Excel Lookup Functions

- In our work on the ACI Mix Design procedure, we have to read data from a series of tables.
- This is an easy thing for us to do…..

	Maximum aggregate size (in.)							
Slump(in)	0.375	0.5	0.75	1	1.5	2	3	6
1 to 2	350	335	315	300	275	260	220	190
3 to 4	385	365	340	325	300	285	245	210
6 to 7	410	385	360	340	315	300	270	-
Air Content	3.0%	2.5%	2.0%	1.5%	1.0%	0.5%	0.3%	0.2%

- How can we get Excel to do this for us?

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- Think about how we accomplish this task.
- First, we find the row that matched the item we are looking up.

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- Think about how we accomplish this task.
- Second, we find the column that matched the item we are looking up.

Excel Lookup Functions

- Lookup-type functions can return particular information from a series of a table of data
- The two most common lookup functions are:

VLOOKUP (for Vertical LOOKUP)
HLOOKUP (for Horizontal LOOKUP)

- Both these function lookup a particular value or text entry in a table and return the related information

Excel Lookup Functions

- The VLOOKUP function moves vertically down the rows of a lookup table, looking for matching information in the first column of the table
- The HLOOKUP function moves horizontally across the columns of a lookup table, looking for matching information in the first row of the table

Excel Lookup Functions

- The format of the VLOOKUP function is:

VLOOKUP(*lookup_value*,*table_array*, *col_index_num*,*range_lookup*)

lookup_value	the value to be serach for in the first column of the array
table_array	is the table of two or more columns of data
col_index_num	is the column number in *table_array* from which the matching value must be returned
range_lookup	is a logical value that specifies whether you want VLOOKUP to find an exact match or an approximate match

Excel Lookup Functions

VLOOKUP(*lookup_value*,*table_array*, *col_index_num*,*range_lookup*)

- The ***lookup_value*** can be a value, a reference, or a text string
- The ***table_array*** is a reference to a range
- A ***col_index_num*** of 1 returns the value in the first column in ***table_array***; a ***col_index_num*** of 2 returns the value in the second column in ***table_array***, and so on . . .

Excel Lookup Functions

VLOOKUP(*lookup_value*,*table_array*, *col_index_num*,*range_lookup*)

- If ***col_index_num*** is less than 1, VLOOKUP returns the #VALUE! error value
- If ***col_index_num*** is greater than the number of columns in ***table_array***, VLOOKUP returns the #REF! error value

Excel Lookup Functions

VLOOKUP(*lookup_value*,*table_array*, *col_index_num*,*range_lookup*)

- If ***range_lookup*** is TRUE or omitted, an approximate match is returned
- In other words, if an exact match is not found, the next largest value that is less than ***lookup_value*** is returned
- If ***range_lookup*** is FALSE, VLOOKUP will find an exact match
- If one is not found, the error value #N/A is returned

Excel Lookup Functions

VLOOKUP(*lookup_value*,*table_array*, *col_index_num*,*range_lookup*)

- If ***range_lookup*** is TRUE, the values in the first column of ***table_array*** must be placed in ascending order: ..., -2, -1, 0, 1, 2, ..., A-Z, FALSE, TRUE; otherwise VLOOKUP may not give the correct value
- If ***range_lookup*** is FALSE, ***table_array*** does not need to be sorted

Excel Lookup Functions

VLOOKUP(*lookup_value*,*table_array*, *col_index_num*,*range_lookup*)

- You can put the values in ascending order by choosing the **Sort** command from the **Data** menu and selecting **Ascending**
- The values in the first column of ***table_array*** can be text, numbers, or logical values
- Uppercase and lowercase text are equivalent

VLOOKUP Examples

	D	E	F	G	H	I
17						
18		x	x^2	x^3	x^4	
19		0.9	0.8	0.7	0.7	
20		1.5	2.3	3.4	5.1	
21		2.2	4.8	10.6	23.4	
22		2.5	6.3	15.6	39.1	
23		3.1	9.6	29.8	92.4	
24		4.8	23.0	110.6	530.8	
25						

VLOOKUP(1,E19:H24,1,TRUE) returns 0.9

VLOOKUP Examples

	D	E	F	G	H	I
17						
18		x	x^2	x^3	x^4	
19		0.9	0.8	0.7	0.7	
20		1.5	2.3	3.4	5.1	
21		2.2	4.8	10.6	23.4	
22		2.5	6.3	15.6	39.1	
23		3.1	9.6	29.8	92.4	
24		4.8	23.0	110.6	530.8	
25						

VLOOKUP(1,E19:H24,1,FALSE) returns #N/A

VLOOKUP Examples

	D	E	F	G	H	I
17						
18		x	x^2	x^3	x^4	
19		0.9	0.8	0.7	0.7	
20		1.5	2.3	3.4	5.1	
21		2.2	4.8	10.6	23.4	
22		2.5	6.3	15.6	39.1	
23		3.1	9.6	29.8	92.4	
24		4.8	23.0	110.6	530.8	
25						

VLOOKUP(0.8,E19:H24,1) returns #N/A

VLOOKUP Examples

	D	E	F	G	H	I
17						
18		x	x^2	x^3	x^4	
19		0.9	0.8	0.7	0.7	
20		1.5	2.3	3.4	5.1	
21		2.2	4.8	10.6	23.4	
22		2.5	6.3	15.6	39.1	
23		3.1	9.6	29.8	92.4	
24		4.8	23.0	110.6	530.8	
25						

VLOOKUP(3,E19:H24,3) returns 15.6

VLOOKUP Examples

	D	E	F	G	H	I
17						
18		x	x^2	x^3	x^4	
19		0.9	0.8	0.7	0.7	
20		1.5	2.3	3.4	5.1	
21		2.2	4.8	10.6	23.4	
22		2.5	6.3	15.6	39.1	
23		3.1	9.6	29.8	92.4	
24		4.8	23.0	110.6	530.8	
25						

VLOOKUP(3,E19:H24,3,FALSE) returns #N/A

VLOOKUP Examples

	D	E	F	G	H	I
17						
18		x	x^2	x^3	x^4	
19		0.9	0.8	0.7	0.7	
20		1.5	2.3	3.4	5.1	
21		2.2	4.8	10.6	23.4	
22		2.5	6.3	15.6	39.1	
23		3.1	9.6	29.8	92.4	
24		4.8	23.0	110.6	530.8	
25						

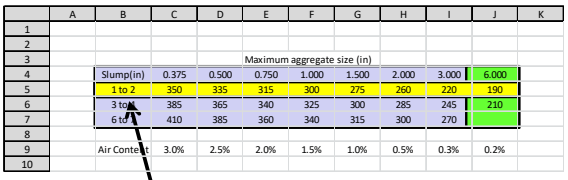
VLOOKUP(2.2,E19:H24,4) returns 23.4

VLOOKUP Examples

	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3					Maximum aggregate size (in)						
4		Slump(in)	0.375	0.500	0.750	1.000	1.500	2.000	3.000	6.000	
5		1 to 2	350	335	315	300	275	260	220	190	
6		3 to 4	385	365	340	325	300	285	245	210	
7		6 to	410	385	360	340	315	300	270		
8											
9		Air Conte	3.0%	2.5%	2.0%	1.5%	1.0%	0.5%	0.3%	0.2%	
10											

VLOOKUP("3 to 4",B4:J7,4) returns 340

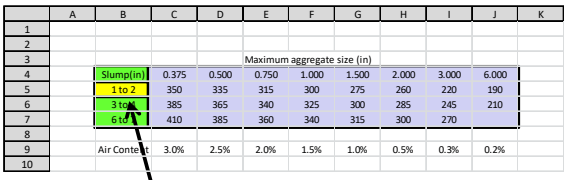
VLOOKUP Examples



		Maximum aggregate size (in)							
Slump(in)	0.375	0.500	0.750	1.000	1.500	2.000	3.000	6.000
1 to 2	350	335	315	300	275	260	220	190
3 to 4	385	365	340	325	300	285	245	210
6 to 7	410	385	360	340	315	300	270	
Air Content	3.0%	2.5%	2.0%	1.5%	1.0%	0.5%	0.3%	0.2%

VLOOKUP("1 to 2",B4:J7,9) returns 190

VLOOKUP Examples



		Maximum aggregate size (in)							
Slump(in)	0.375	0.500	0.750	1.000	1.500	2.000	3.000	6.000
1 to 2	350	335	315	300	275	260	220	190
3 to 4	385	365	340	325	300	285	245	210
6 to 7	410	385	360	340	315	300	270	
Air Content	3.0%	2.5%	2.0%	1.5%	1.0%	0.5%	0.3%	0.2%

VLOOKUP("1 to 7",B4:J7,1) returns "1 to 2"

Excel MATCH Function

- The MATCH function returns the relative position of an item in an array that matches a specified value in a specified order

MATCH(*lookup_value*,*lookup_array*,*match_type*)

lookup_value	is the value you want to match in the ***lookup_array***
lookup_array	is a contiguous range of cells containing possible lookup values
match_type	is the number -1, 0, or 1

Excel MATCH Function

MATCH(*lookup_value*,*lookup_array*,*match_type*)

- The ***lookup_value*** is the value you want to match in ***lookup_array***.

  For example, when you look up someone's number in a telephone book or online, you are using the person's name as the lookup value, but the telephone number is the value you want.

- ***Lookup_value*** can be a value (number, text, or logical value) or a cell reference to a number, text, or logical value.

Excel MATCH Function

MATCH(*lookup_value*,*lookup_array*,*match_type*)

- 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, FALSE, TRUE.
- 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: TRUE, FALSE, Z-A,...2, 1, 0, -1, -2,..., and so on.
- If ***match_type*** is omitted, it is assumed to be 1.

Excel MATCH Function

MATCH(*lookup_value*,*lookup_array*,*match_type*)

- MATCH does not distinguish between uppercase and lowercase letters when matching text values
- If MATCH is unsuccessful in finding a match, it returns the #N/A error value
- If ***match_type*** is 0 and ***lookup_value*** is text, ***lookup_value*** can contain the wildcard characters, asterisk (*) and question mark (?)

  An asterisk (*) matches any sequence of characters; a question mark (?) matches any single character

VLOOKUP Examples

	D	E	F	G	H	I
17						
18		x	x^2	x^3	x^4	
19		0.9	0.8	0.7	0.7	
20		1.5	2.3	3.4	5.1	
21		2.2	4.8	10.6	23.4	
22		2.5	6.3	15.6	39.1	
23		3.1	9.6	29.8	92.4	
24		4.8	23.0	110.6	530.8	
25						

MATCH(4.0,F19:F24,1) returns 2

VLOOKUP Examples

	D	E	F	G	H	I
17						
18		x	x^2	x^3	x^4	
19		0.9	0.8	0.7	0.7	
20		1.5	2.3	3.4	5.1	
21		2.2	4.8	10.6	23.4	
22		2.5	6.3	15.6	39.1	
23		3.1	9.6	29.8	92.4	
24		4.8	23.0	110.6	530.8	
25						

MATCH(4.0,F19:F24,0) returns #N/A

VLOOKUP Examples

	D	E	F	G	H	I
17						
18		x	x^2	x^3	x^4	
19		0.9	0.8	0.7	0.7	
20		1.5	2.3	3.4	5.1	
21		2.2	4.8	10.6	23.4	
22		2.5	6.3	15.6	39.1	
23		3.1	9.6	29.8	92.4	
24		4.8	23.0	110.6	530.8	
25						

MATCH(4.0,F19:F24,-1) returns #N/A

Lookup Function Example

	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3					Maximum aggregate size (in)						
4		Slump(in)	0.375	0.500	0.750	1.000	1.500	2.000	3.000	6.000	
5		1 to 2	350	335	315	300	275	260	220	190	
6		3 to 4	385	365	340	325	300	285	245	210	
7		6 to 7	410	385	360	340	315	300	270		
8											
9		Air Content	3.0%	2.5%	2.0%	1.5%	1.0%	0.5%	0.3%	0.2%	
10											

- Write one function or a series of nested functions that return the amount water required for a concrete mix based on the slump and the maximum aggregate size
- Hint: Consider VLOOKUP and MATCH

Lookup Function Example

	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3					Maximum aggregate size (in)						
4		Slump(in)	0.375	0.500	0.750	1.000	1.500	2.000	3.000	6.000	
5		1 to 2	350	335	315	300	275	260	220	190	
6		3 to 4	385	365	340	325	300	285	245	210	
7		6 to 7	410	385	360	340	315	300	270		
8											
9		Air Content	3.0%	2.5%	2.0%	1.5%	1.0%	0.5%	0.3%	0.2%	
10											

VLOOKUP("3 to 4",B4:J7,MATCH(0.75,B4:J4))

returns 340

Excel Lookup Functions

Questions?