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Interest Activities

The Flash Interest project allows you to explore how interest behaves in situations involving both savings and loans.

Opportunity 1 looks at the power of compounding by investing a lump sum of money for a given number of years.

Opportunity 2 looks at saving money for college by setting aside a given amount of money each month.

Opportunity 3 looks at payment amounts of student loans.

Opportunity 1

The power of compounding. $A = P\left(1 + \frac{APR}{n}\right)^{(nY)}$ A= accumulated balance after Y years P = starting principal APR = annual percentage rate (expressed as a decimal) n = # of compounding periods per year (banks use 360) Y = # of years	(Solving for A to the nearest penny). If you put $2000 in a savings account with an average APR of 2.75% in 2000, would you have enough money after 9 years to pay for CU tuition in 2009 which is $6153? (Ans= No, you'd only have $2561.6) (Solving for APR—round to 1 decimal place) Determine what APR would be needed to save up $6153 if $1000 was invested in 1995 (14 years). (Answer = 13%) (Solving for P to the nearest penny) How much money would need to be set aside in 1990 to have enough for tuition to begin at CU 19 years later in 2009 ($6153)? (Ans = $3164.43)

How Opportunity 1 is Coded

- N is a static 360 for this formula
- In solving for APR, the formula becomes

$$\left(\left(\frac{A}{P}\right)^{(-nY)} - 1\right)n = APR$$

- In solving for P, the equation becomes

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

You can program the function along the following lines:

```
function CalcSavings(P:Number):Number {
        n=12;
        Y=5;
        APR=Number(interest.text);
        var A:Number= P*Math.pow(1+APR/n, n*Y);
        return (A);
}
```

Opportunity 2

It can be difficult to set aside one large lump sum of money for the future. What often happens is one sets aside a certain amount of money every week or month for a specific period of time. The total amount earned after a given number of years is given by the following formula.

$$A = PMT \times \frac{\left[\left(1 + \frac{APR}{n}\right)^{(nY)} - 1\right]}{\left(\frac{APR}{n}\right)}$$

A = accumulated savings plan balance
PMT = regular payment (deposit) amount
APR = Rate (expressed as a decimal)
n = # of payment periods per year
Y = # of years

(Solving for A)
Your parents set aside $50 per month for your college education fund when you are born. Assume you will start at CU Boulder in 2011 when you are 19 years old and that tuition will be $6656. Is there enough in your college fund to pay for your first year at CU if your parents are able to lock in an APR of 6%? (Ans = yes, there's $21,178.99 !)

What if the rate is only 3%? (Ans= yes, there's still $15,340).

(Solving for PMT)
If one enters CU in 2011 and graduates in 2015, the total amount of CU tuition will be approximately $28,800. How much money would your parents have needed to set aside for 19 years in order to pay for tuition for all four years if the rate was 4%? (Ans = $84.54)

(Solving for A)
Retirement! What if you set aside $50 per month for 35 years in an account that average 5%. What would your total amount be after 35 years? (Ans= $56,804.62)

(Solving for A)
What if you set aside $100 per month at 5%? (Ans $113,609.24) What about 7%? ($180,105.46)

How Opportunity 2 is Coded.

In solving for PMT, the equation is

$$A \times \frac{\left(\frac{APR}{n}\right)}{\left[\left(1 + \frac{APR}{n}\right)^{(nY)} - 1\right]} = PMT$$

```
function CalcSavings(PMT:Number):Number {
        n=12;
        Y=Number(years.text);
        APR=Number(interest.text)/100;
        var A:Number= PMT*((Math.pow(1+APR/n,n*Y)-1)/(APR/n));
        return (A);
}
```

Opportunity 3

Determine the monthly payment for given loan scenario, the amount of interest paid, and the total amount paid back. Sometimes, even when money is set aside for college, student loans will need to be taken out. The monthly payment for any type of loan (mortgage, car, college, etc), can be calculated using the Loan Payment Formula $$PMT = \frac{P \times \left(\frac{APR}{n}\right)}{\left[1 - \left(1 + \frac{APR}{n}\right)^{(-nY)}\right]}$$ PMT = regular payment amount P = starting loan principal (amt borrowed) APR = Rate (expressed as a decimal) n = # of payment periods per year Y = # of years	As mentioned in Level 2, if one enters CU in 2011 and graduates in 2015, the total amount of CU tuition will be approximately $28,800. If you need to take out $14,400 in student loans, what is the monthly payment if you repay the loan in 10 years and the interest rate is 6%? What is the total amount to be paid back and how much has been paid in interest? (Ans: monthly payment= $159.87, total to be paid back = $19,184.40, interest = $4,784.40) A loan company says they can lower your monthly payments by over $50 if you payback your loan in 20 years rather than 10. If the interest rate stays at 6%, what would the monthly payments be, the total amount to be paid back, and the total interest? (Ans: Monthly= $103.17, Total = $24,760.80, Interest = $10,360.80)

How Opportunity 3 is Coded

- In addition to finding the payment, it will be necessary to calculate the total amount to be paid back

$PMT \times Y \times n = Total$

- To calculate interest, $Total - P = Interest$

You can program the function along the following lines:

```
function CalcOwed(P:Number):Number {
        n=12;
        Y=Number(LoanYrs.text);
        APR=Number(LoanInt.text)/100;
        var PMT:Number =P*(APR/n)/(1-Math.pow(1+APR/n,(-n*Y)));
        return (PMT);
}
```