HOMEWORK... QUESTIONS???

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Simple Interest

$$I = \Pr t \qquad A = P + \Pr t$$
$$A = P + I \qquad A = P(1 + rt)$$

Compound Interest

$$A = P\left(1 + \frac{r}{n}\right)^{nt} \qquad I = A - P$$

Present Value

$$P = \frac{A}{\left(1 + \frac{r}{n}\right)^{nt}}$$

6. Louis, an art dealer, wants to borrow money at 5.6%, compounded monthly, to purchase a soapstone sculpture. He believes that he can sell the sculpture for a profit within a year. Louis wants to make a single payment of no more than $12 000.
   a) What is the most that Louis can borrow if he repays the loan at the end of a year?
   b) How much interest will he pay?

a) $P = \frac{A}{(1 + \frac{r}{n})^{nt}}$

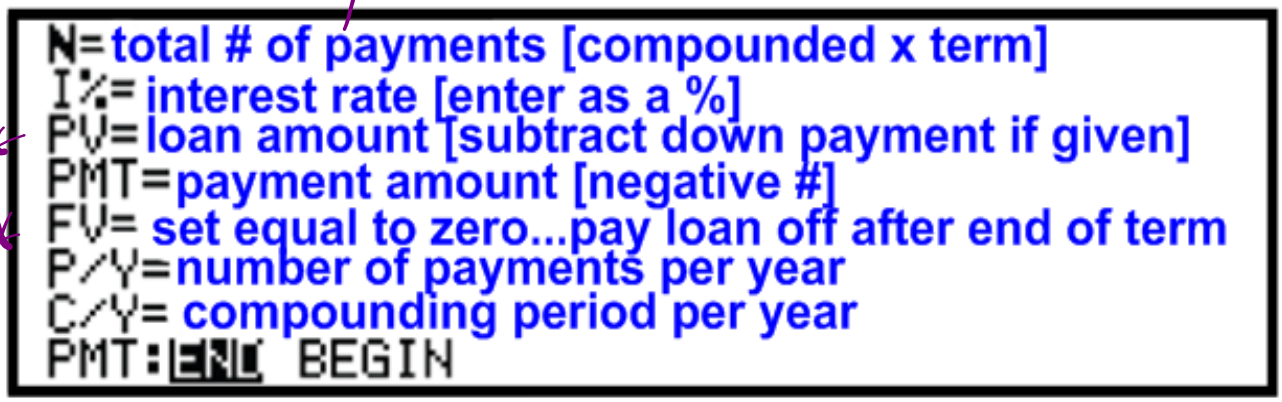
```
12000/(1+0.056/1
2)^12
        11347.94774
```

$P = \$11347.95$

b) $I =$

```
12000-11347.95
          652.05
```

Payments → APP



mortgage

A loan usually for the purchase of real estate, with the real estate purchased used as collateral to secure the loan.

own

collateral

An asset that is held as security against the repayment of a loan.

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EXAMPLE 4 Solving for the payment and interest of a loan with regular payments

Jose is negotiating with his bank for a **mortgage** on a house. He has been told that he needs to make a 10% down payment on the purchase price of $225 000. Then the bank will offer a mortgage loan for the balance at 3.75%, compounded semi-annually, with a term of 20 years and with monthly mortgage payments.

mortgag
A loan u
of real es
estate pu
collatera

a) How much will each payment be?
b) How much interest will Jose end up paying by the time he has paid off the loan, in 20 years?
c) How much will he pay altogether?

a) 10% of 225000
0.10 × 225000
22500 ← DOWN

a)
N=240
I%=3.75
PV=202500
PMT=-1197.5485...
FV=0
P/Y=12
C/Y=2
PMT:END BEGIN

Payment → $1197.55/month

b) PayOut → 1197.55 × 240
= 287412

c) Pay = 287412
+ 22500
$309 912

I = 287412 − 202500
I = $84912

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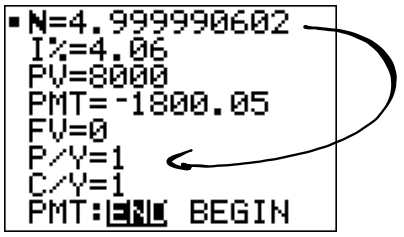
EXAMPLE 5 Relating payment and compounding frequency to interest charged

Bill has been offered the following two loan options for borrowing $8000. What advice would you give?

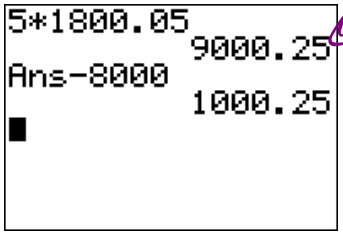
Option A: He can borrow at 4.06% interest, compounded annually, and pay off the loan in payments of $1800.05 at the end of each year.

Option B: He can borrow at 4.06% interest, compounded weekly, and pay off the loan in payments of $34.62 at the end of each week.

A



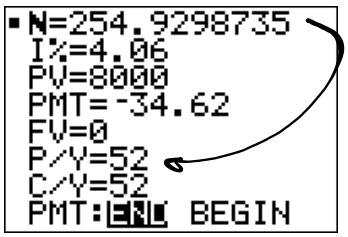
5 years



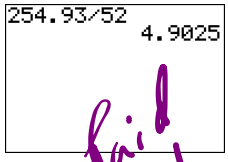
Paid out

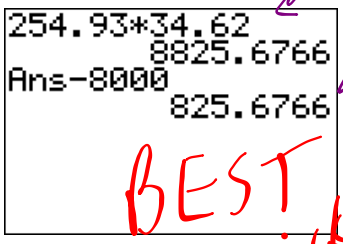
Interest

B



$t = 4.9$ yrs





Paid out

Interest

BEST

- quicker
- less interest

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In Summary

Key Ideas

- The large majority of commercial loans are compound interest loans, although simple interest loans are also available.
- The cost of a loan is the interest charged over the term of the loan.
- A loan can involve regular loan payments over the term of the loan or a single payment at the end of the term.
- The same formulas that are used for investment situations are also used for loans with a single payment at the end of the term:
  - For a loan that charges simple interest, $A = P + Prt$ or $A = P(1 + rt)$
  - For a loan that charges compound interest, $A = P(1 + i)^n$
- Technology can be used to determine unknown variables in compound interest loan situations for both single payment loans and regular payment loans.

Need to Know

- The interest that is charged on a loan will be less under any or all of these conditions:
  - The interest rate is decreased.
  - The interest compounding frequency is decreased.
  - Regular payments are made.
  - The regular payment amount is increased.
  - The payment frequency is increased.
  - The term is decreased.
- An amortization table is a payment schedule for a loan with regular payments. It shows what happens in each payment period. It shows the amount of each payment, the interest and the principal portion of each payment, and the balance of the loan. An amortization table can be created with spreadsheet software.

Payment Period	Payment ($)	Interest Paid ($)	Principal Paid ($)	Balance ($)
0				
1				
2				

- With each payment period, the interest paid decreases while the principal paid increases. This occurs because each payment decreases the balance of the loan, so the interest on the remainder of the balance will be less on the next payment. Also, because the payment amount stays the same, more of the payment goes toward paying off the principal, since less is being paid toward the interest.
- Technology can be used to investigate and analyze "what if" situations that involve borrowing money.

HOMEWORK...

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