



### Cutting Edge Technology

Interactive, engaging content for practical, hands-on training

## Unequalled Breadth of Content Expertise

Fundamental Content	Sector Capabilities Training	Data Sciences	Specialist/Functional Capabilities
Accounting	Commercial Real-Estate	Applied Excel	Corporate Credit Analysis
Corporate Valuation	FIG Analysis (Banks & Insurance)	Python	Cash Mgt & Treasury Services
Financial Modeling	Financial & Corporate Restructuring	SQL	ESG
M&A Modeling	Oil & Gas	Power BI	Investment Banking Overview
LBO Modeling	Project Finance	VBA	Investment Authorities
Capital Markets (DCM   ECM Origination)	Private Equity Investing & Analysis	Google Sheets	Private Co. Analysis
Financial Products / Global Markets (S&T)	Infrastructure		PowerPoint
Portfolio / Investments Analysis	Investment and Wealth Management		Data Storytelling
Applied Excel	Software (SaaS) Analysis		FP&A
	Venture Capital		Model Building Solutions
	Renewables		

# Agenda

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## Topics

Designing and structuring a quarterly financial model

Developing the inputs and assumptions pages

Incorporating all relevant schedules

Build quarterly debt schedule with semi-annual payments

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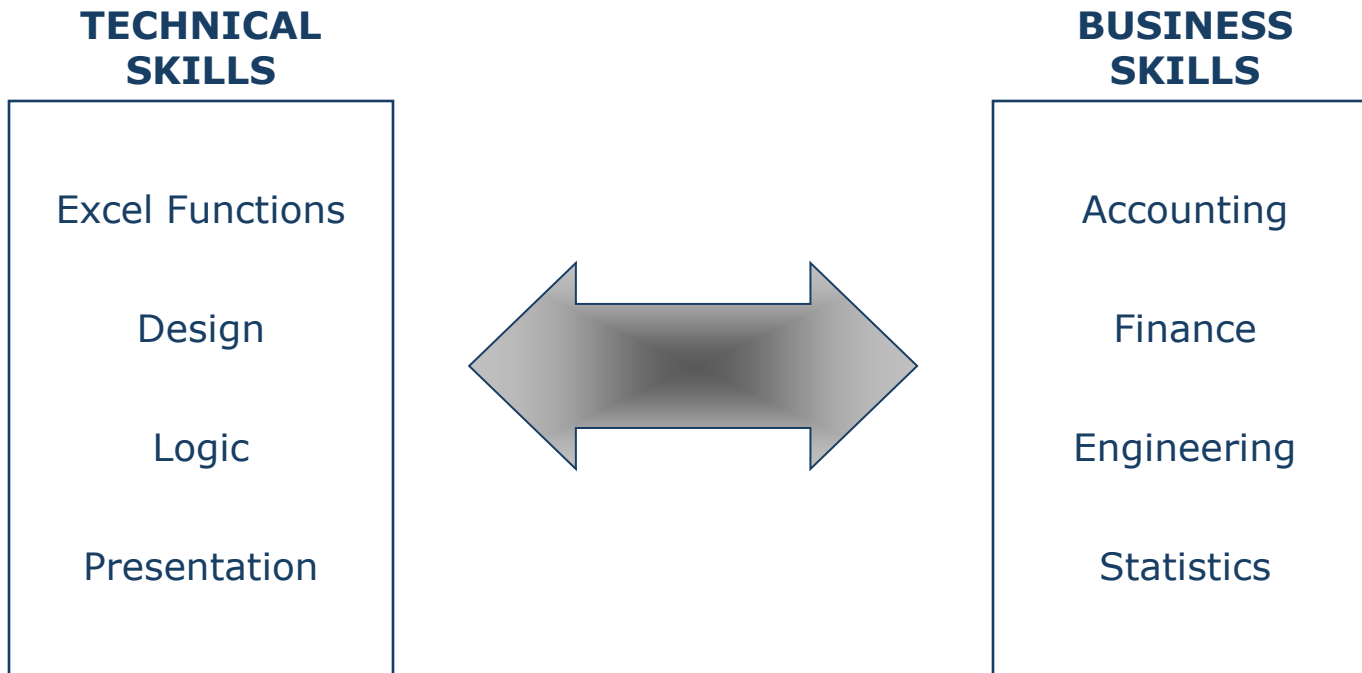
# Introduction

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# What is a Financial Model?

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- The integration of technical skills with business / academic skills to create user-friendly decision-making tools





# Modeling Discipline

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- A good model needs to be a powerful communication tool so that it can be used to make effective decisions
- The following are important attributes of a strong financial model:
  1. Dynamic
  2. Flexible
  3. Intuitive
  4. Printable
  5. Transparent
  6. Transferable
- When a model achieves the criteria above, it creates tremendous credibility for the builder and inspires confidence with the reader.
- It is also much easier for someone to take ownership of a model that meets the criteria above.

# Modeling Basics

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- Keep it simple
- NEVER HARDCODE!
  - Always enter inputs as a different colour than calculations
  - Never enter a formula that looks like:  
$$=A5 * .025 + 4.9$$
- Use the keyboard to increase speed
- Label everything properly (even excessively)
- Everything should be printable
- Master the basics
- Become an expert at formatting
- Practice

# Formatting

			Debt/ Capital	EV / EBITDA		P / BV	ROE	
	Price	Mkt. Cap.		LTM	2023		LTM	2023
Canadian Companies								
Company 1	14.05	2679.335	0.434324	11.233	10.889	0.8913	0.0840	0.0120
Company 2	11.05	2024.4396	0.419133	16.662	8.678	1.2645	0.0801	0.0507
Company 3	33.1	2970.2285	0.467734	8.193	6.208	2.1457	0.2017	0.1799
Company 4	15.35	1906.305	-0.56469	10.501	8.52	0.8801	0.0809	0.1430
Company 5	17.95	2233.2327	0.255723	9.284	7.5461	1.5254	0.0273	0.0281
Company 6	9.4	705.5546	0.439089	7.968	4.8187	0.7309	0.1969	0.0664
Group Average			0.241886	10.640	7.7767	1.2397	0.1118	0.0800
U.S. Companies								
Company 1	33.5	1887.1883	0.579373	11.802	6.729	1.5695	0.0068	0.0160
Company 2	42.5	4062.2616	0.488352	11.451	8.049	1.3025	0.0382	0.0085
Company 3	73.813	6493.8129	0.57933	7.263	7.065	1.9361	0.0443	0.0500
Company 4	44.625	13485.675	0.406555	6.862	9.1	1.5036	0.0354	0.0689
Company 5	30.563	3206.0587	0.361189	7.474	7.461	1.4236	0.0886	0.0527
Company 6	57.625	11467.134	0.48992	9.713	5.5	2.4901	0.1019	0.1007
Group Average			0.48412	9.094	7.317	1.7043	0.0525	0.0495

# Formatting

	Price	Mkt. Cap.	Debt/	EV / EBITDA		P / BV	ROE	
	7/31/23	(\$MM)	Capital	LTM	2023E	LTM	LTM	2023E
<b>CDN Companies - C\$</b>								
Company 1	\$14.05	\$2,679	43%	11.2 x	10.9 x	0.9 x	8.4%	1.2%
Company 2	\$11.05	\$2,024	42%	16.7 x	8.7 x	1.3 x	8.0%	5.1%
Company 3	\$33.10	\$2,970	47%	8.2 x	6.2 x	2.1 x	20.2%	18.0%
Company 4	\$15.35	\$1,906	(56%)	10.5 x	8.5 x	0.9 x	8.1%	14.3%
Company 5	\$17.95	\$2,233	26%	9.3 x	7.5 x	1.5 x	2.7%	2.8%
Company 6	\$9.40	\$706	44%	8.0 x	4.8 x	0.7 x	19.7%	6.6%
<b>Group Average</b>			<b>24%</b>	<b>10.6 x</b>	<b>7.8 x</b>	<b>1.2 x</b>	<b>11.2%</b>	<b>8.0%</b>
<b>U.S. Companies - US\$</b>								
Company 1	\$33.50	\$1,887	58%	11.8 x	6.7 x	1.6 x	0.7%	1.6%
Company 2	\$42.50	\$4,062	49%	11.5 x	8.0 x	1.3 x	3.8%	0.9%
Company 3	\$73.81	\$6,494	58%	7.3 x	7.1 x	1.9 x	4.4%	5.0%
Company 4	\$44.63	\$13,486	41%	6.9 x	9.1 x	1.5 x	3.5%	6.9%
Company 5	\$30.56	\$3,206	36%	7.5 x	7.5 x	1.4 x	8.9%	5.3%
Company 6	\$57.63	\$11,467	49%	9.7 x	5.5 x	2.5 x	10.2%	10.1%
<b>Group Average</b>			<b>48%</b>	<b>9.1 x</b>	<b>7.3 x</b>	<b>1.7 x</b>	<b>5.3%</b>	<b>4.9%</b>



# Building a Financial Model

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# The Planning Process

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- It is critical to properly plan and design a model before it can be built
- Whenever a model becomes an illegible error-prone mess, it is almost always because the modeler didn't properly devise a model plan
- To create a strong plan, follow these three steps:
  1. Identify the major issues
  2. Identify all assumptions that need to be made in the model
  3. Identify the required schedules and components (see following pages)
- As part of the planning process, you should also be able to answer the following questions:
  - What is the purpose of the model?
  - Which assumptions should become scenarios?
  - How much detail is required?
  - Do I have enough historical detail to validate the amount of forecast detail that is required?
  - What is the important output that the client wants to know?
  - What metric is used to measure results?
  - How many time periods should be included in the forecast? Why?
  - What is the most logical order to present the data?

# Information Gathering

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- Gathering the right information is one of the most difficult and important parts of the modeling process
- A good model can help to define the problem and the process
- Don't assume that the information provided is the right level of detail
- A good financial analyst:
  - asks the right questions and determines the right level of detail required to solve the problem
  - needs to be a critical thinker and realizes that a good financial model facilitates this
  - uses the model to facilitate the organization and flow of the analysis
  - keeps the key players engaged in the process through regular updates and by soliciting feedback
- The model is a means to an end, and not an end in itself
- A model needs to be a powerful communication tool to convey all of the information regarding a particular analysis

# Components of a Financial Model

- Every financial model is made up of worksheets and schedules that fall into the following three categories
- Not all models require every worksheet or schedule listed below, and some models will require other schedules

INPUTS AND OUTPUTS	FINANCIAL STATEMENTS	SCHEDULES
<ul style="list-style-type: none"><li>• Model Cover</li><li>• Summary Output Values</li><li>• Inputs / Assumptions</li><li>• Sources and Uses of Capital</li><li>• Scenarios</li><li>• Sensitivity Tables</li></ul>	<ul style="list-style-type: none"><li>• Income Statement</li><li>• Cash Flow Statement</li><li>• Balance Sheet</li></ul>	<ul style="list-style-type: none"><li>• Revenue Schedule</li><li>• Costs Schedules</li><li>• CAPEX / Depreciation Schedule</li><li>• Fixed Asset Schedule</li><li>• Income Tax Schedule</li><li>• Working Capital Schedule</li><li>• Debt and Interest Schedule</li><li>• Shareholders' Equity Schedule</li><li>• Valuation Schedule</li><li>• WACC Schedule</li></ul>



# Important Modeling Tips

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- The following are some important tips to adhere to when creating a financial model:
  1. Use a manageable number of worksheets (5 to 10 if possible)
  2. Keep all inputs and assumptions together, and make sure inputs are ALWAYS blue
  3. Never enter the same input twice
  4. The model should be flexible so that inputs and assumptions can easily be tested
  5. If possible, put all financial statements and schedules on the same worksheet
  6. Do not insert blank columns between quarters
  7. Within each worksheet, each quarter MUST ALWAYS be in the same column when there are multiple schedules beneath one another
  8. Include the model title and worksheet title prominently on every page
  9. Label every row – have one column that's used just for row labels
  10. Include the date and time, page numbers and the file path on every page
  11. Incorporate a "live" scenario tag on every page
  12. Never delete a cell, row or column until you have determined where it flows (Auditing)
  13. Do not make multiple copies of the model with minor revisions – use scenarios
  14. Think about how the model will be printed and make sure the data is in page-size units
  15. ALWAYS review your model on paper before delivering it to your colleagues or the client
  16. Format your model as you go – don't wait until the very end!

# Important Quarterly Modeling Tips

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- The following are some important tips to adhere to in particular for a quarterly financial model:
  1. Keep input time frames consistent (either annual or quarterly)
  2. If the year end is not a calendar year end, add a fiscal year calculation to each column
  3. Seasonal allocations may work for all important drivers except inventory which may lead other drivers in its timing impact
  4. If period timing is complex, use switches and multiple calculations to make timing logic easier to audit
  5. Calculate the model using a single time frame – do not mix quarterly with annual calculations
  6. If you need to show a mix of quarterly and annual results build it separately as a non-calculating summary

# Inputs and Outputs Schedules

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- Well-designed and clearly-articulated Inputs and Outputs Schedules are critical components to properly communicating your model
- If the modeler does a good job preparing the Input and Output Schedules, the reader will have a complete understanding of the model
- The following are some of the Inputs and Outputs Schedules that can be incorporated into most models:
  - **Cover Page:** Labels the model and adds a level of confidentiality.
  - **Summary Values:** This is what the client wants to see! Don't keep them in suspense until the very end. The actual Output values will differ depending on the model and the situation (ie. DCF values, IRRs, Credit ratios, etc...).
  - **Inputs / Assumptions:** Allows the modeler to communicate all of the important inputs and drivers in one place. If an Inputs Schedule isn't used, the reader may overlook important assumptions.
  - **Scenarios:** Every model will have a few inputs that are critical to assessing the company's value. These inputs should be incorporated into scenarios.
  - **Sensitivities:** Another type of output table. Allows you to test the impact of changes to specific inputs on the model's results.

# Custom Formatting a Cell

- Applying custom formatting to cell values is very important to ensure that a cell's contents are clear to the reader

- Bring the Format Cells dialogue box onto your screen (press Ctrl + 1) or:

## Excel 2010

➤ Home [H] ➤ Format [O] ➤ Format Cells [E]

## Excel 2016

➤ Home [H] ➤ Format [O] ➤ Format Cells [E]

- On the "Number" tab, click the "Custom" option at the bottom of the list
    - In the "Type" list on the right, select the number format you want to edit
    - To create a new format, click in the white space under the word "Type"
    - The following rules apply to creating a custom number format:
      - A zero or a number sign (#) is a placeholder for a number
        - a # displays only significant digits, whereas a zero in the custom format box displays insignificant zeros if a number has fewer digits than there are zeros in the format
      - You can specify up to four sections of format codes. The format codes, separated by semicolons, define the formats for positive numbers, negative numbers, zero values, and text, in that order.
      - If you would like a number to begin or end with a **single character** (ie. 5.6x), enter the character before or after the number placeholder (ie. enter 0.0x)
      - If you would like a number to begin or end with **more than one character** (ie. 25 years), enter the text in quotation marks (ie. enter 0.0 "years")
      - To include a comma separator, enter #,### (12000 will appear as 12,000)
      - A comma at the end of the number placeholder will divide the number by 1000 (ie. 12000 will appear as 12)

# Connecting Strings of Data

- Connecting strings of data is critically important when creating inputs or assumptions pages, or when adding footnotes to tables

## Concatenate Function

**= CONCATENATE("text1",A1,"text2"...)**

- Joins text strings and cell references into one text string
- Especially useful for assumptions pages or footnotes to tables
- This function does not extract formatting from a cell being referenced
- Formatting needs to be done manually, or by using the TEXT function
  - Manual: =CONCATENATE("The tax rate used in the model is ",E20\*100,"%")
  - TEXT Function: =CONCATENATE("The dollar amount is ",TEXT(E21,"\$0.00"))

## Ampersand "&"

- The same functionality as the CONCATENATE function
- Connects or concatenates multiple text strings and/or cell references to produce one continuous text string
  - e.g. ="The tax rate used in the model is "&E20\*100&"%"

# Creating Scenarios

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- IF statements are very powerful logical formulas that are used frequently in financial models
  - An IF Statement is a very powerful modeling tool
  - The IF Function is one of 6 logical operators
  - IF Statements follow an IF, THEN, ELSE, pattern
    - =IF(B5>10,G5,H7)
    - =IF(C30-C60=0,"OK","ERROR")
  - Embedded (or Nested) IF Statements allow you to include more than one IF statement in a single formula
  - Embedded IF Statements can be used to create switches for assumption scenarios
    - =IF(C5=1,D6,IF(C5=2,D7,IF(C5=3,D8,D9)))
  - Other logical operators, such as AND and OR, can be used in conjunction with IF Statements to create even more elaborate formulas (e.g. debt repayment schedules)

# Creating Scenarios

- The Choose function is a simpler and cleaner way of creating scenarios than using an IF Statement

**= CHOOSE(Index\_num,Value1,Value2,...)**

- The Choose function chooses a value from a list of values, based on an index number (a switch)
- The switch must always simply be a number in a cell
- The following diagram describes the CHOOSE function

**Choose Function Example**

	A	B	C	D	E	F	G
1							
2		Switch: <input type="text" value="1"/>		<input type="text" value="10%"/>	=CHOOSE(B2,D4,D5,D6)		
3							
4			Base Case	<input type="text" value="10%"/>	} Blue Input Cells		
5			Best Case	<input type="text" value="20%"/>			
6			Worst Case	<input type="text" value="30%"/>			
7							

- Cell D2 contains the CHOOSE function. The function is first looking at the switch cell (B2). Since the switch cell contains a 1, the CHOOSE function is extracting the contents of cell D4, the first argument in the CHOOSE function after the switch cell reference. If the user changes cell B2 to a 2, cell D2 would change to 20%, the contents of cell D5.

# Running Scenarios

## Incorporating Pull Down Menus

- To create a more user-friendly interface on a scenario switch, a pull down menu can be used to control the CHOOSE function
- A pull down menu restricts the values that can be entered into the switch cell, thereby reducing the possibility of causing an error
- Bring the Forms toolbar onto your screen by doing the following:
  - Excel 2010: ➤ File [F] ➤ Options [T] ➤ Select the "Customize Ribbon" box
    - Put a check in "Developer" Tab box ➤ Click Developer menu up top
    - Click the "Insert" button
  - Excel 2016: ➤ File [F] ➤ Options [T] ➤ Select the "Customize Ribbon" box
    - Put a check in "Developer" Tab box ➤ Click Developer menu up top
    - Click the "Insert" button
- Click on the "Combo Box (Form Control)" button and use the crosshair to draw a combo box on your screen
- While the Combo Box is selected, right click and go to ➤ **Format** ➤ **Control**
  - On the "Control" tab, select the range of cells containing the names of the various scenarios in the "Input Range" box
  - On the "Control" tab, enter the switch cell in the "Cell Link" box
- Click OK, then Use your mouse to pull down the arrow and run the scenario



# Auditing Cells

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## Auditing

### Excel 2010

➤ Formulas [M] ➤ *Within the Formula Auditing section you will be able to access the tools.*

- The auditing tools are very important when creating large models
- Auditing allows you to trace a particular cell's precedent and dependent cells
- Double clicking on a coloured line will move the cursor to the referenced cell
- **NEVER** delete a cell, row or column in a financial model before using the Auditing tool to trace its dependents

### Excel 2016

➤ Formulas [M] ➤ *Within the Formula Auditing section you will be able to access the tools.*

A blue-tinted photograph of a dense city skyline, featuring numerous skyscrapers and buildings. The image is used as a background for the title section.

# **Important Functions**

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# VLookup Function

- Lookup Functions are very useful for extracting information from large tables

**= VLOOKUP(Lookup\_value, Table\_array, Col\_index\_num, Range\_lookup)**

- VLOOKUP (vertical lookup) searches for a value in the leftmost column of a table, and then returns a value in the same row from a column you specify

The VLookup function has 4 arguments:

- **Lookup\_value:** This is the item you are searching for. This item must be found in the leftmost column of the Table\_array.
- **Table\_array:** The entire table in which you are searching for the data.
- **Col\_index\_num:** When Excel finds the item you are searching for (the Lookup-value) in the leftmost column of the table (the Table\_array), it will move a certain number of columns to the right to extract the data that you are looking to retrieve.
- **Range\_lookup:** To find a close match, type TRUE (or omit).  
To find an exact match, type FALSE.

**Example Table**

	A	B	C
1	<b>Name</b>	<b>University</b>	<b>Age</b>
2	Michelle	Western	24
3	Paul	McGill	32
4	Ken	Queens	21
5	Cindy	Western	26

**=VLOOKUP("Ken",A1:C5,3,False)**

- This function will return 21, because it will search for the word "Ken" in column A and then return the corresponding age in the third column

# VLookup Function (Cont'd)

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- There are a number of reasons why a VLOOKUP function may not return the correct result

## **Common Pitfalls**

1. The Lookup\_value and the cell that contains the data you are looking to extract must both be within the Table\_array
  2. The cell that contains the data you are looking to extract must be located to the right of the Lookup\_value
  3. The VLOOKUP function is most helpful when there are no repetitive instances of the Lookup\_value in the leftmost column of the Table\_array
  4. Table\_array will not automatically expand when more data is added to the table in which you are searching
  5. Col\_index\_num should be automated in case any columns are inserted or deleted within the Table\_array
  6. Range\_lookup can either return a close match (TRUE) or an exact match (FALSE)
- If any of the pitfalls above become an impediment, it may be necessary to use one of Excel's other lookup functions

# HLookup Function

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**= HLOOKUP(Lookup\_value, Table\_array, Row\_index\_num, Range\_lookup)**

- The HLOOKUP function is very similar to the VLOOKUP function except instead of searching in the *leftmost column* of the table, the HLOOKUP function searches for a value in the *top row* of the table, and then returns a value x number of rows beneath the top row

- **Lookup\_value:** This is the item you are searching for. This item must be found in the first row of the table.
- **Table\_array:** The entire table in which you are searching for the data.
- **Row\_index\_num:** When Excel finds the item you are searching for (the Lookup-value) in the first row of the table (the Table\_array), it will move a certain number of rows down to extract the data that you are looking to retrieve.
- **Range\_lookup:** To find a close match, type TRUE (or omit).  
To find an exact match, type FALSE.

# Index Function

- The Index function is one of the most powerful, but also one of the most complex functions in Excel.
  - Part of the confusion is that there are actually two forms of the Index function: the array form and the reference form.
  - At its most basic, the Index function is similar to an Offset function.
  - Recall that an Offset function says, “where is the anchor cell, how many rows down, and how many columns over should it go to find the desired answer?”
  - A basic Index function says, “where is the range of cells, which row in the range and which column in the range should it go to in order to find the desired answer.” The Index function returns the cell at the intersection of a particular row and column.

**Example Table**

	A	B	C
1	Name	University	Age
2	John	Rotman	22
3	Peter	McMaster	25
4	Miranda	Ivey	27
5	David	Rotman	21
6	Katie	McMaster	23
7	Sarah	Ivey	24
8			
9			

**=INDEX(A1:C7,4,3)**

This function will return the number 27. It will look in the range A1:C7 and pull out the value in the fourth row and third column of the table.

# Index Function

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- **Array form**

**=INDEX(Array,Row\_num,Column\_num)**

- **Array:** A range of cells
- **Row\_num:** The row in the array from which to return a value
- **Column\_num:** The column in the array from which to return a value

- **Reference form**

**=INDEX(Reference,Row\_num,Column\_num,Area\_num)**

- **Reference:** A reference to one or more ranges of cells
- **Row\_num:** The row in the array from which to return a value
- **Column\_num:** The column in the array from which to return a value
- **Area\_num:** Selects the range in the reference argument from which to return the intersection of row\_num and column\_num

# Index Function

- The following is an example of the Reference form of the Index function, where there are two ranges of data:

**Example Table**

	A	B	C
1	<b>Name</b>	<b>University</b>	<b>Age</b>
2	Ted	Rotman	22
3	Joe	Rotman	25
4	Sandy	Rotman	27
5			
6			
7	<b>Name</b>	<b>University</b>	<b>Age</b>
8	Mark	Ivey	21
9	Susan	Ivey	23
10	Jenny	Ivey	24

**=INDEX((A1:C4,A7:C10),4,3,2)**

This function will return the number 24. It will pull out the value in the fourth row and third column of the *second* table, A7:C10

- Both forms of the Index function can be used to return a cell's *address*, as opposed to its *contents*:

**Example Table**

	A	B	C
1	<b>Name</b>	<b>University</b>	<b>Age</b>
2	John	Rotman	22
3	Peter	McMaster	25
4	Miranda	Ivey	27
5	David	Rotman	21
6	Katie	McMaster	23
7	Sarah	Ivey	24
8			
9			

**=SUM(INDEX(A1:C7,2,3):INDEX(A1:C7,7,3))**

This function will sum the ages of all students and return the value 142. The INDEX functions in this example are returning the addresses C2 and C7. The SUM function is returning =SUM(C2:C7).



# Index Function Rules

---

- The following are some rules that pertain to the Index Function:
  - If the row\_num and column\_num arguments are both used, the Index function returns the value at the intersection of row\_num and column\_num.
  - If the range of cells contains only one row or column, the corresponding row\_num and column\_num argument is optional.
  - If the range has more than one row and more than one column, and row\_num or column\_num are left blank or set to zero, the INDEX function will return the entire row or column.
  - In order to do this, the Index function needs to be entered as an array formula by highlighting the entire destination range and pressing CTRL+SHIFT+ENTER.
  - The Index function is commonly used in conjunction with Excel's Match function, which eliminates the need to manually type in row and column reference numbers into the Index function.

# Match Function

- The MATCH function returns the relative position of an item within a table of data that matches a specific value in a specified order

**= MATCH(Lookup\_value,Lookup\_array,Match\_Type)**

- The MATCH function is particularly helpful for use in conjunction with other Lookup functions

The MATCH function has 3 arguments:

- **Lookup\_value:** The item you are searching for within the table
- **Lookup\_array:** The Table from which data is retrieved
- **Match\_type:** Must be either +1, 0 or -1 indicating which value to return.
  - If match\_type is 1, MATCH finds the largest value that is less than or equal to lookup\_value. Lookup\_array must be placed in ascending order: ...-2, -1, 0, 1, 2, ..., A-Z
  - If match\_type is 0, MATCH finds the first value that is exactly equal to lookup\_value. Lookup\_array can be in any order
  - If match\_type is -1, MATCH finds the smallest value that is greater than or equal to lookup\_value. Lookup\_array must be placed in descending order: Z-A,...2, 1, 0, -1, -2,...,

**Example Table**

	A	B	C
1	<b>Name</b>	<b>University</b>	<b>Age</b>
2	Michelle	Western	24
3	Paul	McGill	32
4	Ken	Queens	21
5	Cindy	Western	26

**=MATCH("Ken",A2:A5,0)**

- This function returns 3, because the item we are searching for (Ken) is the third item in the range A2:A5



# Schedules

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# Revenue Schedule

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- Companies either have existing revenues, or they expect to have revenues at some point in the future
- In addition, every company's revenues have two broad components:
  - Revenue per unit
  - Number of units sold
- Within a financial model, it is generally preferable to create a revenue schedule than to simply grow the company's revenues by a growth factor
- Constructing a revenue schedule allows the modeler to forecast the price and volume components independently of one another
- Another way to calculate revenues in some instances is to forecast the size of the overall market, and the company's market share within the market

# Cost Schedules

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- Cost schedules can range from being very short and simple to being extremely long and complex
- There are two main categories of costs:
  - Variable Costs: Increase in direct proportion to the company's sales volume
  - Fixed Costs: Are not directly proportional to the firm's sales volume
- It is usually helpful to present all of the company's costs on both a cost per unit basis and on a total dollar basis
- Variable costs should always be forecast and inflated on a unit basis, and subsequently multiplied by the total number of units to arrive at the aggregate cost of the particular variable cost item
- Fixed costs should always be forecast and inflated on a total dollar basis and subsequently divided by the total number of units to arrive at the unit cost of the particular fixed cost item

# Income Statement

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- None of the Income Statement line items should be calculated directly on the income statement
- Rather, in a good model, all of the income statement line items will be drawn from one of the schedules in the model
- It is important to have a few years of historical income statement data to allow the reader to assess whether the forecast is reasonable
- The income statement should also include some profitability ratios to help the reader assess whether the forecast is reasonable (ie. EBITDA margin, EBIT margin)

# Cash Flow Statement

- Much like the Income Statement, the line items on a Cash Flow Statement should be drawn from other statements or schedules
- A Cash Flow Statement typically has three sections:

## Cash Flow Statement Line Items

Section	Line Item	Drawn From
<b>Operating Activities</b>	• Net Income	• Income Statement
	• Depreciation and Amortization	• Income Stmt or Dep'n Sched
	• Deferred Income Taxes	• Income Statement or Income Tax Schedule
	• Change in working capital	• Working Capital Schedule
<b>Investing Activities</b>	• Capital Expenditures	• Assumptions or Fixed Asset Schedule
	• Purchase or sale of assets	• Assumptions or Fixed Asset Schedule
<b>Financing Activities</b>	• Debt Issuance or Repayment	• The CHANGE line on the Debt Schedule
	• Dividend Payments	• Income Statement or Shareholders' Equity Schedule
	• Equity Issuance or Share Buy Back	• Shareholders' Equity Schedule

# Balance Sheet

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- Typically, the balance sheet is prepared last when creating a financial model
- If the model is disorganized and poorly designed, the balance sheet can be extremely difficult and frustrating to create
- People often spend hours or days trying to balance the balance sheet
- To begin, enter one historical year that is perfectly balanced
- The trick to “balancing” the forecast years is to have an organized model, and to make sure that every line item on the cash flow statement is captured on the balance sheet
- A balance sheet should always include a “check” line at the bottom
- If the balance sheet is off by the same amount every year, there is probably only one error or omission that needs to be found
- However, if the balance sheet is unbalanced by different values every year, there may be a number of problems that need to be corrected



# Depreciation Schedule

---

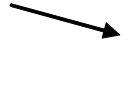
- A Depreciation Schedule is usually designed as a “waterfall” schedule
- The depreciation expense every year will include depreciation on existing assets plus depreciation on new assets (Capex) that were purchased during the year
- In the year that a capital expenditure is made, the asset should be depreciated for only the portion of the year that the asset was owned
- As a general rule, half of the normal depreciation amount is taken in the first year that an asset is purchased
- The most common depreciation methodologies are:
  - Straight Line: The same amount of depreciation is taken every year
  - Declining Balance: The same percentage is applied to the outstanding fixed asset balance every year
- The Capital Expenditure forecast needs to appear vertically on a Depreciation Schedule
  - The HLOOKUP function is a great function to use to show the Capex forecast vertically (see next page)

# Absolute References

- The ability to create formulas with absolute references is extremely important when manipulating data and building financial models
  - By default, Excel uses relative referencing
  - Absolute references allow you to “freeze” a reference to a particular cell, row or column by inserting dollar signs in front of the row reference, the column reference or both
  - As seen in the following example, if a formula references cell A1 and you copy that formula down two rows and over two columns, the following references will result

**Formula Being Copied**

	A	B	C	D
1				
2				
3				
4				



**Cell Reference and Description**

Reference	Description	Changes to
=\$A\$1	(absolute column and absolute row)	=\$A\$1
=A\$1	(relative column and absolute row)	=C\$1
=\$A1	(absolute column and relative row)	=\$A3
=A1	(relative column and relative row)	=C3

- To insert the dollar signs more quickly while editing a formula, use the F4 key to toggle between the various absolute referencing options

# Income Tax Schedule

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- An Income Tax Schedule is used to reconcile the difference between the two ways that a company is required to calculate its income taxes
  - Accounting Rules: Income tax calculations are based on accounting rules
  - Gov't Tax Rules: Income tax calculations based on government rules
- The two main differences between the methods are summarized below:
  - The government typically allows a company to accelerate its depreciation expense on new assets, which reduces the company's taxable income (depreciation based on government rules is called Capital Cost Allowance (CCA) in Canada and Tax Depreciation in the U.S.)
  - The government also allows companies to use losses from previous years to offset earnings in the current year (called Tax Loss Carry Forwards "TLCF", or Net Operating Losses "NOL")
- If taxes calculated under accounting rules are greater than what the government says is payable in the current period, a deferred tax liability is created and added to the balance sheet
- Tax accounting rules vary by region and by industry, so check carefully before using an existing tax schedule as it may not be suitable for your situation

# Income Tax Schedule

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- Income Taxes based on accounting rules are calculated as follows:
  - Earnings Before Tax (EBT) on the Income Statement multiplied by the Tax Rate
  - This calculation results in the Total Income Tax line that appears on the company's Income Statement
- Income Taxes based on Government rules are calculated as follows:
  - Adjusted Earnings Before Tax multiplied by the Tax Rate
  - The formula above calculates the Current Tax line that appears on the company's Income Statement
  - The Adjusted Earnings Before Tax adjusts the EBT on the Income Statement for the two calculations described on the previous page (CCA / Tax Depreciation and Tax Losses)
  - The difference between the Total Tax (as calculated according to accounting rules) and the Current Tax (as calculated according to government rules) equals the Deferred Tax line that appears on the company's Income Statement
- It is important to accurately forecast a company's current and deferred taxes because this can have a meaningful impact on cash flow

# Income Tax Schedule

- The following table provides a numeric example of the tax concepts described on the previous two pages.

**Company A Tax Calculations**

Row	Line Item	Calculation	Notes
<b>Accounting Calculations</b>			
1.	Earnings Before Tax	\$100	EBT on Company A's Income Statement
2.	Tax Rate	35%	Company A's Tax Rate
3.	<b>Income Tax</b>	<b>\$35</b>	EBT multiplied by the Tax Rate
<b>Gov't Calculations</b>			
4.	Earnings Before Tax	\$100	EBT on Company A's Income Statement
5.	Adjustment: CCA / Tax Dep'n	(\$40)	The amount by which the CCA / Tax Dep'n exceeds the Acct. Dep'n
6.	Adjustment: Tax Losses	(\$30)	Company A's Tax Losses which are available and used
7.	<b>Adjusted EBT</b>	<b>\$30</b>	EBT Adjusted for rows 5 and 6
8.	Tax Rate	35%	Company A's Tax Rate
9.	<b>Income Tax</b>	<b>\$10</b>	Adjusted EBT multiplied by the Tax Rate
<b>Taxes as Appearing on Income Statement</b>			
10.	Current Income Tax	\$10	Equal to row 9
11.	Deferred Income Tax	\$25	The difference between row 12 and row 10
12.	<b>Total Income Tax</b>	<b>\$35</b>	Equal to row 3

# Working Capital Schedule

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- Working capital is the non-interest bearing current assets and current liabilities that a company requires to run its business
- The most common types of working capital are: Accounts Receivable, Inventories, and Accounts Payable
- Working capital affects cash flow because if a company is growing, it may need to increase its receivables and inventories which requires cash, thus preventing the cash from being used for other purposes
- Working capital balances are generally calculated based on an average number of days Sales (A/R) or Cost of Goods Sold (Inv and A/P)
  - $\text{A/R Balance} = \frac{\text{Sales}}{365} \times \text{Days in Accounts Receivable}$
  - $\text{Inv. Balance} = \frac{\text{COGS}}{365} \times \text{Days in Inventory}$
  - $\text{A/P Balance} = \frac{\text{COGS}}{365} \times \text{Days in Accounts Payable}$



# Modeling Capital Structure

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# Modeling a Capital Structure

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- Modeling a company's debt and equity is often the most difficult part of any financial model
- To effectively model a company's capital structure, whether simple or complex, the following steps should be followed:
  - Clearly layout all debt and equity assumptions in the assumptions section;
  - Organize the Debt Schedule so that each piece of debt has its own section on the Debt Schedule;
  - Each section of the Debt Schedule should be organized in the same way;
  - The Shareholders' Equity Schedule should be organized such that each component of the equity has its own section.
- These points will be described in greater detail on the following pages
- If the steps above are adhered to carefully, the cash flow statement and balance sheet will be very easy to create



# Debt and Interest Schedule

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- When modeling an entire company with debt on its balance sheet, a Debt and Interest Schedule is required
- A Debt and Interest schedule is generally not required if the company being modeled has no debt (ie. a division or business unit)
  - The Debt and Interest Schedule calculates the change in cash and debt balances each year, along with the interest income or interest expense incurred on the various pieces of debt
  - The interest expense on each piece of debt is typically calculated as the interest rate multiplied by the **average** amount of debt outstanding at the beginning and the end of the year
  - Each piece of debt should have its own section that is laid out as follows:

Beginning Balance:	- equal to the ending balance of the previous year
Change during the Period:	- different for each piece of debt
Ending Balance:	- beginning balance plus the change during the period
Interest Rate:	- either fixed or variable
Interest Expense:	- interest rate times the average debt in the period

# Senior Debt

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- Senior Debt represents the components of a company's debt that have first claim on the company's cash flows
- Senior Debt is also typically secured by the company's assets
- Within a financial model, the most typical forms of senior debt are:
  - Senior Term Debt; and
  - Revolving Credit Facility
- The two types of senior debt above are provided by a bank's corporate or commercial banking departments
- Senior Term Debt and Revolving Credit Facilities will be described in greater detail on the subsequent pages

# Senior Term Debt

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- Senior Term Debt represents the primary product offered by a bank's corporate and commercial banking departments
- Term Debt is typically amortized each year, with a bullet repayment at the end of the term
  - The amortization can be either straight line (ie. 10% of the initial loan amount each year), or accelerated (ie. a 5-year loan could be amortized 5% in year 1, 10% in years 2 and 3, 15% in years 4 and 5, and a bullet repayment at the end of year 5)
  - The interest rate on the Term Debt is often variable and is commonly set at LIBOR plus a spread
  - Term Debt is often the simplest component of the debt schedule because the repayment amounts are known with certainty for each year of the forecast

# Revolving Credit Facility

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- Revolving Credit Facilities are usually structured and provided by banks to provide companies with cash for working capital needs
  - A Revolving Credit Facility is also sometimes known as a Revolver, a Bank Line or an Operating Line
  - It is called a Revolver because it is often structured with a “sweep” provision, and therefore functions like a revolving door:
    - If the company experiences a cash shortfall, it can borrow from its revolver, up to the maximum amount set by the bank; and
    - If the company generates excess cash, the bank will “sweep” all or part of the excess cash to pay down any outstanding balance on the revolver
  - A revolver is an integral part of any financial model because it highlights how the company’s debt will change depending on the operating assumptions that are being made in the model
  - A revolver is also critical from a mechanical standpoint because it forces a financial model to stay balanced by automatically calculating the cash shortfall, or excess cash generated each year
  - The interest rate on the outstanding revolver balance is typically equal to the interest rate on the company’s Senior Term Debt

# Calculating the Revolver

- Calculating the change in the revolver each year can be the most complicated and difficult part of any financial model
  - Since the Revolver needs to increase **OR** decrease, many bankers use a complex nested IF statement to model the change in the revolver
  - Using a nested IF statement is very tricky, and the formula will often not work properly under all circumstances
  - Fortunately, there is a much simpler way to calculate the change in the Revolver, and it requires using Excel's MIN function
  - To calculate the change in the Revolver, you need to know three values:
    1. **FCF After Mandatory Debt Repayments**  
This represents the cash shortfall or cash surplus during the year and it is typically calculated as:  
Operating CF + Investing CF – Mandatory Debt Repayments – Dividends (if these take priority over the revolver)
    2. **Beginning Cash Balance**  
This is the Company's cash balance at the **Beginning** of the period
    3. **Beginning Revolver Balance**  
This is the outstanding Revolver balance at the **Beginning** of the period
  - The calculation of the change in the revolver is simply:  
**=-MIN(FCF<sub>After Mand Debt Rpmnts</sub> + Beg Cash Bal, Beg Revolver Bal)**

# Calculating the Revolver (Cont'd)

- The following example proves that the simple formula at the bottom of the previous page works under all scenarios:

**Example of Revolver Calculation**

	Year 1	Year 2	Year 3	Year 4
FCF <sub>After Mand Debt Repay</sub>	(10)	6	12	(14)
Beg. Cash Balance	0	0	0	8
Beg. Revolver Balance	0	10	4	0
<b>MIN Formula Returns:</b>	<b>10</b>	<b>(6)</b>	<b>(4)</b>	<b>6</b>

- In year 1, the company is forecasting FCF of (10). The MIN formula returns +10, which means that the company needs to borrow \$10MM from its revolver.
- In year 2, the company is forecasting FCF of +6. The MIN formula returns (6), which means that the company will repay \$6MM towards its revolver, thereby reducing its revolver balance to \$4MM at the end of the year.
- In year 3, the beginning revolver balance is 4 and the company is forecasting FCF of +12. The MIN formula returns (4), which means that the company will repay the remaining balance on its revolver. Even though the company is forecasting to generate FCF of +12, it will never repay more than it owes on the revolver.
- In year 4, the company now has \$8MM of cash in the bank at the start of the year and is forecasting to generate FCF of (14). The MIN formula returns +6, which means that the company will borrow +6 from its revolver. The company will use its own cash reserves before borrowing from its revolver.

# Revolver Circularity

- Revolving Credit Facilities make financial models circular for the following reason:
  - To calculate the interest expense each year on the Revolver, the formula is:  
 **$\text{Int. Expense} = \text{Int. Rate} \times \text{Average (Beg. Revolver Balance, End. Revolver Balance)}$**
  - This formula implies that to calculate the interest expense on the revolver, we must know the interest rate, the beginning revolver balance and the ending revolver balance
  - The interest rate and beginning revolver balance are obviously known with certainty
  - However, how can we know how much revolver debt ***is going to be*** outstanding at the end of each period?
  - The reason we don't know how much revolver debt is going to be outstanding at the end of each period is because depending on the amount of the interest expense, there will be more or less cash flow available to repay the revolver
  - So, to calculate the Interest Expense on the Revolver, we need to know what the ending balance is going to be at the end of the period
  - However, in order to know what the ending balance is going to be, we need to know the interest expense on the revolver during the period
  - Both formulas depend on knowing the answer to the other formula, and therefore, the logic is circular
  - This is not typically an issue with Term Debt because with Term Debt, the repayment schedule is usually based on a pre-set amortization schedule, and as a result, the repayments and ending balances each year are known with certainty

# Circular References

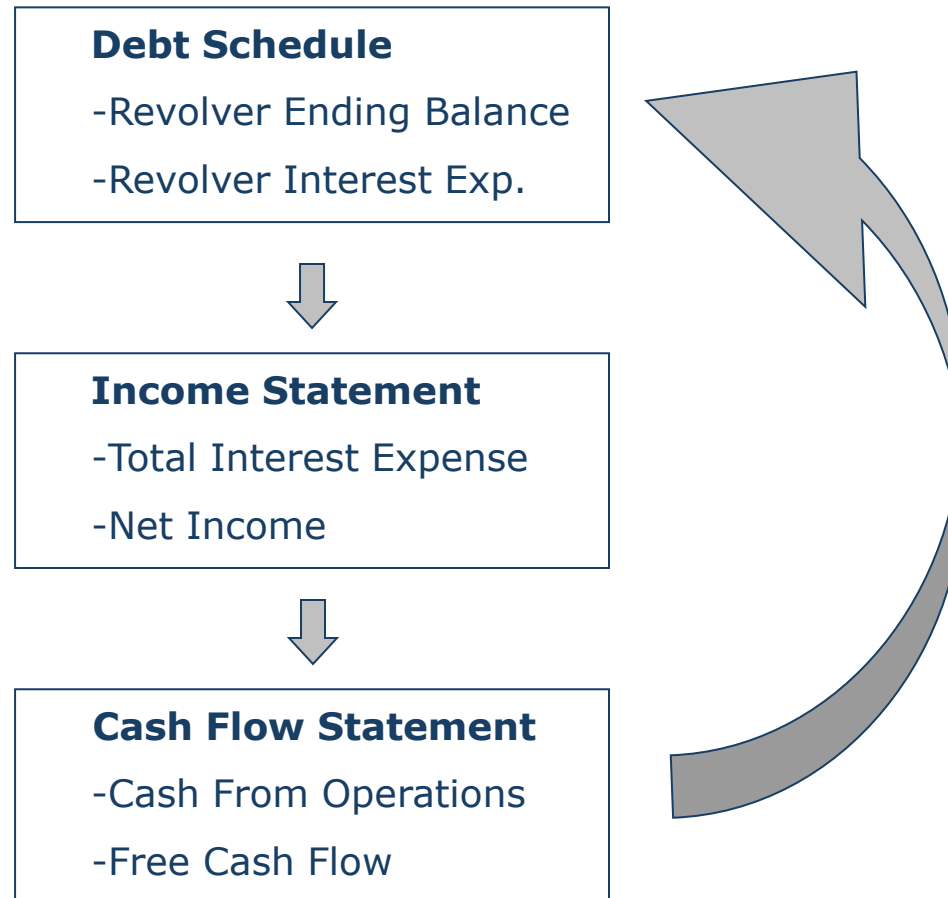
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- As described on the previous page, a revolving credit facility will make a model circular
  - A circular reference occurs when a formula refers to itself, either directly or indirectly
  - Circular references are REQUIRED in models with a Debt and Interest Schedule
  - The circular argument for a Revolving Credit Facility can be resolved iteratively, so you need to turn on the Iteration option within Excel
    - Excel 2010: ➤ File [F] ➤ Options [T] ➤ Select the "Formulas" box - check Enable Iterative Calculation
    - Excel 2016: ➤ File [F] ➤ Options [T] ➤ Select the "Formulas" box - check Enable Iterative Calculation
  - If a financial model becomes circular accidentally, use the Circular Reference Toolbar to find the problem cells
    - Excel 2010: ➤ Formulas [M] ➤ Error Checking [K] ➤ Circular References [C]
    - Excel 2016: ➤ Formulas [M] ➤ Error Checking [K] ➤ Circular References [C]



# A Revolver's Circular Path

- The following diagram illustrates the path of the circular reference caused by the Revolving Credit Facility



# Shareholders' Equity Schedule

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- A Shareholder's Equity schedule is generally required when preparing a model for an entire company
- When preparing a model for a division or a particular asset (ie. a manufacturing facility), a Shareholder's Equity Schedule may not be required
  - Much like the debt schedule, each of the following equity components should have its own section on the Equity Schedule:
    - Preferred Shares
    - Common Shares
    - Retained Earnings
  - A Shareholders' Equity Schedule is particularly helpful in situations where any of the following issues are present:
    - Dividend Payments;
    - Equity Issuances;
    - Share Buy-Backs;
    - Necessity to track shares outstanding;
    - Stock Options.

# Fixing Error Messages

- When an Excel file becomes circular, errors are more common
  - The following are the most common error message, their meaning and how to fix them
    - **#NAME:** The #NAME? error value occurs when Microsoft Excel doesn't recognize text in a formula – **Fix the Formula**
    - **#VALUE!:** The #VALUE! error value occurs when the wrong type of argument or operand is used – **Fix the Formula**
    - **#NUM!:** The #NUM! error value occurs when a problem occurs with a number in a formula or function – **Fix the problem number**
    - **#DIV!:** The #DIV/0! error value occurs when a formula divides by 0 (zero) – **Make sure the formula doesn't divide by zero**
    - **#REF!:** The #REF! error value occurs when a cell reference is not valid. The #REF! errors are the most difficult to fix.
  - To fix a model that has #REF! errors:
    - First, search the entire file for the #REF! term to ensure that there are no actual #REF! references within any formulas
    - If there are not, copy the interest expense and interest income lines off to the right (outside the last column)
    - Delete the contents of the interest expense and interest income lines
    - Continue deleting the contents of rows in the circular loop within the model until all the error messages are gone
    - Copy the formulas back into their appropriate cells

# Printing a Model

- If a model has been designed logically and is well laid out, it will be much easier to print

## Excel 2010

➤ Page Layout [P] ➤ Page Setup [SP]

- Go to the tab called “Sheet” and highlight the print ranges within the “Print Area” box
- Print ranges must be separated by a blank row or column

## Excel 2010

➤ File [F] ➤ Print [P] ➤ Print Preview [V]

- If selected ranges do not fit properly, you need to:
  - Go the tab called “Margins” in Page Setup and adjust the page margins; and/or
  - Go to the tab called “Page” in Page Setup and adjust the scaling; and/or
  - Adjust the spacing of lines and columns on the worksheet

## Excel 2010

➤ View [W] ➤ Page Break Preview [I]

- An alternative way to select print ranges

## Excel 2016

➤ Page Layout [P] ➤ Page Setup [SP]

## Excel 2016

➤ File [F] ➤ Print [P] ➤ Print Preview [V]

## Excel 2016

➤ View [W] ➤ Page Break Preview [I]

- To print multiple sheets simultaneously, select all desired sheets (Ctrl + Shift + PageUp) and then print

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