

Understand Formulas

Excel is a truly powerful program because users at every level of mathematical expertise can make calculations with accuracy. To do so, you use formulas. A **formula** is an equation in a worksheet. You use formulas to make calculations as simple as adding a column of numbers, or as complex as creating profit-and-loss projections for a global corporation. To tap into the power of Excel, you should understand how formulas work. **CASE** *Managers at QST use the Trip Advisor Payroll Calculator workbook to keep track of employee hours prior to submitting them to the Payroll Department. You'll be using this workbook regularly, so you need to understand the formulas it contains and how Excel calculates the results.*

1. Click cell E5

The active cell contains a formula, which appears on the formula bar. All Excel formulas begin with the equal sign (=). If you want a cell to show the result of adding 4 plus 2, the formula in the cell would look like this: =4+2. If you want a cell to show the result of multiplying two values in your worksheet, such as the values in cells B5 and D5, the formula would look like this: =B5*D5, as shown in **FIGURE A-5**. While you're entering a formula in a cell, the cell references and arithmetic operators appear on the formula bar. See **TABLE A-2** for a list of commonly used arithmetic operators. When you're finished entering the formula, you can either click the Enter button on the formula bar or press [Enter].

2. Click cell F5

An example of a more complex formula is the calculation of overtime pay. At QST, overtime pay is calculated at twice the regular hourly rate times the number of overtime hours. The formula used to calculate overtime pay for the employee in row 5 is:

O/T Hrs times (2 times Hrly Rate)

In the worksheet cell, you would enter: =C5*(2*D5), as shown in **FIGURE A-6**. The use of parentheses creates groups within the formula and indicates which calculations to complete first—an important consideration in complex formulas. In this formula, first the hourly rate is multiplied by 2, because that calculation is within the parentheses. Next, that value is multiplied by the number of overtime hours. Because overtime is calculated at twice the hourly rate, managers are aware that they need to closely watch this expense.

In creating calculations in Excel, it is important to:

- **Know where the formulas should be**

An Excel formula is created in the cell where the formula's results should appear. This means that the formula calculating Gross Pay for the employee in row 5 will be entered in cell G5.

- **Know exactly what cells and arithmetic operations are needed**

Don't guess; make sure you know exactly what cells are involved before creating a formula.

- **Create formulas with care**

Make sure you know exactly what you want a formula to accomplish before it is created. An inaccurate formula may have far-reaching effects if the formula or its results are referenced by other formulas, as shown in the payroll example in **FIGURE A-6**.

- **Use cell references rather than values**

The beauty of Excel is that whenever you change a value in a cell, any formula containing a reference to that cell is automatically updated. For this reason, it's important that you use cell references in formulas, rather than actual values, whenever possible.

- **Determine what calculations will be needed**

Sometimes it's difficult to predict what data will be needed within a worksheet, but you should try to anticipate what statistical information may be required. For example, if there are columns of numbers, chances are good that both column and row totals should be present.

FIGURE A-5: Viewing a formula

The screenshot shows the Excel interface for a payroll calculator. The formula bar at the top displays the formula `=B5*D5`. A callout box points to the formula bar with the text "Formula displays in formula bar". The spreadsheet data is as follows:

Name	Hours	O/T Hrs	Hrly Rate	Reg Pay	O/T Pay	Gross Pa
Brueghel, Pieter	40	4	16.5	660	132	
Cortona, Livia	35	0	11	385	0	
Klimt, Gustave	40	2	13	520	52	
Le Pen, Jean-Marie	29	0	15	435	0	
Martinez, Juan	37	0	13	481	0	
Mioshi, Keiko	39	0	20.5	799.5	0	
Sherwood, Burton	40	0	16.5	660	0	
Strano, Riccardo	40	8	16	640	256	
Wadsworth, Alicia	40	5	13	520	130	
Yamamoto, Johji	38	0	15	570	0	

A second callout box points to the value 132 in cell F5 with the text "Calculated value displays in cell".

FIGURE A-6: Formula with multiple operators

The screenshot shows the Excel interface for a payroll calculator. The formula bar at the top displays the formula `=C5*(2*D5)`. A callout box points to the formula bar with the text "Formula to calculate overtime pay". The spreadsheet data is as follows:

Name	Hours	O/T Hrs	Hrly Rate	Reg Pay	O/T Pay	Gross Pay
Brueghel, Pieter	40	4	16.5	660	132	
Cortona, Livia	35	0	11	385	0	
Klimt, Gustave	40	2	13	520	52	
Le Pen, Jean-Marie	29	0	15	435	0	
Martinez, Juan	37	0	13	481	0	
Mioshi, Keiko	39	0	20.5	799.5	0	
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Strano, Riccardo	40	8	16	640	256	
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