

Math 112 Formula Sheet for Chapters 7 and 10

Simple Interest Formulas

- Simple Interest: $I = Prt$
- Future Value = Principle + Simple Interest: $A = P + Prt$
- Remember r must be a decimal in these formulas.

Compound Interest Formulas

- Compound Interest (No installment payments): $A = P \left(1 + \frac{r}{n}\right)^{nt}$
- Interest = Future Value - Principle: $I = A - P$
- Effective Rate: $E = \left(1 + \frac{r}{n}\right)^n - 1$
- Remember r must be a decimal and n depends on how many times per year the interest is compounded. (annually $n = 1$, semiannually $n = 2$, quarterly $n = 4$, monthly $n = 12$, daily $n = 365$)

Annuity Hints and Definitions

- Annuities occur when you make regular fixed payments into a compound interest account. Use the TVM solver on your calculator.
- If you are **saving up** to meet a goal then $PV=0$ and $FV=\text{goal amount}$.
- If you are **paying off** a loan (mortgage, credit card, large purchase) then $PV=\text{price}$ and $FV=0$.
- The **down payment** is the amount you pay at the time of purchase. You subtract this off before calculating the finance charge or payment. Make sure you change the rate to a decimal before multiplying.
- The **amount financed** is the price minus the down payment. This is your PV when you use your calculator's TVM solver.
- The **total cost** (also called the **total installment price**) is the sum of all payments plus the down payment. $(\text{pmt amt})(\# \text{ pmts}) + \text{down pmt}$
- The **finance charge** is the **amount of interest** charged on a loan. It is the total installment price minus the purchase price.

Probability Definitions, Hints, and Formulas

- Theoretical Probability $P(E) = \frac{n(E)}{n(S)}$
- $P(\text{at least one}) = 1 - P(\text{none})$
- **Fundamental Counting Principle:** The number of ways in which a series of successive things can occur is found by multiplying the number of ways in which each thing can occur. This is used with and without repetition.
- $n! = n \cdot (n - 1) \cdot (n - 2) \cdots 3 \cdot 2 \cdot 1$
- A **permutation** is an arrangement of items where no item is repeated and the order is important. The permutation of n total objects taken r at a time is: ${}_nP_r = \frac{n!}{(n - r)!}$
- Permutation of n total items where some $(r_1, r_2, r_3 \dots)$ are identical is: $\frac{n!}{r_1!r_2!r_3!\dots}$
- A **combination** is an arrangement of items where no item is repeated and the order is NOT important. The combination of n total objects taken r at a time is:
 ${}_nC_r = \frac{n!}{(n - r)! \cdot r!}$
- If the odds in favor of an event are $a : b$ then the odds against the same event are $b : a$.
- If the odds in favor of an event are $a : b$ then the probability in favor is $P(E) = \frac{a}{a + b}$.
- If the probability of an event is $P(E)$ then the odds in favor of E are $\frac{P(E)}{1 - P(E)}$.
- Two events are **mutually exclusive** if they cannot both occur at the same time.
- If events A and B are mutually exclusive then $P(A \text{ or } B) = P(A) + P(B)$.
- If A and B are not mutually exclusive then $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$.
- Two events A and B are **independent** if A occurring has no effect on the probability of B occurring. If A and B are independent events then $P(A \text{ and } B) = P(A) \cdot P(B)$.
- Two events A and B are **dependent** if the outcome of A has some effect on the probability of B occurring. If A and B are dependent events then $P(A \text{ and } B) = P(A) \cdot P(B \text{ given that } A \text{ already occurred})$.