

8.2 – Compound Interest – Future Value

Formulas:

$$A = P(1 + i)^n$$

Annotations for the formula:

- n : number of periods
- i : interest rate per period.
- P : Principal, beginning value
- A : Future Value, Final Amount

6% per annum,
compounded



Compounding Period	i (rate per period)	n (total periods)
Annual = 1	$i = \text{rate}/1$	$n = \text{years} * 1$
Semi-Annual = 2	$i = \text{rate}/2$	$n = \text{years} * 2$
Quarterly = 4	$i = \text{rate}/4$	$n = \text{years} * 4$
Monthly = 12	$i = \text{rate}/12$	$n = \text{years} * 12$
Weekly = 52	$i = \text{rate}/52$	$n = \text{years} * 52$
Daily = 365	$i = \text{rate}/365$	$N = \text{years} * 365$

} essential.

Example 1: P

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Mike invests \$6000 for 5 years at 8%/a compounded monthly. How much money will Mike have in 5 years and how much interest did he earn?

$$i = \frac{0.08}{12} = 0.0066$$

$$n = 5 \times 12 = 60$$

$$A = P(1+i)^n$$

$$A = 6000(1.0066)^{60}$$

$$A = \underline{\$8903.62}$$

Interest
is \$2903.62

Example 2: P

Melanie invests \$12000 for 10 years at 4%/a compounded quarterly. How much money will she have in 10 years and how much interest did she earn?

$$i = \frac{0.04}{4} = 0.01$$

$$n = 10 \times 4 = 40$$

$$A = P(1+i)^n$$

$$A = 12000(1.01)^{40}$$

$$A = \$17,866.36$$

Interest.
is \$5,866.36

Example 3:

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Hannah wants to know how long it will take to double her money if she originally invests \$2500 at 5%/a compounded semi-annually.

$$i = \frac{0.05}{2} = 0.025$$

$$A = P(1+i)^n$$

$$\frac{5000}{2500} = \frac{2500(1.025)^n}{2500}$$

$$2 = 1.025^n$$

Guess and check

$$n=10, 1.025^{10} = 1.28$$

$$n=20, 1.025^{20} = 1.64$$

$$n=30, 1.025^{30} = 2.09$$

$$n=28, 1.025^{28} = 1.996 \approx 2$$

$\therefore n=28$, or 14 years.