

\$ 8000

bank
2 years $r = 9\%$ per yearQ.1 Interest ??
Q.2 future Value ??

- ✓ P : Principle or face Value or Present Value
- ✓ r : Annual interest rate $r \in [0, 1]$
- ✓ t : time in years

$$1 \text{ year} = 12 \text{ months} = 52 \text{ week}$$

$$t = \text{half-year} = 0.5 \text{ year}$$

$$= 4 \text{ months} = \frac{4}{12} = \frac{1}{3} \text{ year}$$

$$= 13 \text{ week} = \frac{13}{52} = \frac{1}{4} = 0.25 \text{ year}$$

Def : Simple interest I is defined by

$$I = Prt$$

Exp If \$ 8000 is invested for 2 years at annual interest rate 9 %

① How much interest will be received at the

$P = 8000$ ✓

① How much interest will be at the end of these 2 years?

$$P = 8000$$

$$r = \frac{9}{100}$$

$$t = 2 \text{ years}$$

$$I = Prt$$

$$= (8000) \left(\frac{9}{100} \right) (2)$$

$$= \$1440$$

② Find the future value for this investment

$$S = P + I$$

↑ ↓
principle simple interest

$$S = 8000 + 1440$$
$$= \$9440$$

Exp If \$4000 is borrowed for 39 weeks at annual rate 15%

① how much interest is due to the end of 39 weeks?

$$P = 4000$$

$$I = Prt$$

$$= 4000 \cdot \frac{15}{100} \cdot \frac{39}{52}$$

$$P = 4000$$

$$r = \frac{15}{100}$$

$$t = \frac{39}{52} \text{ years}$$

$$= 4000 \cdot \frac{15}{100} \cdot \frac{39}{52}$$

$$= \$450$$

② Find the future value of this loan

$$S = P + I$$

$$= 4000 + 450$$

$$= \$4450$$

Exp If \$2000 is borrowed for one-half year at simple interest of 12% per year, what is the future value of the loan at the end of the half-year?

$$P = 2000$$

$$r = \frac{12}{100}$$

$$t = 0.5 \text{ year}$$

$$S = P + I$$

$$= 2000 + Prt$$

$$= 2000 + (2000) \cdot \left(\frac{12}{100}\right) \cdot (0.5)$$

$$= 2000 + 120 \rightarrow \text{interest} = I$$

A Hare

- 2120 dollars

Exp An investor wants to have \$20,000 in 9 months. If the best interest rate is 6.05 % per year. How much must be invested now to yield the desired amount?

$$S = 20,000, \quad t = \frac{9}{12} \text{ year}, \quad r = \frac{6.05}{100}$$

P ??

$$S = P + I$$

$$S = P + Prt$$

$$20,000 = P + P \cdot \frac{6.05}{100} \cdot \frac{9}{12}$$

$$20,000 = \textcircled{P} + 0.0454 \textcircled{P}$$

$$= P(1 + 0.0454)$$

$$\frac{20,000}{1.0454} = \frac{1.0454}{1.0454} P$$

$$\boxed{\$ 19,131.4 = P} \rightarrow \text{Principle (Present Value)}$$

$$\boxed{\$ 19,131.4 = 1} \quad (\text{Present Value})$$

Exp If \$1000 is invested at 4% simple interest per year. How long will it take to grow this amount to become \$1100?

t ?? $S = 1100$, $P = 1000$, $r = \frac{4}{100}$

$$S = I + P$$

$$S = Prt + P$$

$$1100 = (\cancel{1000})\left(\frac{4}{\cancel{100}}\right)t + 1000$$

$$\begin{array}{r} 1100 = 40t + \cancel{1000} \\ -1000 \end{array}$$

$$\frac{100}{40} = \frac{40t}{40}$$

$$\boxed{\text{year } 2.5 = t}$$

Exp An investor wants to have \$1030 in 3 months. If \$1000 is invested now,

3 months. If \$1000 is invested now,
then what is the interest rate?

$$S = 1030, \quad P = 1000, \quad t = \frac{3}{12} = \frac{1}{4} \text{ year}$$

r ??

$$S = I + P$$

$$S = Prt + P$$

$$1030 = (\overset{250}{\cancel{1000}})(r)(\cancel{\frac{1}{4}}) + 1000$$

$$\begin{array}{r} 1030 = 250r + 1000 \\ -1000 \end{array}$$

$$\begin{array}{r} \cancel{30} = \cancel{250}r \\ \hline 250 \end{array}$$

$$r = \frac{3}{25} = 0.12$$

$$r = 12\%$$