

## A Whopper of an APR

## MyPayDayLoan.com

Home |Adply | Payments | Renew |Requirements $\operatorname{FAQ} \mid$ APR Disclosure | Privacy |Loan Increase | Mission

| LOAN AMOUNT <br> (Amount <br> Financed) | LOAN TERM: 1 <br> PAYMENT (\# <br> of Days) | LOAN FEE <br> (Finance <br> Charge) | CHECK AMOUNT <br> (Total of <br> Payments) | APR |
| ---: | ---: | ---: | ---: | ---: |
| $\$ 100.00$ | 18 | $\$ 25.00$ | $\$ 125.00$ | $506.94 \%$ |
| $\$ 100.00$ | 14 | $\$ 25.00$ | $\$ 125.00$ | $651.79 \%$ |
| $\$ 100.00$ | 7 | $\$ 25.00$ | $\$ 125.00$ | $1303.57 \%$ |

## Defining the APR

- For a single payment: $\quad R=\frac{I}{P T}$
- I = total finance charges (interest plus fees)
- $\mathrm{P}=$ actual proceeds (available to borrower)
- T = true time (based on 365 -day year)

| Defining the APR |
| :---: |
| - For a single payment: $\quad R=\frac{I}{P T}$ |
| - I = total finance charges (interest plus fees) |
| - $\mathrm{P}=$ actual proceeds (available to borrower) |
| - $\mathrm{T}=$ true time (based on 365-day year) |

## Payday Loan

MyPayDayLoan.com

You Can Qualify for Colorado Payday Loans Via Our Simple Online Application Process Let the prominent payday loan and cash advance provider in Colorado remove you from your financial debt! You can trust Mypaydayloan.com to offer you easy payday loans and cash advances especially when you are runnin out of alternatives. Our experts are alvays on call. Apply at any hour for swift pay day loans and cash advance an our team will ensure that your loan request is handled professionally.

## Basics of Loan Interest

- Simple Interest Formula: I = PRT
- Compounding is just simple interest where the principal includes previously earned interest
- Loans generally avoid compounding because payments are sufficient to cover previously earned interest
- Computational method affected by single or multiple payments, of equal or different amounts.


## Payday Loan

MyPayDayLoan.com


| LOAN AMOUNT <br> (Amount <br> Financed) | LOAN TERM: 1 <br> PAYMENT (\# <br> of Days) | LOAN FEE <br> (Finance <br> Charge) | CHECK AMOUNT <br> (Total of <br> Payments) | APR |
| ---: | ---: | ---: | ---: | ---: |
| $\$ 100.00$ | 18 | $\$ 25.00$ | $\$ 125.00$ | $506.94 \%$ |
| $\$ 100.00$ | 14 | $\$ 25.00$ | $\$ 125.00$ | $651.79 \%$ |
| $\$ 100.00$ | 7 | $\$ 25.00$ | $\$ 125.00$ | $1303.57 \%$ |

$$
R=\frac{I}{P T}=\frac{25}{100 \times \frac{14}{365}}=6.5179=651.79 \%
$$

## A Student's Experience (from fall 2005)

- In 1994, I received a car loan from [Lender A] as a first-time buyer. The interest rate was $12.5 \%$. Right now, I have an auto loan with [Lender B] and my interest rate is $23.45 \%$. I have used [Lender C] in Missouri to take out what they call "signature loans," which are, in essence, payday loans, and their yearly interest rate is $260 \%$. I have a Perkins loan for my college education ... and the interest rate on that is 5\%.
- [Lender C] charges so much because they can. People who are desperately in need of quick cash to pay an unexpected bill, or to make their rent or utilities, call upon the services of companies like these. To borrow \$100 for one month, you will have to pay back $\$ 130$. However, most people don't borrow such a small amount. For every $\$ 100$ that is borrowed, it is a $\$ 30$ monthly fee. You can choose to pay it off right away, but most people don't have an extra $\$ 130$ the next month, so they let the payment plan take its course. The plan is for one year. So, at the end of the year, you have paid back $\$ 360$, when you only borrowed $\$ 100$ to begin with. They don't do credit checks, so they are also taking a huge risk when loaning money.
- Back in $1994,12.5 \%$ was a decent rate for a car loan. These new $1.9 \%$ rates were unheard of. It was by no means a great rate, but average. I had no credit, which went against me, but I was a first time buyer with about $10 \%$ down, so that helped. Now, my credit sucks. I could not get financed for a newer used automobile with my credit. I finally found someone to finance me, but I had $24 \%$ to put as a down payment, and I had to accept the outrageous interest rate. My credit was the main reason for such a high rate. I am a risk to them, so in return for taking that risk, they charge an arm and a leg in interest. (Good news is I can refinance and get a lower interest rate after a year of steady payments.)
- I have found that once I borrow money to make the bills or to get caught up, I have to take another one out the following month to pay the payment on the first one. It goes on like this until I have borrowed my limit. Usually, I use tax refunds or lower interest student loans to pay them off eventually. I try not to let them extend through the entire year. It is a handy loan if you are desperate, but it becomes a hole you can't dig yourself out of. Government officials in Missouri are trying to regulate the amount of interest these payday loan places are allowed to charge, but this place calls its loans "signature loans," so even if that law passes, it will be exempt. My findings: Credit, government, loan type, income of applicant, and economy all play a role in the rate of interest that is paid on a loan.


## The Student's Experience

- \$100 borrowed

$$
R=\frac{I}{P T}=\frac{30}{100 \times \frac{1}{12}}
$$

$\begin{array}{ll}\text { - } \$ 30 \text { interest } & =3.6 \\ \text { - } 1 \text { month } & =360 \%\end{array}$

- $360 \%$, not $260 \%$

Convenience (Late) Fee


Public Water Supply District No. 2
of Jackson County, Missour
6945 Blue Ridge Blvd
6945 Blue Ridge Blvd
Raytown, MO $64133-5695$
Raytown,
Phone: $(816)$
Fax:
(816) 353-553
353
Fax: (816) $353-6000$
E-Mail: pwsd2@sbcglobal.net
Website: www.pwsd2.org

$$
\begin{array}{|ccc|}
\hline \text { TOTALAMOUNT DUE BY: } & 11 / 15 / 2010 & 107.87 \\
\hline \text { Amount Due After } & 11 / 15 / 2010 & 118.46 \\
\hline
\end{array}
$$

When is my Water bill due?
Your Water bill is due upon receipt. If is considered past due and a penalty is added on the date mentioned on your original bill. The past due date is usually the fifteenth of the month following the billing date. The past due penalty $10 \%$ of the balance of water charges. If unpoid a shut off notice will be sent approximately two weeks later.

## Effective Rate of a Late Fee

$\begin{array}{rlrl} & R=\frac{I}{P T} & =\frac{10.59}{107.87 \times \frac{2}{52}} \\ \text { - } \$ 107.87 \text { principal } \\ \text { - } \$ 118.46 \text { if late } & & =2.5525 \\ \text { - } 2 \text { weeks } & & =255.25 \%\end{array}$

$$
\begin{aligned}
R=\frac{I}{P T} & =\frac{10.59}{107.87 \times \frac{2}{52}} \\
& =2.5525 \\
& =255.25 \%
\end{aligned}
$$

- 


## Periodic Payments and the APR

$[\ldots[[P(1+i)+M](1+i)+M](1+i)+\ldots](1+i)+M=-A$

$$
P(1+i)^{N}+\sum_{k=0}^{M-1} M(1+i)^{k}=-A
$$

$$
-P(1+i)^{N}-\frac{M\left[1-(1+i)^{N}\right]}{1-(1+i)}=A
$$

$$
\left(P+\frac{M}{i}\right)\left[1-(1+i)^{N}\right]-P=A
$$

- $A=$ future value ( $\mathrm{A}<0$ for loan balance)
- $P=$ present value
- $M=$ periodic payment ( $M<0$ for loan)
- $\mathrm{i}=$ periodic interest rate (decimal form)
- $\mathrm{N}=$ number of periods


## Periodic Payments and the APR

- Or use a TVM application: (APPS, Finance, TVM Solver)
- $\mathrm{N}=$ number of periods
- $1 \%$ = interest rate $/$ year
- PV = original balance
- $\mathrm{PMT}=$ periodic payment

- $F V=$ future value (usually 0 for a loan)
- $P / Y=$ periods per year

Buy Here Pay Here


## Buy Here Pay Here

- $\mathrm{N}=234$
- $1 \%$ = ???
- PV = 12495 (12995 minus 500 down)
- $\mathrm{PMT}=-88.74$
- $\mathrm{FV}=0$
- $\mathrm{P} / \mathrm{Y}=52$
- Result .... $1 \%=24.80 \%$ (it doesn't check!)

Edmunds 2007 Kia Rondo Prices


## Buy Here Pay Here

- $N=234$
- $1 \%=$ ???
- PV = 9860 (10360 minus 500 down)
- $\mathrm{PMT}=-88.74$
- $\mathrm{FV}=0$
- $\mathrm{P} / \mathrm{Y}=52$
- Result .... $\mathrm{I} \%=35.46$ \%



## Rent-to-Own

- $\mathrm{N}=91$
- $1 \%=$ ???
- PV = 999.99
- $\mathrm{PMT}=-19.99$
- $\mathrm{FV}=0$
- $\mathrm{P} / \mathrm{Y}=52$
- Result .... $1 \%=76.37 \%$



## Rent-to-Own

- $\mathrm{N}=91$
- $1 \%=$ ???
- $\operatorname{PV}=719.99$ (not 999.99)
- $\mathrm{PMT}=-19.99$
- $\mathrm{FV}=0$
- $P / Y=52$
- Result .... I\% = 128.79 \%



## Trumpet: Last Payment?

- $\mathrm{N}=29$
- $\mathrm{I} \%=15$
- $P V=598.03$
- $\mathrm{PMT}=-25.00$
- $\mathrm{FV}=$ ? ??
- $\mathrm{P} / \mathrm{Y}=12$
- Result .... FV = \$ 9.99 (overpaid) so last payment is $25.00-9.99=\$ 15.01$


## Trumpet: Effective Rate?

- $N=29$
- $1 \%=$ ? ??
- $\mathrm{PV}=448.52$ (25\% off of 598.03)
- PMT = - 25.00
- $\mathrm{FV}=10.03$ (25.00-14.97 last payment)
- $\mathrm{P} / \mathrm{Y}=12$
- Result .... $\mathrm{I} \%=41.71 \%$


## Trumpet: How Long?

- $N=$ ???
- $1 \%=15$
- $P V=598.03$
- $\mathrm{PMT}=-25$
- $\mathrm{FV}=0$
- $\mathrm{P} / \mathrm{Y}=12$
- Result .... N = 28.60 periods

Trumpet: The Other Option
gives you three options during your rental period:

1. Rent to own:
2. $25 \%$ discount stated at the right until the instrument has been paid in full or options 2 or 3 are exercised.
Ninety days from the star of the rental, the customer
.ilay receive a $25 \%$ discount on the unpaid balance.
Once the account is paid, the instument is yours and options 1 \& 3 are void.
3. Return at any time:
ondition and may be returned at any time in good
condition and provided the paymients are current. In
the instrument is returned, all payments shall be
considered rent and no refund of money will be made.


## Cash vs. Credit

- Cash Price:
- $39615-13000=\$ 26615$
- Credit Price:
- Monthly payments of 39615 / $72=\$ 550.21$




## $\$ 13,000$ off OR 0\% APR

- $N=72$
- $1 \%=$ ???
- $\mathrm{PV}=26615$ (39615-13000 off)
- $P M T=-550.21$ (39615 / 72)
- $\mathrm{FV}=0$
- $\mathrm{P} / \mathrm{Y}=12$
- Result .... $1 \%=14.13 \%$



## Auto Leasing

- $N=42$
- $1 \%=$ ???
- $P V=18045$
- $\mathrm{PMT}=-199$
- $\mathrm{FV}=-11194$
- $\mathrm{P} / \mathrm{Y}=12$
- Result .... $\mathrm{I} \%=2.92$ \%
- ... usually, leases are done BEGIN mode

From Yahoo! Autos


## Auto Leasing

- $\mathrm{N}=42$
- $1 \%$ = ???
- $P V=16705$ (not 18045)
- $\mathrm{PMT}=-199$
- $\mathrm{FV}=-11194$
- $\mathrm{P} / \mathrm{Y}=12$
- Result .... $\mathrm{I} \%=5.77 \%$

Edmunds 2008 Mazda 3i Sport Price


2008 Mazda MAZDA3 Sedan

sed Twv from \$9,965 Ampast ramicm
 - isp plicerer spio (Opbiona) yem all features e seesi

## Auto Leasing

- $N=42$
- $1 \%$ = ???
- $P V=16705$ (not 18045)
- $\mathrm{PMT}=-199$
- $\mathrm{FV}=-9965$ (not 11194)
- $\mathrm{P} / \mathrm{Y}=12$
- Result .... $\mathrm{I} \%=3.43$ \%


First America Credit -- How Long?

- N = ???
- $1 \%=240$ ( $20 \%$ per month)
- $P V=550$ ( 500 plus $10 \%$ cash advance fee)
- $\mathrm{PMT}=-75.00$
- $\mathrm{FV}=0$
- $\mathrm{P} / \mathrm{Y}=26$
- Result .... $\mathrm{N}=12.80$ periods (about 6 months)

大 FirstAmericaCredit Your Credit, Your Money, When You Need It.

Great Rates No Hassles
Line Of Credit Government Platinum
Interest Rate $20.00 \%$ per month, on average daily balances
Cash Advance $10.00 \%$ of cash advance
Your personal line of credit is simple, yet flexible.
The interest rate is $20.00 \%$ per month. The one-time cash advance fee is $10.00 \%$ of cash advance for each cash advance. And, in less than 10 months, your balance will be There are no monthly fees, application fees, setup fees, or annual fees, If you qualify for a $\$ 1,000$ credit limit, but never get a cash advance, there are no charges. You only pay when you get cashl And, you have the option to pay early, and if you pay early, you will save by paying less interest!

How your payment schedule works:
Let's say your credit limit is $\$ 1,000$. You request a cash advance for $\$ 500$, then your payment is $\$ 75.00$ per pay period, based on a two week pay cycle.

## First America Credit - Last Payment?

- $\mathrm{N}=13$
- $\mathrm{I} \%=240$ ( $20 \%$ per month)
- PV = 550
- $\mathrm{PMT}=-75.00$
- $\mathrm{FV}=$ ???
- $P / Y=26$
- Result .... FV = 14.71
so last payment is $75.00-14.71=\$ 60.29$


## First America Credit - APR?

- $\mathrm{N}=13$
- $1 \%=$ ???
- $P V=500$ (without the cash advance fee)
- $\mathrm{PMT}=-75.00$
- $\mathrm{FV}=14.71$
- $P / Y=26$
- Result .... $1 \%=288.56 \%$

Student Loans


- Amount disbursed: $10200-$ fee $=10200-200=10000$
- Interest Payment Amount: I = PRT $=10200 \times 0.0575 \times 1 / 12=48.88$
- Interest paid during school: $48.88 \times 54=2639.52$
- Monthly payment: N 180, I\% 5.75, PV 10200, FV 0: PMT 84.71
- Final balance: N 180, I\% 5.75, PV 10200, PMT -84.71: FV 2.33
- Total paid: $180 \times 84.71-2.33+2639.52=17884.99$
- Finance charge $=17884.99-10200=7684.99$ (omits prepaid charge)


## Student Loan Effective Rate <br> (In-school Interest Paid)

- Equations: $y=\left[10000-\frac{48.88}{x / 12}\right]\left[1-\left(1+\frac{x}{12}\right)^{54}\right]-10000$

$$
0=\left[y-\frac{84.71}{x / 12}\right]\left[1-\left(1+\frac{x}{12}\right)^{180}\right]-y
$$

- or Internal Rate of Return:

$$
\operatorname{irr}(10000,\{-48.88,-84.71\},\{54,180\}) \times 12
$$

- $x=0.0597, y=10055.50$
- Result .... 5.97\%


## Student Loans

|  | Interat Paid During In Sctiool | Interest Deferred During In School |
| :---: | :---: | :---: |
| Principal Amomit | 510,20000 | 510,20000 |
| Ampuint Disbursed To Bocrower | S10,00000 | 510.000.00 |
| Interest Pauid During School | 52.63952 | 50 |
| luterest Pyyment Amit | 548.88 | so |
| Mourlly Payment | 18008884.71 | $180 @ 510665$ |
| Finame Claye | 57.684,99 | \$9,197.00 |
| Repeyment Temm (Mcouthe) | 180 | 180 |
| Onigimation Fee (Prepaid France Clame) | 520000 | 520000 |
| Interest Rate | $5.75 \%$ | $5.75{ }^{\circ} 9$ |
| Total Paid | 517.88499 | 519,19700 |

- Amount disbursed: $10200-$ fee $=10200-200=10000$
- Principal at start of repayment: $10200+2639.52=12839.52$
- Monthly payment: N 180, I\% 5.75, PV 12839.52, FV 0: PMT 106.62
- Final balance: N 180, I\% 5.75, PV 12839.52, PMT -106.65: FV 8.35
- Total paid: $180 \times 106.65=19197.00$ ( 8.35 credit ignored)
- Finance charge $=19197.00-10000=9197.00$ (includes prepaid charge)


## Student Loan <br> (In-school Interest Deferred)

- Equations: $y=\left[10000-\frac{0}{x / 12}\right]\left[1-\left(1+\frac{x}{12}\right)^{s+}\right]-10000$

$$
0=\left[y-\frac{106.65}{x / 12}\right]\left[1-\left(1+\frac{x}{12}\right)^{80}\right]-y
$$

- or Internal Rate of Return:

$$
\operatorname{irr}(10000,\{0,-106.65\},\{54,180\}) \times 12
$$

- $x=0.0568, y=12903.20$
- Result .... $5.68 \%$ (less than $5.75 \%$ quoted!)
- Deferred interest was simple interest!


## Thank You!

- For copies of the slides, see:
http://www.milefoot.com/about/presentations/APR.pdf
- Contact information:

Steven J. Wilson, Professor of Mathematics
College: Johnson County Community College
Email: swilson@jccc.edu
Phone: 913-469-8500, ext. 3784
Web: www.milefoot.com

