

MA108: Information Packet

Area:

Square $A = s^2$

Rectangle $A = lw$

Parallelogram $A = bh$

Triangle $A = \frac{1}{2}bh$

Trapezoid $A = \frac{1}{2}h(a + b)$

Circle $A = \pi r^2$

Volume:

Rectangular Solid $V = lwh$

Cube $V = s^3$

Pyramid $V = \frac{1}{3}Bh$ (where B is the area of the base)

Right Circular Cylinder $V = \pi r^2 h$

Cone $V = \frac{1}{3}\pi r^2 h$

Sphere $V = \frac{4}{3}\pi r^3$

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Logic

Precedence of Logic Operations

Operator	Precedence
\sim	1
\wedge	2
\vee	3
\rightarrow	4
\leftrightarrow	5

Negation Operation

p	$\sim p$
T	F
F	T

Conjunction (and) Operation

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

Disjunction (or) Operation

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

Conditional (if, then) Statement

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

Biconditional (if and only if) Statement

p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

De Morgan's Laws

$$\sim(p \wedge q) \equiv \sim p \vee \sim q$$

$$\sim(p \vee q) \equiv \sim p \wedge \sim q$$

Variations of Conditional Statement

Conditional	$p \rightarrow q$	If p, then q
Converse	$q \rightarrow p$	If q, then p
Inverse	$\sim p \rightarrow \sim q$	If not p, then not q
Contrapositive	$\sim q \rightarrow \sim p$	If not q, then not p
Negation	$p \wedge \sim q$	p and not q

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Consumer Mathematics & Financial Management

Simple Interest

Chapter 8.2

Interest: $I = Prt$

Future Value: $A = P(1 + rt)$

Compound Interest

Chapter 8.3

Future Value (paid once a year):

$$A = P(1 + r)^t$$

Future Value (paid more than once a year):

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

Present Value:

$$P = \frac{A}{\left(1 + \frac{r}{n} \right)^{nt}}$$

Effective Annual Yield

Chapter 8.3

$$Y = \left(1 + \frac{r}{n} \right)^n - 1$$

Installment Buying

Chapter 8.4

Amount Financed: Cash Price – Down Payment
Total Installment Price: Total of All Monthly Payments + Down Payment
Finance Charge: Total Installment Price – Cash Price

Unearned Interest

Chapter 8.4

Actuarial Method:

$$u = \frac{kRV}{100 + V}$$

Where k is the remaining number of scheduled payments (excluding current payment), R is the regular monthly payment, and V is the finance charge per \$100.

Rule of 78:

$$u = \frac{k(k + 1)}{n(n + 1)} \times F$$

Where k is the remaining number of schedule payments (excluding current payment), n is the original number of payments, and F is the finance charge.

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Credit Card Interest

Chapter 8.4

Unpaid Balance Method

The principal is the unpaid balance on the first day of the billing period, deducting any payments.

1. You have a credit card that has a monthly interest rate of 2.75% and a payment plan that requires a minimum monthly payment of $\frac{1}{40}$ of the closing balance. The most recent statement shows a start date of April 1st with a balance of \$750. You sent in a payment of \$100 which the bank posted on April 13th. Suppose you charge some auto repairs for \$180 on April 15th. There is no other activity on the account.
 - a. What principle is used to determine the interest?
 $750 - 100 = 650$
 - b. Find the interest.
 $I = Pr = 650 \times 0.0275 = 17.88$ (in credit cards, $t = 1$ since the rate is monthly)
 - c. Determine the closing balance.
 $750 - 100 + 17.88 + 180 = 847.88$
 - d. Find the monthly payment due.
 $847.88 \div 40 = 21.20$

Previous Balance Method

The principal is the unpaid balance on the first day of the billing period.

2. You have a second credit card that has a monthly interest rate of 2.85% and a payment plan that requires a minimum monthly payment of $\frac{1}{48}$ of the closing balance. The most recent statement shows a start date of April 1st with a balance of \$450. You sent in a payment of \$50 which the bank posted on April 8th. Suppose you charge some new clothes costing \$120 on April 19th. There is no other activity on the account.
 - a. What balance is used to determine the interest?
450
 - b. Find the interest.
 $I = Pr = 450 \times 0.0285 = 12.83$
 - c. Determine the closing balance.
 $450 - 50 + 12.83 + 120 = 532.83$
 - d. Find the minimum monthly payment due.
 $532.83 \div 48 = 11.10$

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Average Daily Balance Method

The principle is determined by adding the unpaid balances for each day in the billing period and dividing by the number of days in the billing period.

3. You have a third credit card that has a monthly interest rate of 2.25% and a payment plan that requires a minimum monthly payment of 1/36 of the closing balance. The most recent statement shows a start date of April 1st with a balance of \$950. You sent in a payment of \$150 which the bank posted on April 10th. There is no other activity on the account.

- a. Find the average daily balance.

$$\frac{(950 \times 9) + (800 \times 21)}{30} = 845$$

- b. Find the interest.

$$I = Pr = 845 \times 0.0225 = 19.01$$

- c. Determine the closing balance.

$$950 - 150 + 19.01 = 819.01$$

- d. Find the minimum monthly payment due.

$$819.01 \div 36 = 22.75$$

Computing the Total Interest Over the Life of a Mortgage

Chapter 8.5

4. Joe is planning to purchase his first house. The agreed selling price is \$85,000. The bank's mortgage terms are: 10% down payment, 25 year fixed mortgage at 8.5%, with 2 points at closing.

- a. What is the down payment?

$$0.10 \times 85,000 = 8,500$$

- b. What is the amount financed?

$$85,000 - 8,500 = 76,500$$

- c. What is the cost of the points?

$$0.02 \times 76,500 = 1,530$$

- d. What is the factor from the mortgage table that is used?

$$8.05$$

- e. What is the monthly payment?

$$\frac{8.05 \times 76,500}{1,000} = 615.83$$

- f. How many payments are required over the total life of the loan?

$$25 \times 12 = 300$$

- g. What is the total of all the payments over the total life of the loan?

$$300 \times 615.83 = 184,749.00$$

- h. What is the total interest on this loan?

$$184,749 - 76,500 = 108,249$$

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Loan Amortization Schedule

Chapter 8.5

Annual % Rate: 7.0%

Amount of Mortgage: \$200,000

Monthly Payment: \$1,550.00

Number of Monthly Payments: 240

Term: Years 20, Months 0

Payment Number	Interest Payment	Principal Payment	Balance of Loan
1	\$1,166.67	\$383.33	\$199,616.67
2	\$1,164.43	\$385.57	\$199,231.10

Payment Number 1

Interest Payment

$$Prt = \$200,000 \times 0.07 \times \frac{1}{12} \approx \$1,166.67$$

Principal Payment (Monthly Payment – Interest Payment)

$$\$1,550.00 - \$1,166.67 = \$383.33$$

Balance of Loan (Principle Balance – Principal Payment)

$$\$200,000 - \$383.33 = \$199,616.67$$

Payment Number 2

Interest Payment

$$Prt = \$199,616.67 \times 0.07 \times \frac{1}{12} \approx \$1,164.43$$

Principal Payment (Monthly Payment – Interest Payment)

$$\$1,550.00 - \$1,164.43 = \$385.57$$

Balance of Loan (Principle Balance – Principal Payment)

$$\$199,616.67 - \$385.57 = \$199,231.10$$