

Worksheet 6-7: Effects of Changing Variables on Compound Interest

Investigation 1: Compare Different Interest Rates and Final Amount

Jake has saved \$2500 and is considering three investment alternatives for 6 years.

Investment Plan A: at **10%**, compounded annually

Investment Plan B: at **8.5%**, compounded annually

Investment Plan C: at **7%**, compounded annually

(a) Which investment plan gives the most return?

(b) Which investment plan gives the least return?

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Investigation 2: Compare Different Interest Rates and Present Value

Sandy needs \$5000 in 4 years to pay college. She has three GIC options:

GIC Option A: at **9%**, compounded quarterly

GIC Option B: at **6%**, compounded quarterly

GIC Option C: at **3%**, compounded quarterly

(a) Which option requires the biggest principal invested?

(b) Which option requires the smallest principal invested?

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Conclusion:

Interest rate affects the final amount and the present value:

The greater the interest rate, the greater the final amount.

The greater the interest rate, the smaller the present value, or principal required.

Investigation 3: Compare Different Term Lengths and Final Amount

Vince has saved \$2000 and is considering three term deposit alternatives.

Term Deposit A: at 5%, compounded semi-annually for **1 years**

Term Deposit B: at 5%, compounded semi-annually for **3 years**

Term Deposit C: at 5%, compounded semi-annually for **5 years**

- (a) Which term deposit alternative earns the most interest?
- (b) Which term deposit alternative earns the least interest?

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Investigation 4: Compare Different Term Lengths and Present Value

Pam needs \$50 000 to buy an apartment later and is considering three investment options.

- (a) Which of the following investment plans require the biggest principal invested?
- (b) Which of the following investment plans require the smallest principal invested?

Investment Option A: at 6%, compounded monthly for **2 years**

Investment Option B: at 6%, compounded monthly for **4 years**

Investment Option C: at 6%, compounded monthly for **6 years**

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Conclusion:
Term length affects the final amount and the present value:
The longer the term length, the greater the final amount.
The longer the term length, the smaller the present value, or principal required.

- Answers:** 1. (a) Plan A, (b) Plan C (A: \$4428.90, B: \$4078.67, C: \$3751.83);
 2. (a) Plan C, (b) Plan A (A: \$3502.33, B: \$3940.16, C: \$4436.59);
 3. (a) Plan C, (b) Plan A (A: \$2101.25, B: \$2319.37, C: \$2560.17).

Investigation 5: Compare Different Compounding Frequencies and Final Amount

Sharon has \$3000, and she can choose among three 2-year GIC options.

GIC Option A: at 6%, compounded **semi-annually**

GIC Option B: at 6%, compounded **quarterly**

GIC Option C: at 6%, compounded **monthly**

(a) Which GIC option will give the most return?

(b) Which GIC option will give the least return?

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Investigation 6: Compare Different Compounding Frequencies and Present Value

Khan wants to have \$7000 in 4 years to buy a car. He is interested in three 4-year GICs.

GIC Option A: at 8%, compounded **annually**

GIC Option B: at 8%, compounded **semi-annually**

GIC Option C: at 8%, compounded **quarterly**

(a) Which option requires the biggest principal invested?

(b) Which option requires the smallest principal invested?

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Conclusion:

Compounding frequency affects the final amount and the present value:

The more frequent the compounding, the greater the final amount.

The more frequent the compounding, the smaller the present value, or principal required.

Answers: 4. (a) Plan A, (b) Plan C (A: \$44359.28, B: \$39354.92, C: \$34915.12);

5. (a) Plan C, (b) Plan A (A: \$3376.53, B: \$3379.48, C: \$3381.48);

6. (a) Plan A, (b) Plan C (A: \$5145.21, B: \$5114.83, C: \$5099.12).

1. Kabir plans to purchase a new car in three years and hopes to have \$18 000 at that time.
(a) Determine the principal that Kabir needs to invest today to have \$18 000 after three years:

Option 1: at 4.5% per year, compounded monthly

Option 2: at 4.5% per year, compounded semi-annually

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- (b) Which principal is less? Why?

2. Barb plans to invest \$10 000 in a term deposit for two years. She has three choices.

A: 6.8% per year, simple interest

B: 6.2% per year, compounded semi-annually

C: 6.0 % per year, compounded quarterly

Which plan should she choose? Why?

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3. Suppose you recently inherited \$8000. You plan to use half the money now and invest the other half for at least three years. You have narrowed the investment down to three choices:
- A: 3.25% per year, simple interest, cashable any time
 - B: 3.00% per year, compounded monthly, cashable after two years
 - C: 3.50 % per year, compounded semi-annually, cashable after four years
- (a) Which plan earns the most interest after four years? Does that mean it is the best option for you? Justify your response.

- (b) You have decided you will use the investment to make a down payment on a car in two and a half years. Which plan should you choose? Why?

- Answers:**
1. (a) Option 1: \$15730.86, Option 2: \$15750.44, (b) Option 1, interest is compounded more frequently compared to Option 2 which compounds interest semi-annually;
 2. A: \$11360.00, B: \$11298.86, C: 11264.93, Choose Plan A which makes the most interest;
 3. (a) Plan C (A: \$4520.00, B: \$4509.31, C: \$4595.53), Plan C is not the best option because money cannot be used until 4 years later,
(b) Plan A, Plan A earns more interest than Plan B, and Plan C is not cashable in 2 and a half years.