



Averages, Payroll & Taxes

AVERAGES

Arithmetic Average (Mean): The mean of a set of values is found by summing all the numbers in a set and dividing by the number of items.

$$\text{Average} = \frac{\text{Sum of Terms}}{\text{Number of Terms}}$$

Example: Kim scored the following marks in her math test: 8, 4, 6, 3 and 10. If all the tests count equally, what was her average mark for the tests?

Solution: $\text{Average} = \frac{\text{Sum of Terms}}{\text{Number of Terms}} = \frac{31}{5} = 6.2$

Weighted Average: is the average of two or more terms that are not of equal importance (e.g. items purchased at different prices). To find the weighted term, multiply each term by its weighting factor and sum them up. Then divide by the number of terms. The formula for weighted average is:

$$\text{Weighted average} = \frac{\text{Sum of Weight Terms}}{\text{Number of Terms}}$$

Example: Scott wanted to figure out his average bank balance for the year. For Jan – March, his balance was \$4500; Apr – May balance was \$3600; June – Sept: \$3900; Oct – Dec \$4100.

Solution:

Step 1: To get the sum of weighted terms, multiply each balance by the number of months.

$$(4500 \times 3) + (3600 \times 2) + (3900 \times 4) + (4100 \times 3) = 48600$$

Step 2: Total number of terms = Total number of months = 12

Step 3: $\text{Weighted average} = \frac{\text{Sum of Weight Terms}}{\text{Number of Terms}} = \frac{48,600}{12} = 4,050$

Practice Problems

- Five contractors worked $10\frac{3}{4}$, 12, $14\frac{1}{3}$, $11\frac{1}{4}$ and 15 hours respectively. What is the total cost of labour if the contractors were each paid \$15.75 per hour?
- Complete the following inventory sheet:

Item	Quantity	Cost per unit	Total
A	96	0.89	_____
B	330	16.25	_____
C	144	5.54	_____
D	240	1.54	_____
		Total	_____



3. Several mattress stores in the city carry the same brand of mattress. The number of *Comfort* mattresses sold and the price charged by each store are shown below:

Store	Quantity Sold	Cost per unit sold (\$)
A	12	120.99
B	5	135.75
C	6	130.80
D	17	119.50

- What was the average number of mattresses sold per store?
 - What was the average price per store?
 - What was the average sales revenue per store?
 - What is the average price per mattress?
4. An olive oil company tracks the cost of olive oil production over a six month period. Records show that for the first 1,540 litres, they paid 48.6¢/L. For the next 1,720 litres, they paid 42.4¢/litre. For the last 1,105 litres, they paid 38.5¢/L. Determine the average cost of olive oil production per litre for the six-month period in dollars.

Solutions

- Total hours = $10\frac{3}{4} + 12 + 14\frac{1}{3} + 11\frac{1}{4} + 15 = 63.\bar{3}$ hours
Total cost of labour = $63.\bar{3}$ hours \times \$15.75/hr = \$997.50
- A: \$85.44; B: \$5,362.50; C: \$797.76; D: \$369.60; Total: \$6,615.30
- Average number mattresses sold per store = $(12 + 5 + 6 + 17) \div 4 = 10$
 - Average price per store = $(\$120.99 + \$135.75 + \$130.80 + \$119.50) \div 4 = \$126.76$
 - Average sales revenue per store
= $(\$120.99 \times 12 + \$135.75 \times 5 + \$130.80 \times 6 + \$119.50 \times 17) \div 4 = \1236.73
 - Average price per mattress = Total Sales Revenue \div Total mattresses sold
= $\$4,946.93 \div 40 = \$123.67/\text{mattress}$
- Step 1: find the total amount spent on olive oil production.
 $(1,540\text{L} \times \$0.486/\text{L}) + (1,720\text{L} \times \$0.424/\text{L}) + (1,105\text{L} \times \$0.385/\text{L}) = \$1,903.15$
Step 2: divide the total olive oil cost by the total volume of olive oil to find the average cost.
 $\$1,903.15 / (1,105 + 1,720 + 1,540\text{L}) = \$0.44/\text{litre}$

PAYROLL

Salaries

- An employee paid monthly receives 12 paycheques per year.
- An employee paid semi-monthly (twice a month) receives 24 paycheques per year.
- An employee paid bi-weekly (every two weeks) receives 26 paycheques per year. (Not 24!)
- An employee paid weekly receives 52 paycheques per year.
- Always calculate the yearly salary, then the weekly salary, and then the hourly salary.



Example: If Mary earns an annual salary of \$30,000 and is paid biweekly, how much is her paycheque? If Mary were paid semi-monthly, how much would her paycheque be before taxes?

Solution:

$$\$30,000 \div 26 = \$1,153.85$$

[Biweekly paycheques are issued 26 times a year, so divide Mary's salary by 26.]

$$\$30,000 \div 24 = \$1,250$$

[Semimonthly paycheques are issued 24 times a year, so divide Mary's salary by 24.]

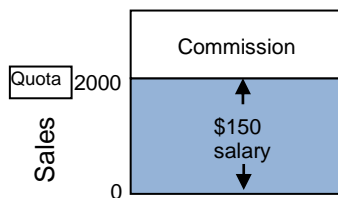
Answer: Mary is paid \$1,153.85 biweekly, or \$1,250 semimonthly.

*Hint, usually to convert from one type of pay period to another (e.g. find bi-weekly pay when given semi-monthly pay amount) – you must first convert to annual salary and then to the new pay period.

Commission

Many salespeople earn a commission based on a percent of their **net sales**, or actual sales.

Net sales are what remains after returns & allowances are deducted from gross sales. An employee whose entire salary is based on net sales works on *straight commission*. Those who receive a guaranteed income in addition to a commission on sales work on a *salary-plus-commission* basis. The **sales quota** is the amount an employee must sell *more than* in order to receive a commission. For any sales amount equal to or less than the quota, they receive the guaranteed salary. The diagram below is drawn to go with the example below.



$$\begin{aligned} \text{Commission} &= \text{rate of commission} \times (\text{sales} - \text{quota}) \\ &= 0.03 \times (6,000 - 2,000) \end{aligned}$$

Example: Ms. Jones receives \$150 weekly in salary. Her commission is 3% of net sales above quota. The sales quota is \$2,000. If her weekly net sales were \$6000, find her gross earnings.

Solution:

Step 1: Find the amount on which commission is paid.

$$= \$6,000 - \$2,000 = \$4,000$$

Step 2: Change the rate of 3% to a decimal. Multiply the rate times the base of \$4,000.

$$= 0.03 \times \$4,000 = \$120 \text{ (commission)}$$

Step 3: Add the commission and salary to find gross earnings.

$$= \$120 + \$150 = \$270 \text{ gross earnings}$$

Wages

Wages are paid on an hourly basis. When an employee works overtime, this means the employee works more hours than a regular work week and gets paid at a higher rate for those extra hours. If a question does not specify the overtime rate, assume it's time and a half.

Example: Lisa McMillan is paid \$7.25 per hour. The regular workweek is 40 hours. If Lisa worked 46 hours last week, what were her earnings?

Solution:

Step 1: Find the amount earned for 40 hours of work at the regular rate of pay.

$$= 40 \times \$7.25 = \$290$$

Step 2: Find the overtime earnings by multiplying the number of overtime hours by the regular rate by 1.5. Round to the nearest cent.

$$= 6 \times \$7.25 \times 1.5 = \$65.25$$

Step 3: Add the two amounts from step 1 and 2 to find Lisa's total gross earnings.



$$= \$290 + \$65.25 = \$355.25 \text{ gross earnings}$$

Practice Problems

1. T. Baldacci earns an annual salary of \$20,493.20 paid biweekly. The regular workweek is 35 hours. (a) What is the regular salary per pay period? (b) What is the hourly rate of pay? (c) What is the gross pay for a pay period in which the employee worked 12 hours overtime at time-and-a-half of regular pay?
2. Darnell receives a semi-monthly salary of \$1,017.25 and works a regular work week of 30 hours. (a) What is Darnell's hourly rate of pay? (b) If Darnell's gross earnings in one pay period were \$1,317.73 for how many hours of overtime was he paid at 1.2 times regular pay?
3. Ms. Ferris receives \$175 weekly salary and 4% of all sales over \$3,800. If she sold \$6,000 worth of merchandise, find her gross earnings.
4. During March, Aidan earned a commission of \$1,884.04 on gross sales of \$21,440. If returns and allowances were 5% of gross sales, what is his rate of commission based on net sales?
5. Jean Grey is paid a commission of 7.3% on net sales and is authorized to draw up to \$700 a month. What is the amount due to Jean at the end of a month in which she drew \$640, had gross sales of \$15,770, and sales returns of \$140?
6. Marco Polo has a guaranteed weekly salary of \$536 plus a commission of 8½% on sales over \$4,200. (a) What are his gross earnings for the week if sales are \$3,975? (b) What are his gross earnings for the week if his sales are \$5180?
7. Vivianne Wells had gross earnings of \$801.40 for the week. If she receives a base salary of \$475 on a quota of \$4,500 and a commission of 6.8% on sales exceeding the quota, what were Vivianne's sales for the week?

Solutions

1. (a) Paycheque = $\$20,493.20 \div 26 = \788.20 (b) Hourly pay = $\$20,493.20 \div 52 \text{ weeks/yr} \div 35 \text{ hrs/week} = \11.26 (c) Overtime pay = $\$11.26/\text{hr} \times 1.5 \times 12\text{hrs} = \202.68
Gross pay = $\$788.20 + \$202.68 = \$990.88$
2. (a) Annual salary = $\$1017.25 \times 24 = \$24,414$; Hourly pay = $\$24,414/\text{yr} \times 1\text{yr}/52\text{weeks} \times 1\text{week}/30\text{hours} = \$15.65/\text{hr}$
(b) $\$1317.73 - \$1017.25 = \$300.48$ (of overtime pay)
 $\$300.48/(\$18.78/\text{hr}) = 16$ hours overtime
3. $\$6,000 - \$3,800 = \$2,200$ (amount on which commission is paid)
Gross earnings = $\$175 + (\$2,200 \times 0.04) = \$263$
4. Gross sales = \$21,440; Less: returns = 5% of \$21,440 = \$1,072
Net sales = \$20,368.00
Rate of commission = $\$1,884.04 \div \$20,368 = 9.25\%$
5. Net Sales = $\$15,770 - \$140 = \$15,630$
Commission = $\$15,630 \times 0.073 = \$1,140.99$
Amount due = $\$1,140.99 - \$640 = \$500.99$
6. (a) \$536 (b) $\$5,180 - \$4,200 = \$980$ (amount on which commission would be earned)



$$\text{Commission} = \$980 \times 0.085 = \$83.30$$

$$\text{Gross pay} = \$535 + \$83.30 = \$619.30$$

7. Gross earnings – base salary = Commission paid

$$\$810.40 - \$475 = \$326.40$$

$$\$326.40 / 0.068 = \$4,800 \text{ (amount of sales on which commission was paid)}$$

$$\text{Total sales} = \$4,800 + \$4,500 = \$9,300$$

TAXES

Goods and Services Tax (GST)

The Goods and Services tax (GST) is 5% in all provinces. GST is collected by businesses on behalf of the government. At the end of the tax season, a business finds the difference between how much GST they paid during their operation as a business (purchasing supplies, etc.) and how much they collected as part of their revenue. If they collected more than they paid, they owe the government money. If they collected less than they paid, the government owes them a refund.

Provincial sales tax (PST) - Depending on your textbook edition, these will be different.

As of November 1, 2020, the numbers shown in parentheses are the current rates:

- In British Columbia (7%), Saskatchewan (6%), Manitoba (7%) and Quebec (9.975%) the GST and the PST are calculated separately, and then added to the price.
- In New Brunswick (15%), Nova Scotia (15%) and Newfoundland (15%), Ontario (13%) and PEI (15%), the Harmonized Sales Tax is used (HST) which is a combined GST and the PST into a single tax.
- In Alberta there is no PST, only GST.

Example: (a) Determine the amount of provincial sales tax (PST) on an invoice of items totalling \$560 in Manitoba and (b) the total of the items including tax. The PST rate in Manitoba is 7%.

Solution: (a) In Manitoba, the PST = 7% of \$560 = $0.07 \times 560 = \$39.20$.

$$(b) \$560 + 0.05(560) + 0.07(560) = \$560 + \$28 + \$39.20 = \$627.20$$

Property Tax

In order for cities to pay for their expenses (utilities, etc.), they must generate revenue to cover those costs. One way to generate revenue is through property taxes. **Property tax** is a municipal tax charged on the **assessed value** of commercial and residential real estate. Note that the assessed value is not always the same as market value; generally it is lower than the market value. **Mill Rate** is a special way of expressing property tax: it is the amount of tax per \$1,000 of assessed value of property.

$$\text{Mill rate} = (\text{Revenue Required} / \text{Assessed Value}) \times 1000$$

$$\text{Property tax} = \text{Mill rate} \times (0.001 \times \text{Assessed Value})$$

Example: The town of Vallejo assesses property at market value. How much will the owner of a house valued at \$225,000 owe in taxes if this year's mill rate has been set at 19.368?

Solution: Using the formula,

$$\text{Property Tax} = 19.368 \times (0.001 \times 225,000) = \$4357.80$$



Practice Problems

1. A local tire repair company in Alberta collected \$27,500 in revenue last year, not including GST. During the year, the company spent \$10,780 on parts and supplies, not including GST. Does the tire repair company owe Canada Revenue GST or will it receive a refund? What is the amount owed/refunded?
2. A store located in Victoria, B.C., sells a computer for \$2,625.00 plus GST and PST. What is the price paid by the consumer?
3. An Ontario bicycle shop is advertising a “save the GST” sale. How much would you save when buying a bicycle with a list price of \$1250 during this promotion?
4. Benjamin Button pays a property tax of \$2,502.50. In his community the mill rate is 55. What is the assessed value of Benjamin’s property, to the nearest dollar?
5. A town has a total residential property assessment of \$975,500,000. It is originally estimated that \$45,567,000 must be raised through residential taxation to meet town expenses.
 - (a) What mill rate (to 2 decimals) must be set to raise \$45,567,000 in property taxes?
 - (b) What is the property tax on a property assessed at \$35,000?
 - (c) If the mill rate increases to 48.76, how much more will the property taxes be on a property assessed at \$35,000?

Solutions

1. Amount of GST collected: $\$27,500(0.05) = \$1,375$
Amount of GST paid: $\$10,780(0.05) = \539
Since the company collected more GST than it paid, it owes Canada Revenue money.
Amount of GST owed to Canada Revenue = $\$1,375 - 539 = \836
2. Amount paid in Victoria, B.C. = Retail Price + 5% GST + 7% PST
 $= \$2,625.00 + 0.05(2,625.00) + 0.07(2,625.00) = 2,625.00 + 131.25 + 183.75 = \$2,940.00$
3. price with GST and PST = $\$1250 + \$1250(0.05) + \$1250(0.08) = \1412.50
price with PST only = $\$1250(1 + 0.08) = \1350
savings: $\$1412.50 - \$1350 = \$62.50$
4. Assessed Value = Property tax \div (Mill rate \times 0.001) = $\$2502.50 \div (55 \times 0.001)$
Assessed Value = \$45,500.
5. a. Mill Rate = $(\$45,567,000 \div \$975,500,000) \times 1000 = 46.71143004 = 46.71$
b. Property Tax = $46.71 \times (0.001 \times 35,000) = \1634.85
c. Change in mill rate = $48.76 - 46.71 = 2.05$
Additional property tax = $2.05 \times (0.001 \times 35,000) = \71.75

