# Year 10 Term 1 Homework

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| **Student Name**: _____ | **Grade**: _____ |
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# 3 Year 10 Term 1 Week 3 Homework

## 3.1 Chapter Review (consumer arithmetic)

### 3.1.1 Simple interest

**Exercise 3.1.1 Find the total balance of an account after:**

1. *3 years if $5000 is invested at 6% p.a.*

2. *4 months if $2700 is invested at 0.95% per month.*

3. *8 months if $9000 at 5% p.a.*

4. *18 months if $1725 at 7% p.a.*

**Exercise 3.1.2 Further applications**

1. *Cathy invested $54,000 for 5 years at 5% p.a. simplest interest. At the end of the 5 years she withdrew the capital and reinvested the interest only for another 5 years. How much interest did she receive in total over this 10 years period?*

2. *Sharon invested $1750 at 6.4% p.a. simple interest. For how many days was the money invested if she earned $112.30 interest?*

### 3.1.2 Compound interest

When compound interest is calculated on an investment, the interest is calculated on the principal as well as on any interest that has been earned previously. The compound interest formula:

$$A = P(1+R)^n \qquad \text{or} \qquad A = P(1+\tfrac{r}{100})^n \text{ where}$$

- **P** is the principal, or the amount invested
- **R** is the interest rate per time period , expressed as a decimal
- **n** is the number of time periods
- **A** is the value of the investment after n time period.

**Exercise 3.1.3 Use the compound interest formula to find the amount of interest earned on each investment:**

1. *$7000 at 8.5% p.a. for 5 year if the interest is compounded annually.*

2. *$9200 at 8% p.a for 8 years if the interest is compounded half-yearly.*

3. *$3500 at 12% p.a for 4 years if the interest is compounded monthly.*

4. *$25000 at 6% p.a for 3 year if the interest is compounded quarterly.*

**Exercise 3.1.4**

1. *Which of the following pays more interest on an investment of $5000?*

   *(a) 8% p.a simplest for 9 years, or*

   *(b) 6% p.a. compound interest for 10 years, compounded annually.*

### 3.1.3 Depreciation

1. If an item loses value over a period of time, then it is said to depreciate in value.
2. The depreciating value of an item each year is related to its value in the previous year.
3. The rate at which it depreciates if often expressed as a percentage.
4. The depreciation formula: $V = P(1 - R)^n$ or $V = P(1 - \frac{r}{100})^n$ where
   - P is the original value of the item
   - R is the annual rate of depreciation, expressed as a decimal
   - n is the number of years the item depreciates
   - V is the value of the item after n years.

**Exercise 3.1.5**

1. *A DVD recorder purchased for \$790 depreciated at the rate of 15% p.a.*
   (a) *What would he the value of the DVD recorder after 5 years?*

   (b) *By how much would the DVD recorder depreciated during this time?*

2. *Tony bought a new car for \$25,000. After how many years will the value of the car first below \$15,000, if the annual rate of depreciation is 18%*

3. *A computer depreciated in value by r% p.a. from \$1200 to \$425 in 3 years.*
   (a) *Find the annual rate of depreciation.*

   (b) *Find the value of the computer at the end of the 5th year, correct to nearest dollar.*

### 3.1.4 Loans

- Loan is an amount of money that is borrowed from bank or finance company.
- Interest on loan is usually charged as reducible interest.
- The borrower repays the loan and interest by making regular payments called instalments.
- Home loans can be taken out at variable rates of a fixed rate.

**Exercise 3.1.6**

1. *Ivy borrowed $12,000 over 3 years to renovate her kitchen. She was charged simplest interest of 9% p.a. on this amount. The loan and interest was to be repaid in 36 equal monthly instalments.*

   *(a) Calculate the interest that was charged on this loan.*

   *(b) How much will Ivy repay altogether?*

   *(c) What is amount of each monthly instalment?*

2. *The table below shows the monthly repayments required to repay each $1000 of a home loan at various monthly reducible rates of interest. Kathy borrowed $500,000 to buy a house. The bank charges 4.5% p.a. monthly reducible interest and the term of the loan is 25 years.*

| Interest rate p.a. | 10 years | 15 years | 20 years | 25 years | 30 years |
|---|---|---|---|---|---|
| **4.5%** | 10.36 | 7.65 | 6.33 | 5.56 | 5.07 |

   *(a) What is Kathy's monthly repayments?*

   *(b) How much will she repay altogether on this loan?*

   *(c) How much interest will be charged?*

### 3.1.5 Buying major items

There are many ways by which major items can be purchased:

- **Cash**: Goods are paid for and received immediately.
- **Lay-by**: A deposit is paid up-front, and the balance of the purchase price is paid instalments over a period of time. The goods are not received until the entire purchase price is paid off. Interest is not charged on lay-by purchases.
- **On terms**: A deposit is paid up-front and the balance is paid regular instalments over a period of time. The good are received immediately. Interest is usually charged in the balance owing and is included in each of the instalments.
- **Deferred payment**: A deposit is usually required . The goods can then be taken, which the balance to be paid before some agreed time in the future. Interest is paid if the balance is not paid on time.
- **Credit card**: The card has a set credit limit. An interest-free period may be available. Goods can be taken immediately when purchased by a credit card.

**Exercise 3.1.7**

1. *The retail price of a refrigerator was \$1200. A discount of 15% was given on the sale because the refrigerator had some minor scratched. A further discount of 5% was offered to customers who paid cash.*

   (a) *Can the cash price of the refrigerator be calculated by discounting the marked price by 20%? Explain.*

   (b) *Calculate the cash price of the refrigerator.*

2. *Graham purchased a digital camera priced at \$540. He paid a deposit of 20% of the cash price and \$80 per month for 6 month.*

   (a) *How much interest did he pay?*

   (b) *Express the interest as percentage of the cash price, correct to 1 decimal place.*

### 3.1.6 Credit cards

- Credit card are issued by financial institutions.
- High rates of interest are usually charged.
- An interest-free period many be available.

**Exercise 3.1.8**

1. *Calculate the amount of simple interest that is payable on each of these credit card debts.*

   *(a) $180 for 20 days at 0.06% per day.*

   *(b) $250 for 40 days at 21% p.a.*

   *(c) $3500 for 45 days at 18% p.a.*

2. *The VISA credit card offers customers a 55 day interest-free credit period. This is, if the balance is paid in full before the due date, no interest will be charged. If the account is not paid by the due date, the following condition will apply:*

   - *Interest is charges at the rate of 17.5% p.a.*
   - *One month interest is charged immediately on the balance owing.*
   - *Daily interest is charged on the balance until the balance is paid.*

   *The due date on Michael's credit card statement was 15 April and the balance owing was $350*

   *(a) If Michael paid the account on 12 April, how much interest would he have been charged?*

   *(b) Calculate the interest if Michael paid the account on 25 April.*

## 3.2 Miscellaneous exercises

**Exercise 3.2.1**

1. *House price in a certain suburb are appreciating in value by an average 8.5% per year. If the house is purchased today for $560,000, find correct to the nearest dollar, its expected value in 12 years time.*

2. *The present population of a country is 25.8 million people. If this is expected to increase by 0.8% p.a. over the next decade, find the population of the country in ten years time, correct to nearest 1000 people.*

3. *A machine with a present value of $1500 has been depreciated at the rate of 5% p.a. for 6 years. What was the value of the machine at the time of purchase? Answer correct to nearest $10.*

4. *If the national inflation rate is 3.8% p.a., find the expected cost of a $3 loaf of bread in 5 years time, correct to nearest 10 cents.*

5. *Amy borrows $300,000 at 9% p.a. monthly reducible interest over 25 years. At the end of each month, the interest on the outstanding amount is added, then Amy makes a payment of $2500.*
   (a) *How much of the load will she have paid after 4 months? Answer correct to nearest dollar.*

   (b) *What could she do to improve this situation?*

**Exercise 3.2.2 Simplify the following expressions:**

1. $(3-\sqrt{2})^2-\sqrt{3}(\sqrt{3}-4\sqrt{6})$

2. $\frac{x^2+5x+4}{x^2-16}\times\frac{x^2-x-12}{4x^2-36}$

3. $\frac{3x^2-12y^2}{x^2+2x-2xy-4y}\times\frac{x^2+6x+8}{6x+12y}$

4. $\frac{x^{-1}-y}{x-y^{-1}}$

5. $\frac{x^2-y^2}{x^{-2}-y^{-2}}$

**Exercise 3.2.3 Solve the following equations:**

1. $\frac{2x+3}{2} - \frac{x-2}{3} = 3$

2. $\frac{2x-1}{3} = \frac{x+2}{7}$

3. $\frac{5x}{2} - \frac{x-3}{4} = x - 3$

4. $x + \frac{1}{x} = 2$

5. $\sqrt{x} + x = 0$

**Exercise 3.2.4 Solve the following inequalities:**

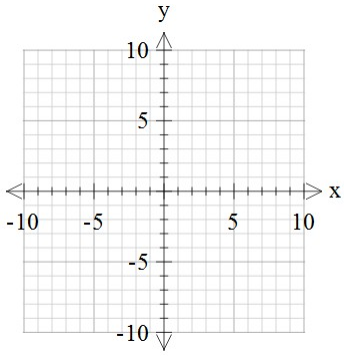
1. $3 + 2x \leq 11x - 12$

2. $x \leq \frac{3x}{2} - 5$

**Exercise 3.2.5**

1. *Solve the following pair of simultaneous equations* $\begin{cases} x + y = 2 \\ 4x + 3y = 11 \end{cases}$

2. *Solve the following pair of simultaneous inequations* $\begin{cases} 3x + 2y < 12 \\ x + y > 5 \end{cases}$ *and shade the graph.*



**Exercise 3.2.6**

1. *An n-sided polygon has* $\frac{1}{2}n(n-3)$ *diagonals. How many sides has a figures if it has 27 diagonals?*

2. *In a rectangular field has an area of 3500* $m^2$ *and its length is 20 metres more than its width, find the width of the field.*

3. *Solve* $x^2 + y^2 = 16$ *and* $3x - 4y - 20 = 0$.

4. $\frac{4}{x-1} - \frac{3}{x} = \frac{5}{x+2}$