

### 3.7 HOMEWORK HANDOUT : INTEREST AND BORROWING

#### PART A

- 1) Iyanu is going to purchase a new car that is priced at \$24 500.
- Determine the cost of the car after a 13% sales tax is applied to the price.
  - Iyanu plans to make a down payment of 20% of the cost (after tax) and finance the remaining balance. Determine the amount of the down payment.
  - What would be some benefits of making a larger down payment in this situation?



- 2) \$1000 is borrowed with a simple interest rate of 5% per year.
- Copy and complete the table shown on the right.
  - Is the relationship between time and the total owed linear or non-linear? Explain.
- 3) \$1000 is borrowed with a compound interest rate of 5% per year.
- Copy and complete the table shown on the right.
  - Is the relationship between time and the total owed linear or non-linear? Explain.

Time (years)	Total Owed (\$)
0	
1	
2	
3	
4	
5	

#### PART B

- 4) Daniel is planning to use a mortgage to purchase a house. Describe how each of the following affects the amount of interest he must pay.



- interest rate
- borrowing time
- down payment

- 5) \$2500 is deposited into an account that pays simple interest at a rate of 3% per year.
- What will be the total amount in the account after 10 years?
  - How much interest will be earned after 10 years?
  - Would doubling the interest rate in this situation also double the interest earned after 10 years? Justify your answer.
- 6) \$1200 is deposited into an account that pays compound interest at a rate of 2% per year.
- What will be the total amount in the account after 10 years?
  - How much interest will be earned after 10 years?
  - Would doubling the interest rate in this situation also double the interest earned after 10 years? Justify your answer.
- 7) Franco wishes to purchase a boat for \$20 000. The seller has agreed to let Franco pay for the boat at a future date but will charge compound interest at a rate of 4.5%/month on any amount not paid up-front.
- How will a \$3000 down payment affect the amount of interest Franco pays if he waits five months to pay off the balance?
  - How would the answer for part (a) change if simple interest was used instead of compound interest?
- 8) Each of the following expressions was used to calculate the end value of a one-time deposit that gained interest annually over several years. In each case, state the type of interest used (simple or compound), the principal deposited, the annual interest rate as a percent, and the number of years over which the interest was earned.
- $A = 3500 + 3500(0.04)(15)$
  - $A = 400(1.02)(1.02)(1.02)$
  - $A = 30(1.014)^{20}$
  - $A = 12(70)(0.026) + 70$

- 9) Simona plans to borrow \$9000 using a loan that charges compound interest at a rate of 2.3%/year.
- How much interest is charged for the 4<sup>th</sup> year of the loan?
  - How much interest is charged for the 5<sup>th</sup> year of the loan?
  - Are the answers for parts (a) and (b) the same? Why or why not?
  - Would the answer for part (c) change if simple interest was being used? Explain.



## ANSWERS

- 1) a) \$27 685   b) \$5537   c) Answers may vary. For example, interest is not paid on a down payment. A larger down payment means less money will be borrowed, resulting in less interest overall. A larger down payment may also make it easier to get approval for a loan and could result in lower monthly (weekly, bi-weekly, etc.) payments.

- 2) a) 

Time (years)	Total Owed (\$)
0	1000.00
1	1050.00
2	1100.00
3	1150.00
4	1200.00
5	1250.00

   b) Linear, since the total owed increases by the same amount each year (\$50).

- 3) a) 

Time (years)	Total Owed (\$)
0	1000.00
1	1050.00
2	1102.50
3	1157.63
4	1215.51
5	1276.28

   b) Non-linear, since the total owed increases by a different (greater) amount each year.

- 4) a) Higher interest rates will result in more interest paid.   b) A greater borrowing time will result in more interest paid.   c) A greater down payment will result in less interest paid.
- 5) a) \$3250   b) \$750   c) Yes, because simple interest is being used. If the interest rate is 6%/year, the interest earned in 10 years is \$1500, which is double the interest earned with a rate of 3%/year.
- 6) a) \$1462.79   b) \$262.79   c) No, because compound interest is being used. If the interest rate is 4%/year, the interest earned in 10 years is \$576.29, which is more than double the interest earned with a rate of 2%/year.
- 7) a) A \$3000 down payment will reduce the interest paid by \$3738.55.  
b) A \$3000 down payment will reduce the interest paid by \$675.00.

8) 

	Type of Interest	Principal	Annual Interest Rate	Number of Years
a)	simple	\$3500	4%	15
b)	compound	\$400	2%	3
c)	compound	\$30	1.4%	20
d)	simple	\$70	2.6%	12

- 9) a) \$221.61   b) \$226.71   c) No. Since compound interest is being used, the interest is calculated on a greater amount each year. Therefore, the amount of interest increases each year.   d) Yes. Simple interest is only charged on the principal, so the same amount of interest would be charged each year.