

### Math for Sales Taxes

**P1.** Jack buys a watch and pays \$4.47 in sales tax, at a sales tax rate of 12%. What was the original price of the watch, before tax?

**P2.** Debra buys a bookshelf for \$137.54 - including tax. She paid exactly \$5.29 in sales tax. What is the sales tax rate in Debra's province?

### Math for Discounts and Markups

**P3.** The manager at Mary's Pizza is trying to figure out how much to charge for a new pizza they've created. It costs \$4.50 to make each pizza from scratch, and Mary's Pizza marks up their cost by 80%. How much will they charge per pizza?

**P4.** The widget store is selling widgets at a 43% discount. Kelly buys a widget listed at \$83.99. If a 14% sales tax were applied to her purchase, how much would she pay for the widget?

### Math for Income Tax

**P5.** Tommy made \$70,000 in 2019. He calculated that his personal exemption and deductions are worth \$12,304.00. How much federal tax does he owe?

Taxable Income	Federal Marginal Tax Rates
\$47,630.00	15%
\$95,259.00	20.5%
\$147,667.00	26%

**P6.** In Math Land, income tax is assessed as follows. There is no tax on the first \$12,000 you earn. Any earnings over \$12,000 are taxed at a rate of 15%, up to \$24,000. Any earnings over \$24,000 are taxed a rate of 45%.

**P6a.** Sketch the graph of the tax rate as a function of income.

**P6b.** Arjun earned \$15,000. How much tax will he pay?

**P6c.** Kathy earned \$27,000. How much tax will she pay?

**P6d.** Sketch the graph of tax paid as a function of income.

### Activity Answer Key

**A1.**

$$\begin{aligned} \text{tax} &= \text{price} \cdot \text{rate} \\ \text{price} &= \frac{\text{tax}}{\text{rate}} \\ \text{price} &= \frac{4.47}{0.12} \\ \text{price} &= \$37.25 \end{aligned}$$

**A2.**

$$\begin{aligned} \text{price} &= 137.54 - 5.29 \\ \text{price} &= \$132.25 \\ \text{rate} &= \frac{\text{tax}}{\text{price}} \\ \text{rate} &= \frac{5.29}{132.25} \\ \text{rate} &= \frac{5.29}{132.25} \\ \text{rate} &= 4\% \end{aligned}$$

**A3.**

$$\begin{aligned} \text{new price} &= 4.50(1 + 0.8) \\ \text{new price} &= \$8.10 \end{aligned}$$

**A4.**

$$\begin{aligned} \text{price} &= (83.99(1 - 0.43))(1 + 0.14) \\ \text{price} &= \$54.58 \end{aligned}$$

**A5.** \$9,884.75. Remember, he still owes provincial tax.

Taxable Income	Federal Marginal Tax Rates	Salary per Tax Bracket	Tax
\$12,304.00	0%	\$12,304.00	
\$47,630.00	15%	\$35,326.00	\$5,298.90
\$95,259.00	20.50%	\$22,370.00	\$4,585.85
\$147,667.00	26%	\$0.00	\$0.00
	<b>Total</b>	<b>\$70,000.00</b>	<b>\$9,884.75</b>

**A6a.**

$$f(x) = \begin{cases} 0 & \text{if } 0 \leq x \leq 12,000 \\ 0.15 & \text{if } 12,000 < x \leq 24,000 \\ 0.45 & \text{if } x \geq 24,000 \end{cases}$$

**A6b.** \$450

**A6c. \$2,250**

Taxable Income	Federal Marginal Tax Rates	Arjun Salary per Tax Bracket	Arjun Tax	Kathy Salary per Tax Bracket	Kathy Tax
\$12,000.00	0%	\$12,000.00	\$0.00	\$12,000.00	\$0.00
\$24,000.00	15%	\$3,000.00	\$450.00	\$15,000.00	\$2,250.00
\$1,000,000.00	45.00%	\$0.00	\$0.00	\$0.00	\$0.00
	<b>Total</b>	\$15,000.00	\$450.00	\$27,000.00	\$2,250.00

**A6d.**

$$f(x) = \begin{cases} 0 & \text{if } 0 \leq x \leq 12,000 \\ 0.15(x - 12,000) & \text{if } 12,000 < x \leq 24,000 \\ 0.15(12,000) + 0.45(x - 24,000) & \text{if } x \geq 24,000 \end{cases}$$



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