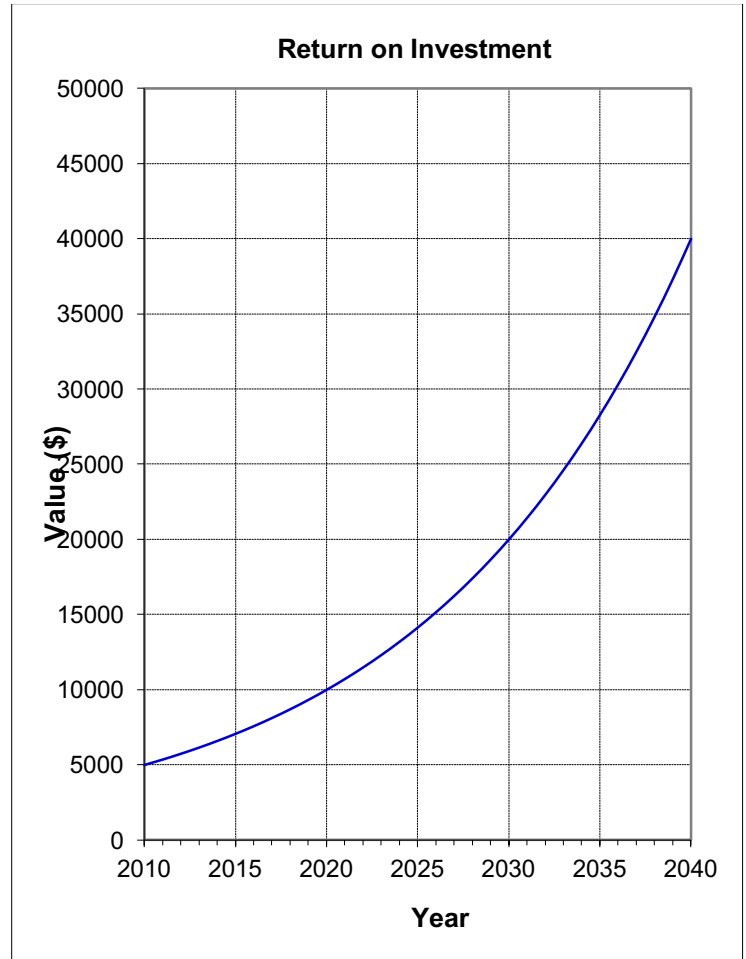# UNIT 5 Day 6:
Exponential Growth and Doubling Time

Doubling time refers to the amount of time for a quantity to double in value. For exponential relations, this doubling time is a constant value.

| Date	Principle ($)
2010	$5,000
2011	$5,359
2012	$5,743
2013	$6,156
2014	$6,598
2015	$7,071
2016	$7,579
2017	$8,123
2018	$8,706
2019	$9,330
2020	$10,000
2021	$10,718
2022	$11,487
2023	$12,311
2024	$13,195
2025	$14,142
2026	$15,157
2027	$16,245
2028	$17,411
2029	$18,661
2030	$20,000
2031	$21,435
2032	$22,974
2033	$24,623
2034	$26,390
2035	$28,284
2036	$30,314
2037	$32,490
2038	$34,822
2039	$37,321
2040	$40,000

Return on Investment

1. What is the doubling time for this investment?

2. What is the multiplying factor for this investment?

3. What is the annual rate of return (percentage)?

Exponential Decay and Half Life Time

Half Life time refers to the amount of time for a quantity to divide in half (multiply by 0.5).
For exponential relations, the half life is a constant value.

Time (hrs)	Caffeine (mg)
0	200.00
1	174.11
2	151.57
3	131.95
4	114.87
5	100.00
6	87.06
7	75.79
8	65.98
9	57.43
10	50.00
11	43.53
12	37.89
13	32.99
14	28.72
15	25.00
16	21.76
17	18.95
18	16.49
19	14.36
20	12.50
21	10.88
22	9.47
23	8.25
24	7.18
25	6.25
26	5.44
27	4.74
28	4.12
29	3.59
30	3.12

Amount of Caffeine Remaining in Bloodstream

Mass (mg) vs Time (hours)
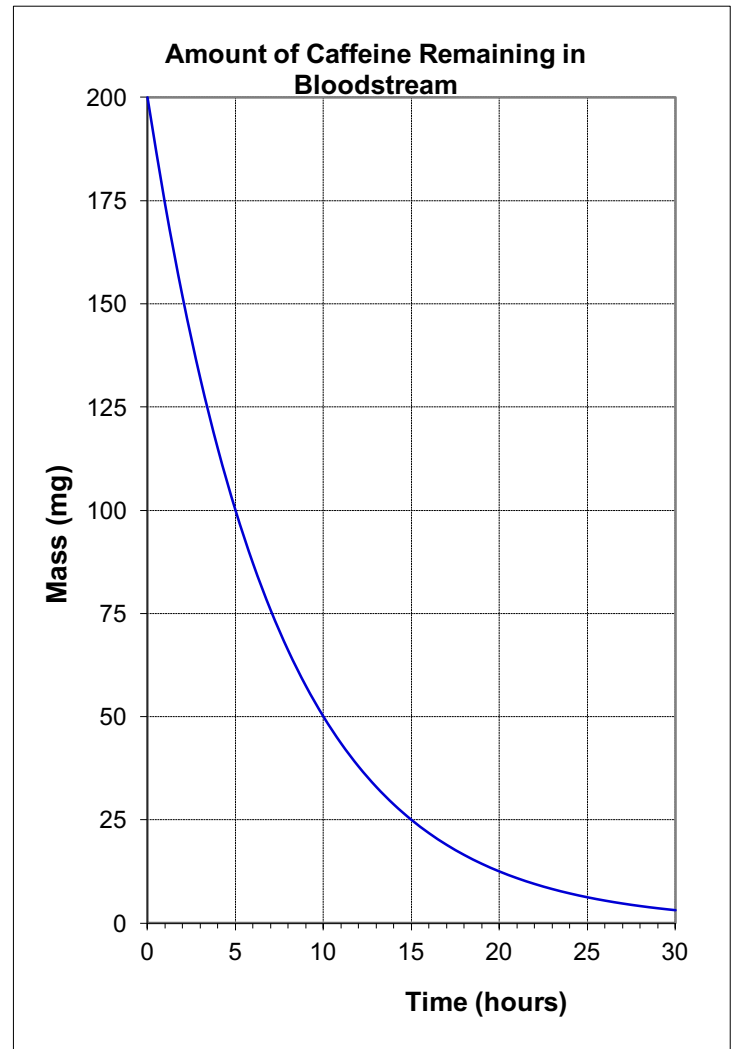
Note : 1 small cup of coffee contains approximately 100 mg of caffeine

1. What is the half life for caffeine in the bloodstream?

2. What is the decay factor for caffeine in the bloodstream?

3. What is the percent decrease per hour for caffeine?