1. Give all answers in this question to the nearest whole currency unit.

In January 2008 Larry had 90 000 USD to invest for his retirement in January 2011.

He invested 40 000 USD in US government bonds which paid 4 % per annum **simple interest**.

(a) Calculate the value of Larry's investment in government bonds in January 2011.

(3)

Larry changed this investment into South African rand (ZAR) at an exchange rate of 1 USD = 18.624 ZAR.

(b) Calculate the amount that Larry received in ZAR from the exchange.

(2)

He changed the remaining 50 000 USD to South African rand (ZAR) in January 2008. The exchange rate between USD and ZAR was 1 USD = 10.608 ZAR. There was 2.5 % commission charged on the exchange.

(c) Calculate the value, **in USD,** of the commission Larry paid.

(2)

(d) Show that the amount that Larry had to invest is 517 000 ZAR, correct to the nearest thousand ZAR.

(3)

In January 2008, Larry deposited this money into a bank account that paid interest at a nominal annual rate of 12 %, **compounded monthly**.

(e) Find the value of the money in Larry's bank account in January 2011.

(3)
(Total 13 marks)

2. A manufacturer in England makes 16 000 garden statues. 12 % are defective and cannot be sold.

(a) Find the number of statues that are non-defective.

(2)

The manufacturer sells each non-defective statue for 5.25 British pounds (GBP) to an American company. The exchange rate from GBP to US dollars (USD) is 1 GBP = 1.6407 USD.

(b) Calculate the amount in USD paid by the American company for all the non-defective statues. Give your answer correct to **two decimal places**.

(2)

The American company sells one of the statues to an Australian customer for 12 USD. The exchange rate from Australian dollars (AUD) to USD is 1 AUD = 0.8739 USD.

(c) Calculate the amount that the Australian customer pays, in AUD, for this statue. Give your answer correct to **two decimal places**.

(2)
(Total 6 marks)

3. Give all your numerical answers correct to two decimal places.

On 1 January 2005, Daniel invested 30 000 AUD at an annual **simple** interest rate in a *Regular Saver* account. On 1 January 2007, Daniel had 31 650 AUD in the account.

(a) Calculate the rate of interest.

(3)

On 1 January 2005, Rebecca invested 30 000 AUD in a *Supersaver* account at a nominal annual rate of 2.5 % **compounded annually**.

(b) Calculate the amount in the *Supersaver* account after two years.

(3)

(c) Find the number of complete years since 1 January 2005 it will take for the amount in Rebecca's account to exceed the amount in Daniel's account.

(3)

On 1 January 2007, Daniel reinvested 80 % of the money from the *Regular Saver* account in an *Extra Saver* account at a nominal annual rate of 3 % **compounded quarterly**.

(d) (i) Calculate the amount of money reinvested by Daniel on the 1 January 2007.

(ii) Find the number of complete years it will take for the amount in Daniel's *Extra Saver* account to exceed 30 000 AUD.

(5)
(Total 14 marks)

4. Susi travels from Singapore to Thailand and changes 1500 Singapore dollars (SGD) to Thai baht (THB). The exchange rate is 1 SGD buys 21.03464 THB.

(a) Calculate the number of Thai baht Susi buys. Give your answer **correct to the nearest baht**.

(2)

Susi leaves Thailand and travels to Indonesia. She has 20 000 THB and uses these to buy Indonesian rupiah (IDR). The exchange rate is 3.28352 THB buys 1000 IDR.

(b) Calculate the **total** number of Indonesian rupiah Susi receives, **correct to the nearest thousand rupiah**.

(2)

Susi wants to find the approximate exchange rate between Singapore dollars and Indonesian rupiah and uses the exchange rates for Thai baht to do this.

(c) Calculate Susi's exchange rate between Singapore dollars and Indonesian rupiah. Give your answer in the form 1 SGD buys x IDR, where x is given correct to the nearest rupiah.

(2)
(Total 6 marks)

5. Astrid invests 1200 euros for five years at a nominal annual interest rate of 7.2 %, **compounded monthly**.

(a) Find the interest Astrid has earned during the five years of her investment. **Give your answer correct to two decimal places**.

(3)

Helen invests 1200 euros in an annual **simple interest** scheme for five years. She earns **the same** interest as Astrid.

(b) Find the simple interest rate of this scheme.

(3)

(Total 6 marks)

6. Daniel wants to invest $25 000 for a total of three years. There are three investment options.

Option One pays simple interest at an annual rate of interest of 6 %.

Option Two pays compound interest at a nominal annual rate of interest of 5 %, compounded **annually**.

Option Three pays compound interest at a nominal annual rate of interest of 4.8 %, compounded **monthly**.

(a) Calculate the value of his investment at the end of the third year for each investment option, **correct to two decimal places**.

(8)

(b) Determine Daniel's best investment option.

(1)

(Total 9 marks)

7. Give all answers in this question to the nearest whole currency unit.

Ying and Ruby each have 5000 USD to invest.

Ying invests his 5000 USD in a bank account that pays a nominal annual interest rate of 4.2 % **compounded yearly**. Ruby invests her 5000 USD in an account that offers a fixed interest of 230 USD each year.

(a) Find the amount of money that Ruby will have in the bank after 3 years.

(2)

(b) Show that Ying will have 7545 USD in the bank at the end of 10 years.

(3)

(c) Find the number of complete years it will take for Ying's investment to first exceed 6500 USD.

(3)

(d) Find the number of complete years it will take for Ying's investment to exceed Ruby's investment.

(3)

Ruby moves from the USA to Italy. She transfers 6610 USD into an Italian bank which has an exchange rate of 1 USD = 0.735 euros. The bank charges 1.8 % commission.

(e) Calculate the amount of money Ruby will invest in the Italian bank after commission.

(4)

Ruby returns to the USA for a short holiday. She converts 800 euros at a bank in Chicago and receives 1006.20 USD. The bank advertises an exchange rate of 1 euro = 1.29 USD.

(f) Calculate the percentage commission Ruby is charged by the bank.

(5)

(Total 20 marks)

1. ***Financial Penalty applies in parts (b) and (e).***

(a) $I = \frac{40\,000(4)(3)}{100}$ (M1)

Note: *Award (M1) for substituted simple interest formula.*

$I = 4800$ (A1)

OR

$40\,000 + \frac{40\,000(4)(3)}{100}$ (M1)(M1)

Note: *Award (M1) for substituted simple interest formula, (M1) for addition of 40 000.*

Amount = 44 800USD (A1)(G2)

Note: *Award final (A1) for 44 800 only.*

(b) $44\,800 \times 18.624$ (M1)

FP = 834355 ZAR (A1)(ft)(G2)

Note: *Follow through from (a).*

(c) $50\,000 \times \frac{2.5}{100}$ (M1)

= 1250 USD (A1)(G2)

(d) $(50\,000 - 1250) \times 10.608$ (M1)(M1)

Note: *Award (M1) for their 48750 seen or implied, (M1) for × 10.608*

= 517140 (A1)

= 517 000 ZAR (AG)

Note: *Follow through from (c), both unrounded and rounded answers must be seen for final (A1) to be awarded.*

(e) $517\,000 \times (1.01)^{36}$ (M1)(A1)

OR

$= 517000\left(1 + \frac{12}{100(12)}\right)^{12\times 3}$ (M1)(A1)

Note: *Award (M1) for substituted compounded interest formula, (A1) for correct substitutions.*

FP 739 707 ZAR (A1)(G2)

Notes: *Accept 739 908 if 517 140 used.*

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2. ***Financial penalty applies in parts (b) and (c).***

(a) 0.88×16000 **OR** 0.12×16000 **OR** 1920 (M1)
14080 (A1) (C2)

(b) 1.6407×5.25×14080 (M1)
FP 121280.54 USD (A1)(ft) (C2)

Note: *Follow through from their answer to part (a).*

(c) $12 \times \frac{1}{0.8739}$ (M1)

FP 13.73 AUD (A1) (C2)

Note: *If division used in part (b) and multiplication used in part (c), award (M0)(A0) for part (b) and (M1)(A1)(ft) for part (c).*

[6]

3. ***Financial penalty (FP) applies in part (b)***

(a) $1650 = \frac{30000 \times r \times 2}{100}$ or equivalent (A1)(M1)

Note: *Award (A1) for 1650 or equivalent seen, (M1) for correct substitution into simple interest formula (right-hand side).*

$r = 2.75\ \%$ (A1)(G2)

(b) $\text{Amount} = 30000\left(1+\frac{2.5}{100}\right)^2$ (M1)(A1)

Note: *Award (M1) for substitution into compound interest formula, (A1) for correct substitution.*

FP 31518.75 AUD (A1)(G2)

OR

$I = 30000\left(1+\frac{2.5}{100}\right)^2 - 30000$ (M1)(A1)

Note: *Award (M1) for substitution into compound interest formula, (A1) for correct substitution.*

FP 31518.75 AUD (A1)(G2)

(c) Rebecca's amount = $30000\left(1+\frac{2.5}{100}\right)^n$

Daniel's amount = $30000 + \frac{30000\times 2.75\times n}{100}$ (M1)(A1)(ft)

Note: *Award (M1) for substitution in the correct formula for the two amounts, (A1) for correct substitution. Follow through from their expressions used in part (a) and /or part (b).*

OR

2 lists of values seen (at least 2 terms per list) (M1)
lists of values including at least the terms with $n = 8$ and $n = 9$ (A1)(ft)
For $n = 8$ CI 36552.09 SI = 36600
For $n = 9$ CI 37465.89 SI = 37425

Note: *Follow through from their expressions used in part (a) or/and (b).*

OR

Sketch showing 2 graphs, one exponential and the other straight line (M1)
point of intersection identified (M1)

Note: *Follow through from their expressions used in part (a) or/and (b).*

$n = 9$ (A1)(ft)(G2)

Note: *Answer 8.57 without working is awarded (G1).*

Note: *Accept comparison of interests instead of the total amounts in the two accounts.*

(d) (i) $0.80 \times 31650 = 25320$ (M1)(A1)(G2)

Note: *Award (M1) for correct use of percentages.*

(ii) $25320\left(1+\frac{3}{4\times100}\right)^{4n} > 30000$ (M1)(M1)(ft)

Notes: *Award (M1) for correct left-hand side of the inequality, (M1) for comparison to 30000. Accept equation. Follow through from their answer to part (d) (i).*

OR

List of values from their $25320\left(1+\frac{3}{4\times100}\right)^{4n}$ seen (at least 2 terms) (M1)

Their correct values for $n = 5$ (29401.18) and $n = 6$ (30293) seen (A1)(ft)

Note: *Follow through from their answer to (d) (i).*

OR

Sketch showing 2 graphs – an exponential and a horizontal line (M1)
Point of intersection identified or vertical line drawn (M1)

Note: *Follow through from their answer to (d) (i).*

$n = 6$ (A1)(ft)(G2)

Note: *Award (G1) for answer 5.67 with no working.*

[14]

4. ***Financial Penalty (FP) applies in parts (a) and (b) of this question***

(a) 1500×21.03464 (M1)

FP $= 31552$ (A1) (C2)

(b) $20\,000 \times \frac{1000}{3.28352}$ (M1)

FP $= 6\,091\,000$ (A1) (C2)

(c) $\frac{21.03464}{3.28352} \times 1000$ (M1)

1 SGD = 6406 IDR (A1) (C2)

Note: *Accept 6406.*

[6]

5. ***Financial penalty applies in part (a)***

(a) $I = 1200\left(1+\frac{7.2}{600}\right)^{5\times12} - 1200$ (M1)(A1)

FP $I = 518.15$ euros (A1) (C3)

Notes: *Award (M1) for substitution in the compound interest formula, (A1) for correct substitutions, (A1) for correct answer. If final amount found is 1718.15 and working shown award (M1) (A1)(A0).*

(b) $518.15 = \frac{1200\times r\times 5}{100}$ (M1)(A1)(ft)

$r = 8.64$ % (% sign not required) (A1)(ft) (C3)

Note: *Award (M1) for substitution in the simple interest formula, (A1)(ft) for correct substitution, (A1)(ft) for answer.*

[6]

6. ***Financial Penalty applies in Part A option 2 and option 3***

(a) **Option 1:** Amount = $25000 + \frac{25000\times 6\times 3}{100}$ (M1)(A1)

$= 29\,500.00\ (29\,500)$ (A1)(G2)

Note: *Award (M1) for substitution in simple interest formula (A1) for correct substitution. Give full credit for use of lists.*

Option 2: Amount = $25000\left(1+\frac{5}{100}\right)^{3}$ (M1)(A1)

FP $= 28\,940.63$ (A1)(G2)

Note: *Award (M1) for substitution in compound interest formula, (A1) for correct substitution. Give full credit for use of lists.*

Option 3: Amount = $25000\left(1+\frac{4.8}{12(100)}\right)^{3\times12}$ (M1)

FP $= 28\,863.81$ (A1)(G2)

Note: *Award (M1) for correct substitution in the compound interest formula. Give full credit for use of lists.*

(b) Option 1 is the best investment option. (A1)(ft)

[9]

7. ***Financial penalty (FP) applies in this question in part (e).***

(a) $5000 + 3 \times 230 = 5690$ (M1)(A1)(G2)

Note: *Accept alternative method.*

(b) $A = 5000\left(1+\frac{4.2}{100}\right)^{10}$ *or equivalent* (M1)(A1)

$= 7544.79...$ (A1)

$= 7545$ USD (AG)

Note: *Award (M1) for correct substituted compound interest formula, (A1) for correct substitutions, (A1) for unrounded answer seen. If final line not seen award at most (M1)(A1)(A0).*

(c) $5000(1.042)^n > 6500$ (M1)(A1)

Notes: *Award (M1) for setting up correct equation/inequality, (A1) for correct values. Follow through from their formula in part (b).*

OR

List of values seen with at least 2 terms (M1)

Lists of values including at least the terms with $n = 6$ and $n = 7$ (A1)

Note: *Follow through from their formula in part (b).*

OR

Sketch showing 2 graphs, one exponential, the other a horizontal line (M1)

Point of intersection identified or vertical line (M1)

Note: *Follow through from their formula in part (b).*

$n = 7$ (A1)(ft)(G2)

(d) $5000(1.042)^n > 5000 + 230n$ (M1)(A1)

Note: *Award (M1) for setting up correct equation/inequality, (A1) for correct values.*

OR

2 lists of values seen (at least 2 terms per list) (M1)

Lists of values including at least the terms with $n = 5$ and $n = 6$ (A1)

Note: *One of the lists may be written under (c).*

OR

Sketch showing 2 graphs of correct shape (M1)

Point of intersection identified or vertical line (M1)

$n = 6$ (A1)(ft)(G2)

Note: *Follow through from their formulae used in parts (a) and (b).*

(e) 6610×0.735 (M1)

$= 4858.35$ (A1)

4858.35×0.982 ($= 4770.8997...$) (M1)

FP $= 4771$ euros (A1)(ft)(G3)

Note: *Accept alternative method.*

(f) 800×1.29 (= 1032 USD) (M1)(A1)

Note: *Award (M1) for multiplying by 1.29, (A1) for 1032. Award (G2) for 1032 if product not seen.*

(1032 – 1006.20 = 25.8)

$25.8 \times \frac{100}{1032}\%$ (A1)(M1)

Note: *Award (A1) for 25.8 seen, (M1) for multiplying by* $\frac{100}{1032}$.

OR

$\frac{1006.20}{1032} = 0.975$ (M1)(A1)

OR

$\frac{1006.20}{1032} \times 100 = 97.5$ (M1)(A1)

$= 2.5\ \%$ (A1)(G3)

Notes: *If working not shown award (G3) for 2.5. Accept alternative method.*

[20]