Financial Math IB Questions – parts 1 & 2

1. The following is part of a display on the notice board of a bank in the United Kingdom. It shows the exchange rate between one British pound (GBP) and other currencies.

EXCHANGE RATES

	Bank buys foreign currency	**Bank sells foreign currency**
Denmark (KR)	11.38	10.78
Finland (MKK)	7.00	6.60
France (FFR)	10.05	9.45
Germany (DM)	2.854	2.798
Greece (DR)	292	266

NO COMMISSION CHARGED

Geraldine eats a meal in a restaurant while on holiday in Greece. The meal costs 4256 drachma (DR).

(a) Use the **bank-selling** price to calculate the cost of the meal in British pounds.

The Williams family go to Germany. Before leaving, they change 600 GBP into German marks.

(b) Calculate the number of German marks they receive for 600 GBP , giving your answer correct to two decimal places.

They spend 824 DM in Germany, and on returning to the United Kingdom, they change their remaining German marks into British pounds.

(c) Calculate the number of British pounds they receive, correct to two decimal places.

Working:

Answers:

(a) .....

(b) .....

(c) .....

(Total 4 marks)

2. The exchange rate from US dollars (USD) to French francs (FFR) is given by 1 USD = 7.5 FFR. Give the answers to the following correct to **two** decimal places.

(a) Convert 115 US dollars to French francs.

(b) Roger receives 600 Australian dollars (AUD) for 2430 FFR. Calculate the value of the US dollar in Australian dollars.

Working:

Answers:

(a) .....

(b) .....

(Total 8 marks)

3. Zog from the planet Mars wants to change some Martian Dollars (MD) into US Dollars (USD). The exchange rate is 1 MD = 0.412 USD. The bank charges 2% commission.

(a) How many US Dollars will Zog receive if she pays 3500 MD?

Zog meets Zania from Venus where the currency is Venusian Rupees (VR). They want to exchange money and avoid bank charges. The exchange rate is 1 MD = 1.63 VR.

(b) How many Martian Dollars, to the nearest dollar, will Zania receive if she gives Zog 2100 VR?

Working:

Answers:

(a) .....

(b) .....

(Total 8 marks)

4. Bobby is spending a year travelling from America to France and Britain.
Consider the following exchange rates.

1 US dollar (USD) = 0.983 Euros
1 British Pound (GBP) = 1.59 Euros

(a) Bobby changes 500 USD into Euros.

(i) Calculate how many Euros he receives.

He spends 328 Euros in France and changes the remainder into GBP.

(ii) Calculate how many GBP he receives.

While in Britain Bobby decides to put this money in a bank that pays 6% simple interest per annum, and he gets a part-time job to cover his expenses. Bobby remains in Britain for six months.

(b) Calculate how much interest he receives for the six months.

Working:

Answers:

(a) (i) .....
(ii) .....
(b) .....

(Total 8 marks)

5. At what interest rate, compounded annually, would you need to invest \$100 in order to have \$125 in 2 years?

Working:

Answer:

……..

(Total 4 marks)

6. Takaya invested 1000 JPY at 6.3% simple interest for 15 years. Morimi invested 900 JPY at 6.3% interest compounded annually for 15 years. Who had more money at the end of the 15th year? Justify your answer **clearly**.

(Total 5 marks)

7. Two brothers Adam and Ben each inherit $6500. Adam invests his money in a bond that pays simple interest at a rate of 5% per annum. Ben invests his money in a bank that pays compound interest at a rate of 4.5% per annum.

(a) Calculate the value of **Adam's** investment at the end of 6 years.

(3)

(b) Calculate the value of **Ben's** investment at the end of 6 years. Give your answer **correct to 2 decimal places**.

(3)

Working:

Answers:

(a) .....

(b) .....

(Total 6 marks)

8. Emma places €8000 in a bank account that pays a nominal interest rate of 5% per annum, compounded quarterly.

(a) Calculate the amount of money that Emma would have in her account after 15 years. Give your answer correct to the nearest Euro.

(3)

(b) After a period of time she decides to withdraw the money from this bank. There is €9058.17 in her account. Find the number of months that Emma had left her money in the account.

(3)

Working:

Answers:

(a) .....

(b) .....

(Total 6 marks)

9. Kurt wants to invest 2000 Euros in a savings account for his new grandson.

(a) Calculate the value of Kurt's investment based on a **simple interest rate** of 4% *per annum*, after 18 years.

Inge tells Kurt about a better account which offers interest at a rate of 3.6% *per annum*, **compounding monthly**.

(b) Giving your answer to the nearest Euro, calculate the value of Kurt's investment after 18 years if he follows Inge's advice.

Working:

Answers:

(a) .....

(b) .....

(Total 8 marks)

10. Ali, Bob and Connie each have 3 000 USD (US dollar) to invest.

Ali invests his 3 000 USD in a firm that offers simple interest at 4.5% per annum. The interest is added at the end of each year.

Bob invests his 3 000 USD in a bank that offers interest compounded annually at a rate of 4% per annum. The interest is added at the end of each year.

Connie invests her 3 000 USD in another bank that offers interest compounded half-yearly at a rate of 3.8% per annum. The interest is added at the end of each half year.

(a) Calculate how much money Ali and Bob have at the **beginning** of year 7.

(6)

(b) Show that Connie has 3 760.20 USD at the beginning of year 7.

(3)

(c) Calculate how many years it will take for Bob to have 6 000 USD in the bank.

(3)

At the beginning of year 7, Connie moves to England.

She transfers her money into a Bank there at an exchange rate of 1 USD = 0.711 GBP (British pounds).

The bank charges 2% commission.

(d) (i) Calculate, in USD, the commission that the bank charges.

(ii) Calculate the amount of money, in GBP, that Connie transfers to the bank in England.

(5)

(Total 17 marks)

Financial Math IB Questions – parts 1 & 2: Answers

1. (a) $4256 \div 266 = 16$ GBP (A1)

Note: *Penalize only once in parts (b) and (c) if the buying and selling price are consistently confused throughout the question. Allow (ft) marks.*

(b) $600 \times 2.798 = 1678.80$ DM (A1)

(c) $1678.80 - 824 = 854.80$ DM
$= (854.80 \div 2.854)$ GBP (M1)
$= 299.51$ GBP (2 d.p.) (A1)

Note: *Penalize only once for answer not given to 2 d.p.*

[4]

2. (a) $115 \times 7.5 = 862.5$ (M1)(A1)
862.50 USD (A1) (C3)

(b) **METHOD 1**

$\frac{2430}{600} = \frac{1\text{FFR}}{x\,\text{AUD}}$ (M1)

1 FFR = 0.247 AUD (A1)
1 USD = 7.5 FFR = 7.5×0.247 AUD = 1.8518... (M1)(A1)

1 USD = 1.85 AUD (2 d.p.) (A1) (C5)

METHOD 2

2430 FFR = 600 AUD (M1)

1 FFR = $\frac{600}{2430}$ AUD (= 0.247 AUD) (M1)

1 USD = 7.5 FFR = $7.5 \times \frac{603}{2430} = 1.8518...$ (M1)(A1)

1 USD = 1.85 AUD (2 d.p.) (A1) (C5)

[8]

3. (a) 3500×0.412 USD = 1442 USD (M1)(A1)
$1442 \times 0.98 = 1413.16$ USD (M2)(A1) (C5)

OR

3500×0.412 USD = 1442 USD (M1)(A1)
$1442 - 1442 \times 0.02 = 1413.16$ USD (M2)(A1) (C5)

(accept nearest \$1413 or 3 s.f. \$1410).

(b) $\frac{2100}{1.63} = 1288.34$ (M1)(A1)

= 1288 MD to the nearest dollar. (A1) (C3)

[8]

4. (a) (i) $500 \times 0.983 = 491.50$ Euros (492 Euros) (M1)(A1)

(ii) $491.50 - 328 = 163.50$ Euros (A1)

$\frac{163.50}{1.59} = 102.83$ GBP (103 GBP) (M1)(A1) (C5)

(b) $\frac{102.83 \times 0.5 \times 6}{100}$ (M1)(A1)

= £3.08 (A1) (C3)

[8]

5. $A = C\left(1 + \frac{r}{100}\right)^n$

$125 = 100\left(1 + \frac{r}{100}\right)^2$ (M1)

$1.25 = \left(1 + \frac{r}{100}\right)^2$ (M1)

$1.11803398 - 1 = \frac{r}{100}$ (M1)

$r = 11.8\%$ (3 s.f.) (A1) (C4)

[4]

6. Takaya: $1000 + 1000(0.063)(15) = 1945$ JPY (M1)(A1)

Morimi: $900(1.063)^{15} = 2250$ JPY (M1)(A1)

Morimi had more (A1) 5

Note: *Award (M0)(A0) for computing interest only for Takaya.*
Award (M1) follow through, (A1) follow through for follow through with only interest for Morimi.
Award (A1) for "Morimi had more" for comparing the two interests.
Award (A1) for "Morimi had more" for any reasoning that shows understanding of difference between compound and simple interest.
Award (A0) for "Morimi had more" after computing interest for Takaya, but interest + principal for Morimi.
Award (A1) for "Morimi had more" with no work shown at all.

[5]

7. (a) Adam $I = \dfrac{Crn}{100}$

$= \dfrac{6500 \times 5 \times 6}{100}$ (M1)(A1)

Adam has 1950 + 6500 = \$8450 (A1) (C3)

(b) Ben Amount = $6500\left(1 + \dfrac{4.5}{100}\right)^6$ (M1)(A1)

(FP)

= \$8464.69 (A1) (C3)

Note: *(M1)*(A1)(A0) *if interest only found (=\$1964.69)*

[6]

8. (a) $FV = 8000\ (1.0125)^{60}$ (M1)(A1)

Note: *(M1) for substituting in compound interest formula, (A1) for correct substitution*

€16857 only (A1) (C3)

(b) $8000\ (1.0125)^n = 9058.17$ (M1)

Note: *(M1) for equating compound interest formula to 9058.17*

n =10 *correct answer only* (A1)

So 30 months, (ft) on their n (A1)(ft)

Note: *Award (C2) for 2.5 seen with no working* (C3)

[6]

9. (a) I = 0.04 × 2000 × 18 = 1440 Euros (M1)(A1)

Total amount = I + 2000 = 3440 Euros. (M1)(A1) (C4)

(b) $2000\left(1 + \dfrac{0.036}{12}\right)^{18\times12}$ (M1)(A1)

= 3819.72 (A1)

= 3820 Euros, to nearest Euro. (A1) (C4)

[8]

10. (a) Ali : $\frac{(3000\times 4.5\times 6)}{100}+3000=\$3810$ (M1)(A1)(A1)

Note: *Award (M1) for correct formula, (A1) for correct numbers in formula, (A1) for correct answer.*

Bob : $3000\left(1+\frac{4}{100}\right)^{6}=\$3\,795.96\,(=\$3800)$ (M1)(A1)(A1) or (G3) 6

Note: *Award (M1) for correct formula, (A1) for correct numbers in formula, (A1) for correct answer.*

(b) Connie : $3000\left(1+\frac{3.8}{200}\right)^{12}=\$3\,760.204\,(482)$ (M1)(A1)(A1)

Note: *Award (M1) for correct formula, (A1) for correct numbers in formula (A1) for full correct answer.*

= \$3760.20 (AG) 3

(c) $3000(1.04)^{n}=6000$ (M1)(A1)

$1.04^{n}=2$

n = 18 (by trial and error or solver or by using logarithms) (A1) or (G3) 3

(accept 17.7)

(d) (i) 2% of 3760.20 = 75.20 USD (M1)(A1) 2

(ii) 3760.20 – 75.20 = 3685 (A1)

3685 × 0.711 = 2620.035 GBP
(accept 2620.04, 2620.03, 2620) (M1)(A1) 3

[17]