

Part I. Numbers

1. What is 1200 plus 45? How do you write it out in words?

1245 twelve hundred and forty five

2. Which is bigger, 100 or 88?

3. What is $\frac{3}{4}$ of 4? 3

4. Which is bigger, 0.8 or 0.123456789?

5. Which is bigger, $\frac{1}{2}$ or $\frac{3}{8}$?

6. What is $\frac{17}{47}$ of 47? 17

7. Which is bigger $\frac{1}{2}$ or 65%?

8. What is 34% of \$100? \$34

9. What is 34% of 100%? 34%

10. What is 34% of \$50? \$17

11. What is 34% of 50%? 17%

12. What is 34% of 50% of \$100? \$17

Does it matter if you do 50% of \$100 first versus 34% of 50% first? No
\$100 is \$17 17% of \$100 = \$17

Part II. Simple interest

1. A friend pawns their iPod for \$30 plus 2% interest and a \$5 processing fee, due in one month. If the full loan is not repaid in one month, it can be renewed for another month by paying the interest and the processing fee. If even that is not paid, then the loan goes into default, and a second month of interest is charged (another 2%). If the full amount is not paid in under 30 days, the pawn shop forgives all of the money, but keeps the iPod. (used price is \$80, so pawn shop offers a \$30 loan)

(a) How much would your friend owe at the end of one month?

$$\$30 + 2\% + \$5 = 30 + 0.60 + 5 = \$35.60$$

(b) If he only paid the interest and fee, how much would he owe at the end of the next month?

$$\$30 + 2\% = \$30.60$$

or $\$30 + \$5 + 2\% = \$35.60$

(c) If he paid nothing, how much would he owe in order to get his iPod back?

$$\$30 + 2\% + 2\% + \$5 = \$36.20$$

(d) If he paid nothing, how much would he pay for his iPod in four months?

\$80, has to buy it back

2. A friend loans their Uncle Sam a \$1000, but expects 5% simple interest per year. Your friend and his uncle go way back, so he figures Sam should pay him back in 10 years, the original amount plus all the interest.

(a) How much should Sam pay your friend back?

$$\$1000 + 5\% + 5\% + \dots + 5\% = \$1000 + 50\% = \$1500$$

(b) His uncle has a strange sense of humor, and lets your friend know about the 18% tax on the interest that Sam gets to keep. How much will Sam end up paying to your friend after tax?

$$\$1000 + (82\% \text{ of } \$500) = \$1000 + \$410 = \$1410$$

Part III. Compound Interest

1. Harley, Marley, and Charlie do contract construction, destruction, and short-term loans.

(a) Harley loans you \$100 at 5% per week interest, for one week. How much do you owe at the end of the week?

$$\$100 + 5\% = \$105$$

$$(\$100)(105\%) = \$105$$

(b) You don't have any money at the end of that week either, so you borrow the whole amount from part (a) from Marley at 5% per week interest, for one week. You use it to pay off Harley, so you're square, but how much will you owe Marley at the end of the week?

$$\$105 + 5\% = \$110.25$$

$$(\$100)(105\%)^2 = \$110.25$$

(c) You still don't have any money at the end of that week either, so you borrow the whole amount from part (b) from Charlie at 5% per week, for one week. You use it to pay off Marley, so you are square with Harley and Marley, but how much will you owe Charlie at the end of the week?

$$\$110.25 + 5\% = \$115.76$$

$$(\$100)(105\%)^3 = \$115.76$$

(d) Suppose you use the three brothers for another three weeks. How much will you owe Charlie at the end of the three weeks?

$$(\$100)(105\%)^6 = \$134.01$$

(e) Suppose you use the three brothers for an entire year. How much do you owe after 52 weeks?

$$(\$100)(105\%)^{52} = \$1,264.28$$

Part IV. Amortized Loans

1. Suppose you desperately need to borrow \$50.00, and your good friend Lenny the Shark (a.k.a. Lenny the Lemora) offers to loan it to you for a mere 5% interest per week. It seems a little high, but you decide that you are going to pay him back \$10 each week, so it should only take like five weeks or something, so no big deal.

(a) After one week, you owe \$50.00 plus 5% interest. That is:

\$52.50

(b) But you pay him back \$10, so you only owe him:

\$42.50

(c) The next week, you only had the amount from part (b) past due, so you owe him that plus 5% interest. That is:

\$44.63

(d) But you pay him back \$10, so you only owe him:

\$34.63

(e) How much do you owe him after you've paid him \$50?

\$8.55

$$\begin{array}{r} 63.81 \\ - 55.26 \\ \hline 8.55 \end{array}$$

Payments are worth $\left\{ \begin{array}{l} R=10, I=5\%, N=5 \\ A=10((1.05)^5-1)/0.05 = \$55.26 \end{array} \right.$

Debt is worth $\left\{ \begin{array}{l} P=50, I=5\%, N=5 \\ A=50(1.05)^5 = \$63.81 \end{array} \right.$

(f) How much do you need to pay each week to get it paid off in five weeks?

\$11.55

Payment Debt is worth $\left\{ \begin{array}{l} P=50, I=5\%, N=5 \\ A=50(1.05)^5 = \$63.81 \end{array} \right.$

Payments are worth $\left\{ \begin{array}{l} R=?, A=63.81, I=5\%, N=5 \\ 63.81 = R(1.05^5-1)/0.05 \end{array} \right.$

$$63.81 = 5.525631240 R$$

$$R = \$11.55$$