

Mathcad Prime™ The World's Greatest Scratchpad

I want to buy 3 gifts costing \$17.99, \$19.99, and \$24.99. If the tax is 5.5% and I have a 20% off coupon. Can I buy all three with \$50.00? If not, how much do I need to borrow from my friend?

$$17.99 + 19.99 + 24.99 = 62.97$$

$$.80 \cdot 62.97 = 50.376$$

$$1.055 \cdot 50.38 = 53.151$$

$$53.15 - 50 = 3.15$$

Alternatively

$$80\% \cdot 62.97 = 50.376$$

$$5.5\% \cdot 50.38 = 2.771$$

$$50.38 + 2.77 = 53.15$$



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Questions or Corrections

Please direct inquiries or questions regarding the contents of this tutorial to the Mathcad Academic Program at MathcadEducation@ptc.com. Suggestions for improvement or further development will be gladly accepted.

Step	Examples	Keystroke Instruction
<h2><i>Introducing the World's Greatest Live Scratchpad</i></h2>		
1.	<p>You will need to open the file Scratchpad 1.mcdx from the zip file in order to complete this tutorial. Please open this file now. Throughout this tutorial you will reproduce the content in the red box using the keystrokes and notes in the right hand column.</p>	
2.	<p>Using Mathcad Prime's natural mathematics notation to record and evaluate numerical calculations. Use the mouse to place your cursor. Then perform the keystroke instructions precisely.</p> <div style="border: 1px solid #add8e6; padding: 10px; margin: 10px 0;"> <p style="color: #00a0e3; font-weight: bold;">Back-of-the-Envelope Calculations</p> <p>I need to paint the walls of an 8 x 10 room with a 9 foot ceiling height</p> <div style="border: 2px solid red; padding: 5px; margin: 10px 0;"> $2 \cdot (8 \cdot 9) + 2 \cdot (10 \cdot 9) = 324$ $2 \cdot (8 \text{ ft} \cdot 9 \text{ ft}) + 2 \cdot (10 \text{ ft} \cdot 9 \text{ ft}) = 324 \text{ ft}^2$ </div> </div>	<p><u>Keystroke Instructions:</u></p> <p>2*(8*9)+2*(10*9)=</p> <p>2*(8ft*9ft)+2*(10ft*9ft)=</p> <p><u>Notes:</u></p> <ol style="list-style-type: none"> 1. A multiplication dot is an * 2. Numerical values appear in black 3. Units of measure appear in blue 4. = is the evaluation symbol in Mathcad

3. Mathcad Prime is a whiteboard environment where calculations can be entered anywhere on the page. You can think of Mathcad as a math processor -- a tool to record your calculations. Just hit enter and you move down to the next line on the page. In this tutorial you will experience Mathcad Prime as a flexible and powerful environment for writing and performing numerical calculations.

Enters the series of calculations shown in the red box below using the keystrokes in the right hand column:

I want to buy 3 gifts costing \$17.99, \$19.99, and \$24.99. If the tax is 5.5% and I have a 20% off coupon. Can I buy all three with \$50.00? If not, how much do I need to borrow from my friend?

$17.99 + 19.99 + 24.99 = 62.97$	Alternatively
$.80 \cdot 62.97 = 50.376$	$80\% \cdot 62.97 = 50.376$
$1.055 \cdot 50.38 = 53.151$	$5.5\% \cdot 50.38 = 2.771$
$53.15 - 50 = 3.15$	$50.38 + 2.77 = 53.15$

Can you complete the alternative calculation on your own? Give it a try!

Keystroke Instructions:

$$17.99+19.99+24.99=$$

$$.80*62.97=$$

$$1.055*50.38=$$

$$53.15 - 50=$$

<p>4.</p>	<p>Mathcad’s unit-handling capabilities are legendary. Only Mathcad allows you to attach units to live mathematics. Only Mathcad performs unit calculations for you automatically. The mathematical expression below compares the rise to the run for a set of stairs. Notice that the units are different in the numerator and the denominator of the fraction. Notice that Mathcad reports that answer as unit-less.</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>A set of stairs rises 41 feet over a run of 7 meters. What is the slope of the stairs?</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 2px solid red; padding: 5px; margin-right: 20px;"> $\frac{41 \text{ ft}}{7 \text{ m}} = 1.785$ </div> <div style="color: blue;">What happened to the units?</div> </div> </div> <p style="color: red; text-align: center;">Mathcad is correctly reporting the result as a scalar quantity!</p>	<p style="color: red;">One of the important keyboarding skills for Mathcad is using the space bar <SP> to select multiple terms in a selection. In the keystrokes below pressing <SP> twice selects “41ft” so that the whole quantity can be divided by 7m.</p> <p><u>Keystroke Instructions:</u></p> <p>41ft<SP><SP>/7m=</p>
<p>5.</p>	<p>This example presents another simple comparison statement. In this case, however, Mathcad adds units to the resulting rate when the statement is evaluated.</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>Last Thursday I drove 528 miles in 8 hours and 45 minutes. What was my average speed?</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 2px solid red; padding: 5px; margin-right: 20px;"> $\frac{528 \text{ mi}}{8 \text{ hr} + 45 \text{ min}} = 60.343 \frac{\text{mi}}{\text{hr}}$ </div> <div style="color: blue;">Mathcad performs unit analysis for you!</div> </div> </div> <p>Did you get the same result? If not, did you consider the units given with the answer?</p>	<p style="color: red;">Pay careful attention to the way in which Mathcad handles the units in this problem!</p> <p><u>Keystroke Instructions:</u></p> <p>528mi<SP><SP>/8hr+45min=</p> <p style="color: red;">To change the units from “m/s” to “mi/hr”, simply select and edit the units and Mathcad Prime will re-evaluate the result in terms of the new units provided.</p>

<p>6.</p>	<p>Although it was developed for handling much more sophisticated engineering calculations, Mathcad is a really easy and flexible tool to have on your computer when you need to perform some quick calculations.</p> <p>Mathcad’s developers have done their best to make Mathcad Prime as easy-to-use as possible. Practice writing and editing expressions with Mathcad by completing the following four problems. The keystrokes are included at right for reference.</p>	
	<p>If you drive 812 km in 11 hours and 10 minutes, what is your average speed in miles per hour?</p>	<p><u>Keystroke Instructions:</u></p> <p>812km<SP><SP>/11hr+10min=</p> <p>Delete unit m/s and change the unit to km/hr</p>
	<p>If you join three friends for dinner and the check is \$111.38 including tax. What is your share of the bill if the group decides to leave a 17% tip.</p>	<p><u>Keystroke Instructions:</u></p> <p>111.38*1.17<SP><SP>/4=</p>

	<p>A cylinder has a radius of 7 cm and a height of 22.3 cm. What is the volume and the surface area of the cylinder? (Try using the constant pi from the constants list on the Math tab)</p> <p>Volume Calculation Hint: Volume of a Cylinder is equal to the Base Area time the Height</p> <p>Surface Area Calculation Hint: What is the shape of the label on a soup can?</p>	<p>Note: [^] or <Shift-6> is the exponentiation symbol in Mathcad Prime.</p> <p><u>Keystroke Instructions:</u></p> <p>3.14*7cm<SP><SP>^2<SP><SP>*22.3cm=</p> <p>2*3.14*7cm<SP><SP>^2<SP><SP><SP>+2*3.14*7cm*22.3cm=</p>
	<p>Which is larger 12 factorial or 12 to the 8th power? By how much?</p>	<p><u>Keystroke Instructions:</u></p> <p>12!=</p> <p>12^8=</p> <p>12^12-12!=</p> <p>12^8/12!=</p>

Great Job!