

Answers to Financial Math Review Packet-November Questions

1. **Financial penalty (FP) applies in parts (b) and (d).**
Accuracy penalty applies in part (e) if answer not given correct to 2 decimal places

(a) $4000 \times 0.97 = 3880.00$ (3880) (M1)(A1)(G2)

Note: Award (M1) for multiplication of correct numbers.

OR

3% of 4000 = 120 (A1)

$4000 - 120 = 3880.00$ (3880) (A1)(G2)

FP (b) $3880 \times 0.3071 = 1191.55$ (M1)(A1)(ft)(G2)

Note: Award (M1) for multiplication of correct numbers.

Follow through from their answer to part (a).

(c) $\frac{400}{0.3125}$ (M1)

= 1280.00 (1280) (A1)(G2)

Note: Award (M1) for division of correct numbers.

FP (d) 63.20 (A1)(ft)

Note: Follow through (their (c) –1216.80).

(e) $t = \frac{63.20 \times 100}{1280}$ (M1)

$t = 4.94$ (A1)(ft)(G2)

Note: Follow through from their answers to parts (c) and (d).

[9]

2. **Financial penalty (FP) applies in part (b).**
Accuracy penalty applies in part (c) if answer not given correct to 2 decimal places.

(a) $A = 1000 \left(1 + \frac{3.5}{2 \times 100}\right)^6 = 1109.7023\dots$ (M1)(A1)(A1)

= 1109.70 (AG)

Notes: Award (M1) for substitution into correct formula, (A1) for correct substitution, (A1) for unrounded answer. If 1109.70 not seen award at most (M1)(A1)(A0).

OR

$I = 1000 \left(1 + \frac{3.5}{2 \times 100}\right)^6 - 1000 = 109.7023$ (M1)(A1)

$A = 1109.7023\dots$ (A1)

= 1109.70 (AG)

Note: Award (M1) for substitution into correct formula, (A1) for correct substitution, (A1) for unrounded answer.

FP (b) 109.70 (A1)

Note: No follow through here.

(c) $\frac{1000 \times 3 \times r}{100} = 109.70$ (A1)(M1)

$r = 3.66$ (A1)(ft)(G2)

Notes: Award (A1) for 109.70 seen and used, (M1) for correct substitutions in simple interest formula, (A1) for answer.

Follow through from their answer to (b).

If 1109.70 or other is used as interest award at most

(A0)(M1)(A0).

[16]

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

(a) $k = 2.034 \times 0.632$ (M1)

$= 1.29$ (1 GBP = 1.29 EUR) (A1) (C2)

Note: Accept 1.29 only

(b) 400×0.632 (M1)

$= 252.80$ EUR (A1)

2 % of 252.80 = 5.06 EUR (A1)

FP She receives 247.74 EUR (A1)

OR

FP $0.98 \times 252.80 = 247.74$ EUR (A1)(A1) (C4)

Note: Accept (A1) for 0.98 seen.

[6]

4. Financial penalty (FP) applies in part (b).

(a) $568 = \frac{(5000 \times r \times 4)}{100}$ (M1)(A1)

Note: Award (M1) for substitution into the simple interest formula, (A1) for correct values.

$r = 2.84$ (A1) (C3)

(b) $I = 5000 (1.009)^{16} - 5000$ (M1)(A1)

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

FP $I = 770.70$ CHF (A1) (C3)

[6]

5. Financial penalty (FP) applies in parts (a) and (c) in this question.

(a) $500 \times \frac{100}{3.684}$ (M1)

FP = 13572 (A1) (C2)

Note: (M1) for multiplication by $\frac{100}{3.684}$

(b) 2500×0.03 (M1)
 $= 75$ (75.0, 75.00) (A1)

If $2500 \times 0.03 \times \frac{3.672}{100}$
 $= 2.75$ (C2)

Note: Award (M1)(A0)

(c) $2425 \times \frac{3.672}{100}$ (M1)(ft)

FP = 89.05 (A1)(ft)

OR

$\frac{3.672}{100} \times 0.97 \times 2500$ (M1)(ft)

FP = 89.05 (A1)(ft)

OR

3% of 91.8 = 2.754
 $91.8 - 2.754$ (M1)(ft)

FP = 89.05 (A1)(ft) (C2)

Note: (ft) in (c) if the conversion process is reversed consistently through the question. i.e. multiplication in (a) followed by division in (c)

[6]

6. Financial penalty (FP) applies in part (a) in this question.

(a) $2000(1.04)^{10}$ (M1)(A1)

Note: (M1) for substitution into CI formula.
 (A1) for correct substitution.

FP 2960 (A1)

OR

$2000 \left(1 + \frac{8}{200}\right)^{10} - 2000$ (M1)(A1)

Note: (M1) for substitution into CI formula
 (A1) for correct substitution

2960 (A1) (C3)

(b) $1500(1.078)^n = 3000$ (M1)(M1)

Note: (M1) for correct substitution in CI formula, (M1) for 3000 seen.

$n = 10$ years ($n = 9.23$ years not accepted) (A1)

OR

$1500(1.078)^n - 1500 = 1500$ (M1)(M1)

Note: (M1) for correct substitution in CI formula, (M1) for 1500 seen.

$n = 10$ years ($n = 9.23$ years not accepted) (A1)

OR

Note: (M2) for list or graph. (M2)

$n = 10$ years ($n = 9.23$ years not accepted) (A1)

Note: If simple interest formula is used in both parts (a) and (b) then award (M0)(M0)(A0) in (a) and

(b) $1500 = \frac{1500(7.8)n}{100}$ (M1)(A1)

(M1) for substitution in SI formula or lists, (A1) for correct substitution

$n = 13$

Correct answer only. (A1) (C3)

If 9.23 seen without working award (A2).

If calculator notation is used in either part with correct unrounded answer award (A1)(d) only if (FP) is applied in (a) or (AP) in (b).

Otherwise (A2)(d) if penalty has already been applied in a previous question.

[6]

7. Financial penalty (FP) is applicable in question part (b) **only**.

(a) Adam $I = \frac{Cn}{100}$
 $= \frac{6500 \times 5 \times 6}{100}$ (M1)(A1)

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

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

= \$8464.69 (A1) (C3)

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

[6]

8. Financial accuracy penalty (FP) is applicable in parts (a) and (b).

(a) $120 - 3 = 117$

117×1.37 (A1)

FP = 160.29 euros (correct answer only) (M1)

Note: First (A1) for 117 seen, (M1) for multiplying by 1.37 (A1)(G2) 3

(b) $\frac{13.5}{1.37}$ (A1)(M1) 3

FP 9.85 GBP (answer correct to 2dp only) (A1)(ft)(G3)

Note: First (A1) is for 13.5 seen, (M1) for dividing by 1.37

[6]

9. (a) $\frac{20000 \times 2 \times 8}{100} = 3200$ Swiss francs (M1)(A1) (C2)

Note: Award (M1) for formula with correct values.

(b) $20\,000 (1.0125)^{24} - 20\,000$ (M1)(A1)
 $= 6947.02$ Swiss francs (A1)

Principal = 26947.02 Swiss francs. (A1)(ft) (C4)

Note: (M1) for correct substituted formula, (A1) for correct values inserted. (A1) for 6947.02 and (A1) for adding back the 20 000. The last (A1) follows through from the previous answer.

OR

$20000 (1.0125)^{24}$ (M2)(A1)
 $= 26947.02$ Swiss francs (A1)

Note: (M2) for correct substituted formula, (A1) for correct substitution, (A1) for correct answer.

(M2)(A1) (A1)

[6]

10. (a) $1000 \times 0.98 \times 0.543 = 532.14$ (M1)(M1)(A1)

Note: Award (M1) for multiplying by 0.98, (M1) for multiplying by 0.543. Accept 532.

OR

$1000 \times 0.543 \times 0.02 = 10.36$ (M1)(M1)

$543 - 10.36 = 532.14$ (A1) (C3)

Note: (M1) for multiplying by 0.543, (M1) for multiplying by 0.02 and (A1) for correct answer.

(b) $\frac{150 \times 1.35 - 200}{1.35} = 1.85$ GBP (M1)(M1)(A1)

Note: Award (M1) for 150×1.35 , (M1) for subtracting 200 or for 2.5 seen and (A1) for correct answer in GBP.

OR

$150 - \frac{200}{1.35} = 1.85$ GBP (M1)(M1)(A1) (C3)

*Note: Award (M1) for subtracting from 150, (M1) for $\frac{200}{1.35}$
and (A1) for correct answer in GBP.*

[6]

11. (a) 800×1.5162 for multiplying by 1.5162 (M1)
 $= 1212.96$ EUR (accept 1213) (A1) (C2)
- (b) $1212.96 / 1.5546$ (M1)
 $= 780.24$ (accept 780) (A2) (C3)
- (c) 19.76 CAD (A1) (C1)

[6]

12. (a) $600 \left(1 + \frac{2.75}{100}\right)^4 = 668.77$ (accept 669) (M1)(A1)
- OR**
 669 (G2) (C2)

- (b) $600 \left(1 + \frac{2.75}{100}\right)^n = 1200$ (M1)
 $n = 25.6$
 $n = 26$ (A1)
OR
 26 (G2) (C2)

- (c) $600 \left(1 + \frac{r}{100}\right)^{20} = 1200$ (M1)
- $1 + \frac{r}{100} = 1.03526$
 $r = 3.53\%$ (A1)
OR
 3.53% (G2) (C2)

[6]

13. (a) For attempting to find 5 years by compound interest formula or any alternative method. (M1)
 For using (1.0375) (M1)
 $\$1442.52$ accept 3 s.f. (A1) (G3)

Note: Accept \$1440 or \$1443.

- (b) For using answer in part (a) in an expression. (M1)
 For multiplying by $(1.0325)^3$ (M1)
 $\$1587.79$ accept \$1588 or \$1590 (A1) (G3)

[6]

14. (i) (a)

	0	1	2	3	4
Option 1	20000	20700	21425	22174	22950
Option 2	20000	20800	21600	22400	23200

(A3) 3

*Notes: Award (A2) for Option 1 all correct.
Award (A1) for Option 2 all correct.*

- (b) $A = 20000(1.035)^{15}$ (A1)
 Option 1 = 33507 (A1)
 $A = 20000 + 15 \times 800$ (A1)
 Option 2 = 32000 (A1)

OR

- Option 1 = 33507 (G2)
 Option 2 = 32000 (G2) 4

- (c) 7 years (from reading the table from GDC) (G2) 2

- (d) $\frac{800}{31200} \times 100$ (M1)

Note: Award (M1) for candidate's difference divided by their original times 100.

- = 2.56% (A1) 2

- (ii) Option 3: $20000 \times (1.035)^7 + 800 \times 8$ (M1)(A1)
 = \$31845.59 (A1)
 Option 4: $(20000 + 7 \times 800) \times (1.035)^8$ (M1)(A1)
 = \$33710.31 (A1)

OR

- \$31845.59 (G3)
 \$33710.31 (G3)
 She should choose Option 4 (R1) 7

[18]

15. (a) 2.95 euros (A2) (C2)

- (b) 3.40 euros (A1)

$3.40 \times 40\% = 1.36$ (M1)

$3.40 - 1.36 = 2.04$ euros (A1)

OR

3.40 euros (A1)

$3.40 \times 60\% = 2.04$ euros (M1)(A1) (C3)

- (c) saving = 1.36 euros (A1)
 $\frac{15}{1.36} = 11.03$ (M1)
 So, he must make 12 journeys. (A1) (C3)
Note: If no working shown, award only (A2) for 11 journeys.

[8]

16. (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 : $3000 \left(1 + \frac{4}{100}\right)^6 = \$3795.96 (= \$3800)$ (M1)(A1)(A1) or (G3) 6
Note: Award (M1) for correct formula, (A1) for correct numbers in formula, (A1) for correct answer.

- (b) Connie : $3000 \left(1 + \frac{3.8}{200}\right)^{12} = \$3760.204(482)$ (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)
 $3685 \times 0.711 = 2620.035$ GBP
 (accept 2620.04, 2620.03, 2620) (M1)(A1) 3

[17]

17. (a) $1200 \times 1.03^2 = 1273$ (M1)(A1)(A2) (C4)
*Note: Award (M1) for using correct formula, (A1) for substituting correct numbers, (A2) for answer ((A1) of which is for answer to the nearest pound).
 Award (M1)(A0)(A2) ft if the candidate has put 3 for the power.
 Award (M1)(A0)(A1) ft if the candidate has put 1 for the power.*

OR

3% of 1200 = 36 (M1)

$$\begin{aligned} \text{After 1 year fees} &= 1236 && \text{(A1)} \\ 3\% \text{ of } 1236 &= 37.08 && \text{(M1)} \\ \text{fees after 2 years} &= 1236 + 37.08 = 1273.08 \\ &= 1273 && \text{(A1)} \end{aligned}$$

Note: Award (M1)(A1)(M1)(A0) if candidate has repeated the process another time.

$$\begin{aligned} \text{(b)} \quad & \frac{1200(1.03^5 - 1)}{(1.03 - 1)} && \text{(M1)(A1)} \\ & = 6370.96 \text{ (6370 to 3 s.f.)} && \text{(A2) (C4)} \end{aligned}$$

Note: Award (M1) for using correct formula, (A1) for substituting correct numbers, (A2) for answer. Candidates can also write out each term and add them up.

Award (M1)(A1) for terms and (A2) for the correct answer.

Award only (A1) if answer is incorrect due to premature rounding.

[8]

$$\begin{aligned} \mathbf{18.} \quad \text{(a)} \quad \text{(i)} \quad & 500 \times 0.983 = 491.50 \text{ Euros (492 Euros)} && \text{(M1)(A1)} \\ \text{(ii)} \quad & 491.50 - 328 = 163.50 \text{ Euros} && \text{(A1)} \\ & \frac{163.50}{1.59} = 102.83 \text{ GBP (103 GBP)} && \text{(M1)(A1) (C5)} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & \frac{102.83 \times 0.5 \times 6}{100} && \text{(M1)(A1)} \\ & = \text{£}3.08 && \text{(A1) (C3)} \end{aligned}$$

[8]

$$\begin{aligned} \mathbf{19.} \quad \text{(a)} \quad & A = 6000(1.06)^{10} && \text{(M1)(A1)} \\ & = 10745 \text{ (AUD)} && \text{(A1) (C3)} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 10745 - 5000 && \\ & = 5745 && \text{(A1)} \\ & 5000 \times 1.08 + 5745 \times 1.06 && \text{(M1)(M1)} \\ & = 11489.80 && \text{(A1)} \\ & = 11490 \text{ (to the nearest AUD)} && \text{(A1) (C5)} \end{aligned}$$

[8]

$$\mathbf{20.} \quad \text{(a)} \quad 1.7700 \text{ CHF} \quad \text{(A2) (C2)}$$

$$\begin{aligned} \text{(b)} \quad & \mathbf{Method 1} \\ & 2\% \text{ of } 1000 \text{ CHF} = 20 && \text{(A1)} \\ & \text{Amount} = 1000 - 20 && \text{(M1)} \\ & = 980 \text{ CHF} && \text{(A1)} \\ & = \frac{980}{1.7700} \text{ USD} && \text{(M1)} \\ & = 553.67 \text{ USD} && \text{(A1)} \\ & = 554 \text{ USD (to nearest dollar)} && \text{(A1) (C6)} \end{aligned}$$

Method 2

$$1.7700 \text{ CHF} = 1 \text{ USD}$$

$$\begin{aligned}
1000 \text{ CHF} &= \frac{1000}{1.77} && \text{(M1)} \\
&= 564.97175 && \text{(A1)} \\
&564.97175 \times 0.98 && \text{(M1)(A1)} \\
&= 553.67 && \text{(A1)} \\
&= 554 \text{ USD (to the nearest dollar) (ft from answer in (a))} && \text{(A1) (C6)}
\end{aligned}$$

[8]

21. (a) $0.08m + 0.06f = 640$ (A2) (C2)
 $m + f = 10\,000$ (A2) (C2)

(b) $8m + 6f = 64\,000$
 $\frac{-8m - 8f = 80\,000}{-2f = -16\,000}$ (M1)
 $f = 8000$ or \$8000 at First National Bank (M1) (C2)
 $m = 2000$ or \$2000 at Midland Bank (A1)
(A1) (C2)

Note: Allow ft from part (a).

[8]

22. (a) $S = 2.5(133 - 3)$ (M1)
 $S = 325 \text{ CHF}$ (A1) (C2)

(b) $S = 2.5(b - 3)$ or $2.5(b - 3)$ (A2) (C2)

(c) $430 = 2.5(b - 3)$ (M2)
 $172 = b - 3$
 $175 = b$
 175 GBP (A2) (C4)

[8]

[8]

23. (a) Choice A = $100 \times 12 = \$1200$ (A1)
Choice B = $1100 \left(1 + \frac{12}{1200}\right)^{12} = \1239.51 (M1) (A1)
Choice C = $75 + 80 + \dots$ (M1)
 $= \frac{12}{2} \{2 \times 75 + 11 \times 5\} = \1230 (A1)
Choice D = $80 + 80 \times 1.05 + 80 \times 1.05^2 + \dots$ (M1)
 $= \frac{80(1.05^{12} - 1)}{(1.05 - 1)} = \1273.37 (M1) (A1)

*Note: Award method marks if candidate works out each amount.
But the answer has to be accurate to receive the mark of (A1).*

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(b) Option D because the total allowance is the highest (C1) (R1) 2

(c) $1200 \left(1 + \frac{r}{100}\right)^2 = 1452$ (A1)

$$\left(1 + \frac{r}{100}\right)^2 = \frac{1452}{1200} = 1.21 \quad (\text{A1})$$

$$\left(1 + \frac{r}{100}\right) = \sqrt{1.21} = 1.1 \quad (\text{A1})$$

$$\frac{r}{100} = 0.1$$

$$r = 10\% \quad (\text{A1}) \quad 4$$

[14]

24. (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]

25. (a)

	Amount	End of month + Interest	
January	600	604.50	
February	1904.50	1918.78	
end January:	$600 \times 1.0075 = 604.50$		(M1)
begin February:	$604.50 + 1300 = 1904.50$		(M1)
end February:	$1904.50 \times 1.0075 = 1918.78$		(M1)(AG) 3

(b) March amount $= 1918.78 + 230$
 $= 2148.78$
 end of March $= 2148.78 \times 1.0075$ (M1)
 $= 2164.90$

April amount $= 2164.90 + 710$
 $= 2874.90$
 end of April $= 2874.90 \times 1.0075$
 $= 2896.46$ (A1) 2

(c) 2896.46×1.0075^8 (M1)
 $= 3074.88$ (A1) 2

(d) $3074.88 \times 1.035^n = 3300$
 $n = 1$ $3074.88 \times 1.035 = 3182.50$
 $n = 2$ $3074.88 \times 1.035^2 = 3293.89$
 $n = 3$ $3074.88 \times 1.035^3 = 3409.17$ (M1)
 Hence after 3 years. (A1)

OR

$3074.88 \times 1.035^n = 3300$
 $\Rightarrow n = 3$, that is, after 3 years. (G2) 2

Note: Candidates may also use logarithms to solve this.

[9]

26. (a) Monthly repayment = AUD 95.07 (A1) (C1)
- (b) Monthly repayment on AUD 8000 taken over 5 years at 18% per annum (M1)
 $= 8 \times 26.14$
 $= \text{AUD } 209.12$

Note: Award (M1) for multiplying by 8

Total repaid = $209.12 \times 5 \times 12$ (M1)
 $= \text{AUD } 12547.20$ (A1) (C3)

Notes: Award (M1) for multiplying by (5×12) or 60. No accuracy specified, but the answer is exact.

[4]

27. (a) Price today = $\text{USD } 180\,000 \times 1.03^3$ (M1)
 $= \text{USD } 196690.86\dots\dots$
 $= \text{USD } 196691$ or $\text{US\$}196691$ (to the nearest dollar) (A1) (C2)

Note: Accept equivalent method

- (b) $119102 = 100\,000 \times r^3$
 $1.19102 = r^3$ (M1)
 $r = 1.060001187$
 Rate = 6.00% per annum (3 s.f.) (accept 6%) (A1) (C2)

[4]

28. *Notes: If no method is shown, award (M1)(A1) if and only if answer is correct, otherwise award zero marks. However, award (M1) if correct method is shown; even if final answer is wrong.*

- (a) (i) $p = \frac{1}{0.64} = 1.56$ (2 d.p.) (M1)(A1)
- (ii) $q = \frac{1}{0.19} = 5.26$ (2 d.p.) (M1)(A1) 4

Notes: For parts (a)(i) and (a)(ii) accept and follow through with conversions routed via candidate's home currency. For example:

$\text{USD } 1 = \text{GBP } 0.64$
 $\text{GBP } 1 = \text{FFR } 8.33$
 $\therefore \text{USD } 1 = \text{FFR } (0.64) (8.33)$
 $\Rightarrow q = 5.33$ instead of 5.26

- (b) (i) $\text{GBP } (1500 \times 0.64) = \text{GBP } 960.00$ (M1)(A1) 2
Note: Accept $(1500 \div 1.56$ (or candidate's p)) = $\text{GBP } 961.54$

- (ii) (a) $(0.015 \times 960) = \text{GBP } 14.40$ (A1) 1
Note: Follow through from part (b)(i) above.

(b) $(960 - 14.40) = \text{GBP } 945.60$ (A1) 1

Note: Follow through from parts (b)(i) and (b)(ii)(a).

(c) (i) $700(1.05)^4 = \text{GBP } 850.85$ (M1)
Therefore interest = GBP 150.85 (A1) 2

(ii) $700(1.05)^5 = 893.397\dots = 893.40$ (2 d.p.) (M1)
 $700(1.05)^6 = 938.066\dots = 938.07$ (2 d.p.)
therefore after 6 years (A1) 2

Note: Accept other correct methods.

(d) $C(1.05)^4 = 900$
 $\Rightarrow C = \frac{900}{(1.05)^4}$ (M1)

Notes: Award the (M1) at the point where C has been correctly isolated

Accept $C = \frac{900}{1.22} = \text{GBP } 738$

= GBP 740 (nearest GBP) (A1) 2

[14]

29. (a) $X(1.005)^{12}$ (A1)

(b) $X(1.005)^{12} = X\left(1 + \frac{r}{100}\right)$ (M1)

Note: Award (M1) for equating follow through from (a).

$r = 100(1.0617) - 100$ (or equivalent) (M1)

Note: Award (M1) for isolating r correctly.

Rate = 6.17% (A1)

[4]

30. (a) Compound interest (A1)
8% per year (A1)

(b)

Year	Value at beginning of year	Value at end of year
1st	CHF 500	CHF 540
2nd	CHF 540	CHF 583.20
3rd	CHF 583.20	CHF 629.86
4th	CHF 629.86	CHF 680.25
5th	CHF 680.25	CHF 734.67
6th	CHF 734.67	CHF 793.44

(A1)

(A1)

[4]

