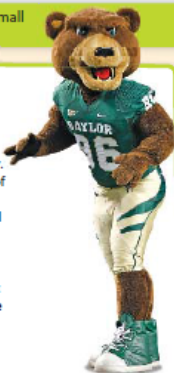# 16.2 Saving and Investing

Personal financial literacy— 8.12.D Calculate and compare simple interest and compound earnings. *Also* 8.12.C.

? ESSENTIAL QUESTION
How can you save money by investing small amounts of money regularly?

EXPLORE ACTIVITY 1 | Real World | TEKS 8.12.C, 8.12.D

Calculating Simple Interest

Interest is money paid by banks and others for the use of depositors' money. **Simple interest** is earned using the formula $I = Prt$, where I is the amount of interest, P is the principal, or the original amount deposited, r is the interest rate expressed as a decimal, and t is the time in years. Simple interest is paid at the end of the term based only on the principal at the beginning.

Adan makes regular deposits to a savings account to save money for college. He deposits $1000 at the start of each year into an account that pays 4% simple interest at the end of each year. He does not deposit the interest.

A How much interest does Adan's account earn the first year?

$I = Prt$ — Use the formula for simple interest.

$I = 1000 \times \boxed{0.04} \times 1 = \boxed{40}$ — Substitute and simplify.

Adan's account earns $\underline{\$40}$ the first year.

B Complete the table to show how the interest earned grows over time.

Deposit phase	Beginning balance for new phase	Amount deposited	New balance	Amount of interest earned (at 4%)
1	$0	$1000	$1000	$40
2	$1000	$1000	$2000	$80
3	$2000	$1000	$3000	$120
4	$3000	$1000	$4000	$160
5	$4000	$1000	$5000	$200
6	$5000	$1000	$6000	$240
7	$6000	$1000	$7000	$280
8	$7000	$1000	$8000	$320
9	$8000	$1000	$9000	$360
10	$9000	$1000	$10,000	$400

EXPLORE ACTIVITY 1 (cont'd)

Reflect

1. How much interest did Adan's account earn from the initial deposit to the end of year 5? from the start of year 6 to the end of year 10? How do these values compare? Explain.

   $600; $1600; sample answer: More interest is earned in later years as deposits are made. If money is saved regularly, the amount of interest increases over time.

2. What was the total amount saved from the initial deposit to the end of year 5? from the start of year 6 to the end of year 10? Include the amount contributed and the interest.

   $5600; $6600

EXPLORE ACTIVITY 2 | Real World | TEKS 8.12.C, 8.12.D

Calculating Compound Interest

Compound interest is interest paid not only on the principal but also on any interest that has already been earned. Every time interest is calculated, the interest is added to the principal for future interest calculations. The calculation can be made more than once a year, but in this lesson only interest compounded annually will be found.

The formula for compound interest is $A = P(1 + r)^t$, where P is the principal, r is the interest rate expressed as a decimal, t is the time in years, and A is the amount in the account after t years if no withdrawals were made.

Lilly makes regular deposits to a savings account to save money for retirement. She deposits $1000 each year, and her account earns interest compounded annually at a rate of 4%.

A How much interest does Lilly earn the first year?

$A = P(1 + r)^t$ — Use the formula for compound interest.

$A = 1000 \times \left(1 + \boxed{0.04}\right)^1$ — Substitute.

$A = \boxed{1040}$ — Simplify.

So, Lilly's account earns $\underline{\$1040} - \$1000 = \underline{\$40}$ the first year.

B Complete the table to show how the amount in the account accumulates over time. Round all values to the nearest cent.

Year	Beginning balance for new year	Amount deposited	New balance	Amount of interest earned (at 4%)	Ending balance
1	$0	$1,000	$1,000	$40	$1,040
2	$1,040	$1,000	$2,040	$81.60	$2,121.60
3	$2,121.60	$1,000	$3,121.60	$124.86	$3,246.46
4	$3,246.46	$1,000	$4,246.46	$169.86	$4,416.32
5	$4,416.32	$1,000	$5,416.32	$216.65	$5,632.97
6	$5,632.97	$1,000	$6,632.97	$265.32	$6,898.29
7	$6,898.29	$1,000	$7,898.29	$315.93	$8,214.22
8	$8,214.22	$1,000	$9,214.22	$368.57	$9,582.79
9	$9,582.79	$1,000	$10,582.79	$423.31	$11,006.10
10	$11,006.10	$1,000	$12,006.10	$480.24	$12,486.34

Reflect

3. How much interest did Lilly's account earn from the initial deposit to the end of year 5? from the start of year 6 to the end of year 10?

   $632.97; $1,853.37

4. Compare the interest earned during the two five-year periods. Explain the difference.

   The total interest for the second 5 years is almost triple the interest for the first 5 because the balance increases each year with new deposits and the accumulated interest also earned interest.

5. Compare the final balance in this Explore Activity to the total amount deposited and earned in interest in Explore Activity 1 (see Reflect question 2). What can you conclude?

   In Explore 1, the total was $5,600 + $6,600 = $12,200. In this activity it is $12,486.34. With compound interest, $286.34 more was earned.

Comparing Simple and Compound Interest

In this example, you will compare simple and compound interest in a situation where no additional deposits are made.

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EXAMPLE 1 | Real World | TEKS 8.12.D

Suppose you have two savings accounts, both with a principal of $100 and an interest rate of 5%, but one earns simple interest and one earns interest compounded annually. Which account will earn more interest after 10 years?

STEP 1 Find the amount of simple interest earned in 10 years.

$I = Prt$ — Use the formula for simple interest.

$I = 100 \times 0.05 \times 10$ — Substitute 100 for P, 0.05 for r, and 10 for t.

$I = 50$ — Simplify.

The account earning simple interest will earn $50.

STEP 2 Find the amount of interest compounded annually earned in 10 years.

$A = P(1 + r)^t$ — Use the formula for compound interest.

$A = 100(1 + 0.05)^{10}$ — Substitute 100 for P, 0.05 for r, and 10 for t.

$A = 162.89$ — Simplify. Round to the nearest cent.

Subtract the principal of $100 to find the interest earned, $62.89.

The account earning interest compounded annually will earn $62.89.

STEP 3 Compare the interest earned in each account.

The account that earns interest compounded annually earns $62.89, which is $12.89 more than the $50 of simple interest earned.

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6. Marlena saved $50 in an account earning 3.5% simple interest. How much more interest would her account earn in 10 years if her account earned interest compounded annually instead of simple interest?

   $3.03