INTERESTS

A DEFINITIONS

A.1 FINDING THE INTEREST

Ex 1: Louis lends Hugo 100 dollars. After one year, Hugo repays Louis 110 dollars.
Find the interest paid.

☐ dollars

Ex 2: Maria borrows 200 dollars from John. After one year, Maria repays John 230 dollars.
Find the interest paid.

☐ dollars

Ex 3: Jack lends Sarah 500 dollars. After one year, Sarah repays Jack 525 dollars.
Find the interest paid.

☐ dollars

Ex 4: A bank lends 1 000 dollars to a customer. After one year, the customer repays the bank 1 080 dollars.
Find the interest paid.

☐ dollars

A.2 FINDING THE TOTAL AMOUNT

Ex 5: A customer borrows 2 500 dollars from a bank, with 150 dollars of interest.
Find the total amount the customer needs to repay the bank.

☐ dollars

Ex 6: Maria borrows 300 dollars from John with 30 dollars of interest.
Find the amount Maria needs to repay.

☐ dollars

Ex 7: Jack lends Sarah 500 dollars with 50 dollars of interest.
Find the total amount Sarah needs to repay Jack.

☐ dollars

Ex 8: A bank lends 1 000 dollars to a customer with 80 dollars of interest.
Find the total amount the customer needs to repay the bank.

☐ dollars

A.3 FINDING THE PRINCIPAL

Ex 9: Emma repaid 330 dollars in total, including 30 dollars of interest.Find the original amount (principal) that Emma borrowed.

☐ dollars

Ex 10: Lucas repaid 550 dollars in total, including 50 dollars of interest.Find the original amount (principal) that Lucas borrowed.

☐ dollars

Ex 11: Sophia repaid 1,080 dollars in total, including 80 dollars of interest.Find the original amount (principal) that Sophia borrowed.

☐ dollars

Ex 12: Mia repaid 750 dollars in total, including 150 dollars of interest.Find the original amount (principal) that Mia borrowed.

☐ dollars

B SIMPLE INTEREST

B.1 FINDING THE INTEREST

Ex 13: Find the simple interest on a principal of \$500 at a rate of 3% per year over 5 years (you can use a calculator).

☐ dollars

Ex 14: Find the simple interest on a principal of \$1 000 at a rate of 4% per year over 3 years (you can use a calculator).

☐ dollars

Ex 15: Find the simple interest on a principal of \$750 at a rate of 5% per year over 2 years (you can use a calculator).

☐ dollars

Ex 16: Find the simple interest on a principal of \$1 200 at a rate of 6% per year over 4 years (you can use a calculator).

☐ dollars

B.2 FINDING THE INTEREST OVER MIXED TIME PERIODS

Ex 17: Find the simple interest on a principal of \$600 at a rate of 4% per year over 18 months (you can use a calculator).

☐ dollars

Ex 18: Find the simple interest on a principal of \$700 at a rate of 5% per year over 180 days (you can use a calculator).

dollars (round at two decimal place)

Ex 19: Find the simple interest on a principal of \$800 at a rate of 4% per year over 9 months (you can use a calculator).

dollars

Ex 20: Find the simple interest on a principal of \$1 200 at a rate of 4% per year over 2 years and 6 months (you can use a calculator).

dollars

B.3 FINDING THE TOTAL AMOUNT

Ex 21: Jack lends Sarah 500 dollars with simple interest over 3 years at a rate of 3% per year.
Find the total amount Sarah needs to repay Jack (you can use a calculator).

dollars

Ex 22: Emma borrows 600 dollars from a bank with simple interest over 4 years at a rate of 2.5% per year.
Find the total amount Emma needs to repay the bank (you can use a calculator).

dollars

Ex 23: Michael lends 800 dollars to a friend with simple interest over 2 years at a rate of 4% per year.
Find the total amount the friend needs to repay Michael (you can use a calculator).

dollars

Ex 24: Sophia borrows 1 200 dollars with simple interest over 5 years at a rate of 2.5% per year.
Find the total amount Sophia needs to repay (you can use a calculator).

dollars

B.4 FINDING THE PRINCIPAL

Ex 25: Find the original amount invested if a flat rate of 4% per year produces \$1 800 interest in 5 years (you can use a calculator).

dollars

Ex 26: Find the original amount invested if a flat rate of 5% per year produces \$2 500 interest in 10 years (you can use a calculator).

dollars

Ex 27: Find the original amount invested if a flat rate of 6% per year produces \$720 interest in 4 years (you can use a calculator).

dollars

Ex 28: Find the original amount invested if a flat rate of 5% per year produces \$1 250 interest in 2 years (you can use a calculator).

dollars

B.5 FINDING THE INTEREST RATE

Ex 29: Find the interest rate per year if an original investment of \$8 000 earns \$960 in interest over 3 years (you can use a calculator).

%

Ex 30: Find the interest rate per year if an original investment of \$5 000 earns \$600 in interest over 4 years (you can use a calculator).

%

Ex 31: Find the interest rate per year if an original investment of \$7 500 earns \$900 in interest over 5 years (you can use a calculator).

%

Ex 32: Find the interest rate per year if an original investment of \$10 000 earns \$1 200 in interest over 4 years (you can use a calculator).

%

B.6 FINDING THE TIME

Ex 33: Find the time required for an original investment of \$6 000 to earn \$720 in interest at an interest rate of 4% per year (you can use a calculator).

years

Ex 34: Find the time required for an original investment of \$4 500 to earn \$540 in interest at an interest rate of 3% per year (you can use a calculator).

years

Ex 35: Find the time required for an original investment of \$2 500 to earn \$375 in interest at an interest rate of 5% per year (you can use a calculator).

years

Ex 36: Find the time required for an original investment of \$7 000 to earn \$840 in interest at an interest rate of 4% per year (you can use a calculator).

years

C COMPOUND INTEREST

C.1 FINDING THE TOTAL AMOUNT USING A TABLE

Ex 37: \$1000 is placed in an account that earns 10% interest per annum (p.a.), and the interest is allowed to compound over three years. This means the account is earning 10% p.a. in compound interest.
Fill the compound interest table (you can use a calculator).

Year	Amount	Compound interest
0	\$1000	10% of \$1000 = \$100
1	\$1000 + \$100 = \$1100	10% of \$1100 = \$110
2	\$	
3	\$	

Find the amount at 3 years.

dollars

Ex 38: \$3 000 is placed in an account that earns 20% interest per annum (p.a.), and the interest is allowed to compound over three years. This means the account is earning 20% p.a. in compound interest.
Fill the compound interest table (you can use a calculator).

Year	Amount	Compound interest
0	\$3 000	20% of \$3 000 = \$600
1	\$3 000 + \$600 = \$3 600	20% of \$3 600 = \$720
2	\$	
3	\$	

Find the amount at 3 years.

dollars

Ex 39: \$3 000 is placed in an account that earns 20% interest per annum (p.a.), and the interest is allowed to compound over three years. This means the account is earning 20% p.a. in compound interest.
Fill the compound interest table (you can use a calculator).

Year	Amount	Compound interest
0	\$3 000	
1	\$	
2	\$	

Find the amount after 2 years.

dollars

C.2 FINDING THE TOTAL AMOUNT

Ex 40: Find the final amount on a principal of \$10 000 at a rate of 10% per year over 3 years compounded yearly (you can use a calculator).

dollars

Ex 41: Find the final amount on a principal of \$200 000 at a rate of 5% per year over 3 years compounded yearly (you can use a calculator).

dollars

Ex 42: Find the final amount on a principal of \$5 000 at a rate of 8% per year over 2 years compounded yearly (you can use a calculator).

dollars

Ex 43: Find the final amount on a principal of \$5 000 at a rate of 8% per year over 20 years compounded yearly (round at 2 decimal places).

dollars

C.3 FINDING THE BEST OPTION OF INVESTMENT

Ex 44: You have \$8000 to invest for 5 years and there are 2 possible options you have been offered:

- Option 1: Invest at 9% p.a. simple interest.
- Option 2: Invest at 8% p.a. compound interest.

You can use a calculator.

- Calculate the amount accumulated at the end of the 3 years for option 1 (round to the neareast integer)

  dollars

- Calculate the amount accumulated at the end of the 3 years for option 2 (round to the neareast integer)

  dollars

- Decide which option to take.
  ☐ Option 1
  ☐ Option 2

Ex 45: You have \$20 000 to invest for 5 years and there are 2 possible options you have been offered:

- Option 1: Invest at 7% p.a. simple interest.
- Option 2: Invest at 6% p.a. compound interest.

You can use a calculator.

- Calculate the amount accumulated at the end of 5 years for option 1 (round to the nearest integer):

  dollars

- Calculate the amount accumulated at the end of 5 years for option 2 (round to the nearest integer):

  dollars

- Decide which option to take.
  ☐ Option 2
  ☐ Option 1

Ex 46: You have \$50 000 to invest for 30 years and there are 2 possible options you have been offered:

- Option 1: Invest at 10% p.a. simple interest.
- Option 2: Invest at 9% p.a. compound interest.

You can use a calculator.

- Calculate the amount accumulated at the end of the 30 years for option 1 (round to the nearest integer):

  dollars

- Calculate the amount accumulated at the end of the 30 years for option 2 (round to the nearest integer):

  dollars

- Decide which option to take.
  ☐ Option 1
  ☐ Option 2

D COMPOUND INTEREST BY PERIOD

D.1 FINDING THE FINAL AMOUNT

Ex 47: Find the final amount for compound interest on a principal of \$5 000 at a rate of 2% over 10 years, compounded monthly (you can use a calculator).

☐ dollars (round to the nearest integer)

Ex 48: Find the final amount for compound interest on a principal of \$10 000 at a rate of 3.5% over 8 years, compounded quarterly (you can use a calculator).

☐ dollars (round to the nearest integer)

Ex 49: Find the final amount for compound interest on a principal of \$15 000 at a rate of 4% over 5 years, compounded semi-annually (you can use a calculator).

☐ dollars (round to the nearest integer)

Ex 50: Find the final amount for compound interest on a principal of \$7 500 at a rate of 5% over 12 years, compounded annually (you can use a calculator).

☐ dollars (round to the nearest integer)

D.2 FINDING THE INTEREST

Ex 51: Khesya invested \$6 000 in an account paying 5.4% per annum interest, compounded half-yearly for 5 years (you can use a calculator).

- Find the future value of the investment.

  ☐ dollars (round to the nearest integer)

- How much interest did Khesya earn?

  ☐ dollars

Ex 52: Amir deposited \$4 500 in a savings account paying 3.8% per annum interest, compounded quarterly for 6 years (you can use a calculator).

- Find the future value of the deposit.

  ☐ dollars (round to the nearest integer)

- How much interest did Amir earn?

  ☐ dollars

Ex 53: Emma deposited \$5 000 in a savings account paying 4.2% per annum interest, compounded monthly for 8 years (you can use a calculator).

- Find the future value of the deposit.

  ☐ dollars (round to the nearest integer)

- How much interest did Emma earn?

  ☐ dollars

D.3 FINDING THE PRINCIPAL

Ex 54: Liam wants to open an investment account for his daughter's college fund. The account pays 4.8% p.a. compounded monthly. If Liam wants to have \$30 000 in the account when his daughter turns 18, how much does he need to deposit now (you can use a calculator) ?

☐ dollars (round to the nearest integer)

Ex 55: Oliver wants to save for a down payment on a house. The account pays 5.2% p.a. compounded monthly. If Oliver wants to have \$50 000 in the account in 10 years, how much does he need to deposit now (you can use a calculator)?

☐ dollars (round to the nearest integer)

Ex 56: Sophia wants to save for a car purchase. The account pays 6.1% p.a. compounded monthly. If Sophia wants to have \$40 000 in the account in 7 years, how much does she need to deposit now (you can use a calculator)?

☐ dollars (round to the nearest integer)

Ex 57: Ethan wants to invest in a retirement fund. The account pays 5.9% p.a. compounded monthly. If Ethan wants to have \$100 000 in the account after 15 years, how much does he need to deposit now (you can use a calculator)?

☐ dollars (round to the nearest integer)

D.4 FINDING TIME

Ex 58: You currently have \$5 000 saved in an account that pays 3.8% p.a., compounded monthly. You want to buy a house that costs \$100 000.

- How long would it take you to save \$100 000 using the TVM solver on your calculator?

  ☐ months (round to the nearest month)

- Do you think it will be practical to wait this long before buying a house?
  ☐ Yes
  ☐ No

Ex 59: You currently have \$20 000 saved in an account that pays 5.2% p.a., compounded monthly. You want to buy a car that costs \$23 000.

- How long would it take you to save \$23 000 using the TVM solver on your calculator?

  ☐ months (round to the nearest month)

- Do you think it will be practical to wait this long before buying a car?
  ☐ Yes
  ☐ No

Ex 60: You currently have \$10 000 saved in an account that pays 4.2% p.a., compounded monthly. You want to buy a car that costs \$35 000.

- How long would it take you to save $35 000 using the TVM solver on your calculator?

  ☐ months (round to the nearest month)

- Do you think it will be practical to wait this long before buying a car?
  ☐ Yes
  ☐ No

E VARIABLE RATE INVESTMENTS

E.1 FINDING THE TOTAL AMOUNT

Ex 61: Louis invested $200 in a variable rate investment account for 8 years. The interest rates were:

- for the first six years: 3% compounded yearly.
- for the last two years: 2% compounded yearly.

You can use a calculator or the TVM solver on your calculator.

- Find the final amount after 6 years.

  ☐ dollars (round to the nearest integer)

- Find the final amount after 8 years.

  ☐ dollars (round to the nearest integer)

Ex 62: Sarah invested $300 in a variable rate investment account for 10 years. The interest rates were:

- for the first seven years: 4% compounded monthly.
- for the last three years: 3% compounded monthly.

You can use a calculator or the TVM solver on your calculator.

- Find the final amount after 7 years.

  ☐ dollars (round to the nearest integer)

- Find the final amount after 10 years.

  ☐ dollars (round to the nearest integer)

Ex 63: Emma invested $1 000 in a variable rate investment account for 9 years. The interest rates were:

- for the first five years: 3.5% compounded monthly.
- for the last four years: 2.8% compounded monthly.

You can use a calculator or the TVM solver on your calculator.

- Find the final amount after 5 years.

  ☐ dollars (round to the nearest integer)

- Find the final amount after 9 years.

  ☐ dollars (round to the nearest integer)

Ex 64: Sophie invested $1 500 in a variable rate investment account for 9 years. The interest rates were:

- for the first six years: 4.1% compounded monthly.
- for the last three years: 3.5% compounded monthly.

You can use a calculator or the TVM solver on your calculator.

- Find the final amount after 6 years.

  ☐ dollars (round to the nearest integer)

- Find the final amount after 9 years.

  ☐ dollars (round to the nearest integer)

F PERIODIC PAYMENT

F.1 FINDING PERIODIC PAYMENTS IN LOANS

Ex 65: Suppose Maria takes out a loan of $15 000 to buy a car. The loan has an interest rate of 5.5% per annum, compounded monthly, and she agrees to repay the loan over 5 years.
Calculate the periodic (monthly) payment Maria needs to make using the TVM solver on your calculator.

☐ dollars (round to the nearest integer)

Ex 66: Suppose John takes out a loan of $25 000 to buy a motorcycle. The loan has an interest rate of 4.8% per annum, compounded monthly, and he agrees to repay the loan over 6 years.
Calculate the periodic (monthly) payment John needs to make using the TVM solver on your calculator.

☐ dollars (round to the nearest integer)

Ex 67: Suppose Su takes out a loan of $18 000 to buy a car. The loan has an interest rate of 5.2% per annum, compounded monthly, and she agrees to repay the loan over 4 years.
Calculate the periodic (monthly) payment Su needs to make using the TVM solver on your calculator.

☐ dollars (round to the nearest integer)

Ex 68: Suppose Amir takes out a loan of $200 000 to buy a house. The loan has an interest rate of 3.9% per annum, compounded monthly, and he agrees to repay the loan over 20 years.
Calculate the periodic (monthly) payment Amir needs to make using the TVM solver on your calculator.

☐ dollars (round to the nearest integer)