Money, time, and interest

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Learning objectives

- Explain the meaning of interest rate
- Calculate basic interest amounts
- Describe the nature of compound interest
- Calculate interest over multiple compounding periods
- Describe how interest works for you (against you) in investments (loans)

Prerequisites

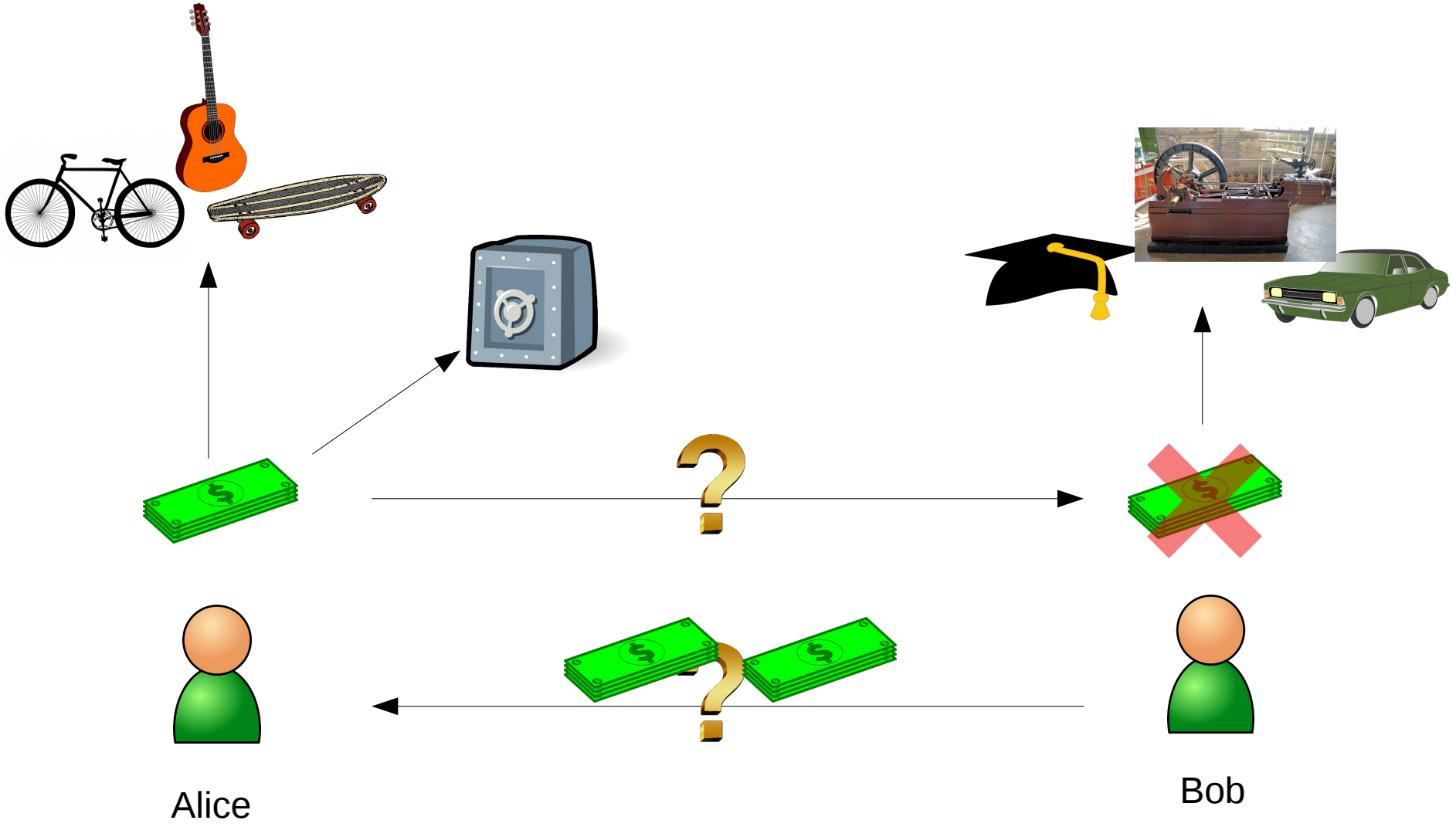
Percentages

Exponents

Basic algebra

For refresher:
https://www.khanacademy.org/math/algebra-basics

Time value of money



Rate of return

Arrangements:

- Debt – fixed amount promised back
- Equity (ownership stake) – fraction of future profits

Return: cost of using other people's money

Expressed as percentage of amount invested

Usually expressed as annualized percentage

Interest rate calculation

Invest $100, at 5% annual rate

At the end of the year, you have:

100 + 5% of 100 = 100 + 0.05*100 = 105

100 + 0.05*100 = 100 * (1 + 0.05) = 105

$$P * (1 + r) = F$$

Rates over time

Time	Amount
0	100
1	100*1.05 = 105
2	105*1.05 = 110.25
	= 100*1.05 + 5*1.05
	= (100*1.05)*1.05 = 100*1.05^2 = 110.25
3	110.25*1.05 = 100*1.05^3 = 115.7625

$$P * (1 + r)^t = F$$

Quiz 1

How much money do you have if you start with 100, get 5% rate of return, and wait for 5 years?

100 * 1.05^5 = 127.628

Testing it out

Additional reading

A History of Interest Rates

by Sidney Homer and Richard Sylla

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