

A Penny Saved

A. Use the Rule of 72 to find how long it will take an investment to double.

Interest Rate	Number of Years to Double
5%	1. 14.4 14 years 4.8 months
6%	2. 12
7%	3. 10.29 10 years 3 1/2 months
8%	4. 9
9%	5. 8

B. The formula for calculating compound interest is: $P(1 + i)^n$ where P is the **Principal** or amount invested, and i is the nominal interest rate, and n is the **number of years**. Let's use this formula to explore the effects of compounding on principal, P, at various interest rates, i, for various principal investments.

Principal	Interest Rate	Number of Years	Prinicpal at Maturity
\$ 500	4%	10	6. \$ 740.12
\$ 500	8%	20	7. \$ 2,330.48
\$ 500	10%	30	8. \$ 8,724.70
\$1,000	4%	10	9. \$ 1,480.24
\$1,000	8%	20	10. \$ 4,660.96
\$1,000	10%	30	11. \$17,449.40

C. Banks are required to keep a fraction of each deposit as required reserves. Assume that the required reserve ratio and amount of deposit are given. Calculate the required reserves.

Deposit	Fractional Reserve Ratio	Required Reserves
\$ 100	20%	12. \$ 20
\$ 100	25%	13. \$ 25
\$ 500	10%	14. \$ 50
\$ 500	20%	15. \$100
\$1,000	15%	16. \$150

D. The FDIC ensures a deposit. Some banks can make sub-prime loans to applicants who are not credit-worthy. This is called a *moral hazard*. Look up the term “moral Hazard” on AMOSweb.com and write the definition.

17. Why would a bank make a sub-prime loan?

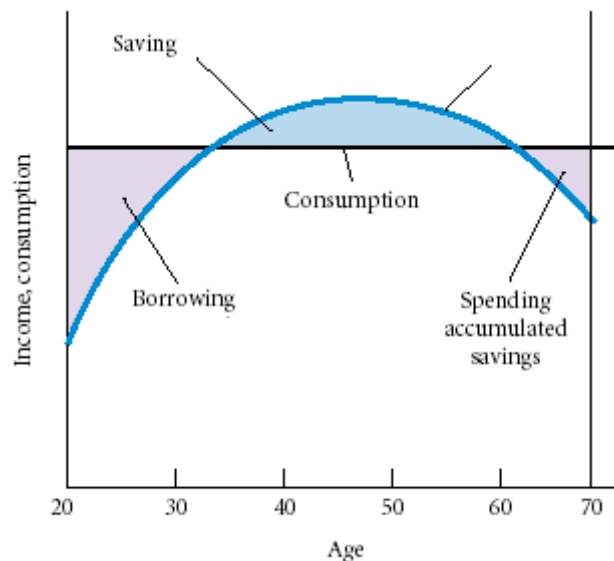
If the bank can make a loan that is guaranteed by the federal government and banks earn money by making loans that pay interest, then there's an incentive to make bad loans.

E. The length of an investment is affected by the risk, the **18. Liquidity**, and the time of the loan. (Hint: what is the term that describes how easily an investment can be converted into cash?)

F. **19. What are some reasons given in the comic book why people save?**

College, emergencies, major purchase, vacations, mortgages for a home, necessities, diamond ring, etc.

G. Nobel Prize Laureate, Franco Modigliani¹, developed a theory of life cycle saving in 1950. This theory is graphically displayed below. Find the section in the comic book where lifecycle savings is discussed. On the graph, indicate in some way where each stage of the life-cycle would lie. **(Students need to show where different age groups spend and save during their lives.)**



H. Assume that investors and savers only care about the real rate of return and make decisions by taking inflation into account. The real interest rate is calculated by subtracting the expected rate of inflation from the nominal interest rate. That is, suppose that the nominal rate is 10% and the expected rate of inflation is 3%. The real rate of interest, r , would equal 7%. Complete the table below.

¹ <http://piketty.pse.ens.fr/fichiers/enseig/ecoineg/articl/Modigliani1988.pdf>
http://en.wikipedia.org/wiki/Franco_Modigliani

Real Interest Rate, r	Nominal Interest Rate, i	Expected Rate of Inflation, π^e
20. 2%	10%	8%
21. 1%	5%	4%
12%	22. 17%	5%
6%	8%	23. 2%

I. Income that is not spent is savings. On page 6 of A Penny Saved, the example of saving was \$300. This savings was equal to income of \$2,000 – spending of \$1,700.

24. Using this information, how much is savings when income is equal \$5,420 and spending is equal to \$3,330? \$2,030

J. When we save, we forgo the opportunity to spend now.

25. If I could spend \$300 now but choose to save the money and receive \$330 a year from now, what interest rate did I receive? $10\% = (\$330 - \$300)/\$300$

K. There are many types of depository institutions. Page 7 lists several.

26. What are some of the “Banks” that are listed? Credit Unions, Savings Banks, etc.

L. On page 15, A Penny Saved, the stock market is an institution in which consumers could invest their income. There are two ways that a stock has a return on investment. The stock can appreciate, that is grow to a higher price than what was paid for it. The stock can return earnings in the form of dividends. Suppose Juan buys 10 shares of a stock for \$120 per share. Later, Juan sells the stock for \$125 per share.

27. How much did the stock appreciate per share? \$5

28. What was the total appreciation? \$50

29. What return in percent did Juan earn? 4.167%

M. Suppose that the stock Juan bought in question 12 returns dividends of 50 cents per share.

30. What is Juan's yield per share? .4%

N. A mutual fund pools the money from many investors to invest in a wide variety of assets.

31. What is the main advantage of a mutual fund? Diversification

O. Both real estate and art were given as areas that you could invest your savings and earn a high rate of return. Suppose Juan buys a rare Oscar Grossheim photo for \$30 and sells it for \$3,000 two years later.

32. What was Juan's return on investment? 99%

P. [The Paradox of Thrift](#), by Paul Solman is a PBS documentary. Download and watch his video.

33. Explain, in a paragraph or less the Paradox of Thrift.

The Paradox of Thrift is the contradiction between savings as a vehicle for growth and the idea that excessive savings strangles growth. So if I save, that's good for the economy, but if everyone saves it's bad. The author believes that financial and legal institutions have to be working properly for savings to translate into growth and these institutions are corrupt or absent in developing countries.

Q. The table below shows how \$100.00 invested at 5% interest grows at various time periods.

34. How much would \$100 grow to over 15 years? \$207.89

Year	Amount
1	\$ 105
2	\$ 110.25
3	\$ 115.76
4	\$ 121.55
5	\$ 127.63
10	\$ 162.89
15	\$ 207.89
20	\$ 265.33
50	\$ 1,146.70
100	\$13,150.00