



This brainteaser was supplied by the Mathematical Olympiads for Elementary and Middle Schools (www.moems.org).

Mara has 3 times as many dollars as her brother, Timmy. If Mara is given \$20 by their mother, she will have 7 times as many dollars as Timmy. How many dollars does Timmy have?



Solution: \$5.

If Timmy has \$1, then Mara must have \$3. But when her mother gives her \$20, she will have a total of $3 + 20 = 23$, which is more than seven times the amount that Timmy has. (In fact, it is 23 times as much as Timmy has.) A table can be used to investigate other amounts, and the table below shows that the conditions of the problem are satisfied if Timmy has \$5.

<i>Number of dollars Timmy has</i>	<i>Number of dollars Mara has (three times Timmy's amount)</i>	<i>Mara's amount after mother gives her \$20</i>	<i>Ratio of Mara's new amount to Timmy's amount</i>
1	3	23	$23 \div 1 = 23$
2	6	26	$26 \div 2 = 13$
3	9	29	$29 \div 3 = 9.67$
4	12	32	$32 \div 4 = 8$
5	15	35	$35 \div 5 = 7$
6	18	38	$38 \div 6 = 6.33$

It's also possible to use algebra to solve this problem. Let x = Timmy's amount. Then Mara currently has $3x$ dollars, and she will have $3x + 20$ after her mother gives her \$20. Since Mara's new amount is supposed to be seven times Timmy's current amount, this leads to the equation $3x + 20 = 7x$. Solving this equation yields $x = 5$, which verifies the answer in the table.