revise.wales — Mark Scheme

Mock Paper A — Unit 1: Financial Mathematics and Other Applications of Numeracy
(Higher Tier, Calculator-allowed)

80 marks. R.WM-MNH-U1-001 (MS).

Notation. Mn = method mark; An = accuracy / answer mark; Bn = independent unsupported correct value; Cn = communication (OCW); ft = follow through from a prior error; oe = or equivalent; cao = correct answer only.

Question 1 (5 marks)

(a) **B1** LCM $= 2^3 \times 3^2 \times 5 \times 7 =$ **2520** (cao).

(b) **B1** $\frac{2}{3} \times 0{\cdot}87 \times 540 =$ £**313·20** (cao). Accept any equivalent order of operations.

(c) **M1** Graphs: $480 \times \frac{3}{8} = 180$; remaining $= 300$.
M1 Tables: $0{\cdot}35 \times 300 = 105$.
A1 Commentary $= 300 - 105 =$ **195** pages (cao).

Question 2 (8 marks)

(a) **M1** Pension $= 0{\cdot}05 \times 34{,}500 =$ £$1{,}725$.
M1 Tax: $(34{,}500 - 1{,}725 - 12{,}570) \times 0{\cdot}20 = 20{,}205 \times 0{\cdot}20 =$ £$4{,}041$.
M1 NI: $(34{,}500 - 12{,}570) \times 0{\cdot}08 =$ £$1{,}754{\cdot}40$.
A1 Take-home $= 34{,}500 - 1{,}725 - 4{,}041 - 1{,}754{\cdot}40 =$ £**26,979·60** (cao). Accept £$26{,}980$.

(b) **(i)** **B1** $36 \times 247{\cdot}80 =$ £**8,920·80** (cao).

(ii) **B1** Cost $= 8{,}920{\cdot}80 - 8{,}000 =$ £**920·80** (ft from (b)(i)).

(iii) **M1** Flat rate per year $= \dfrac{920{\cdot}80}{8{,}000 \times 3} \times 100 = 3{\cdot}836\ldots\%$.

A1 $\approx$ **3·84%** per year; APR is higher because it is a compound rate computed on the *reducing* balance, not on the original loan (oe — accept any clear statement of compounding on the declining balance).

Question 3 (4 marks)

(a) **M1** $528 / 1{\cdot}20$ or recognise $528 = 120\%$ of pre-VAT.
A1 £**440·00** (cao).

(b) **M1** Plan total $= 60 + 18 \times 29{\cdot}50 =$ £591; difference $= 591 - 528 =$ £63.
A1 Cash is cheaper by £**63·00**; must state which.

Question 4 (11 marks)

(a) **M1** Apply charge: $750 - 4{\cdot}50 =$ £$745{\cdot}50$.
M1 $\times 1{\cdot}16 =$ €$864{\cdot}78$; then $-240 =$ €$624{\cdot}78$.
M1 $\times 1{\cdot}08 =$ \$$674{\cdot}76$; then $\div 1{\cdot}27$.

A1 £**531·31** (± 1 p tolerance).

(b) **M1** Loss $= 750 - 531{\cdot}31 - (240/1{\cdot}16) = 750 - 531{\cdot}31 - 206{\cdot}90 = £\,11{\cdot}79$.

A1 $11{\cdot}79/750 \times 100 \approx$ **1·6%** (accept $1{\cdot}5$–$1{\cdot}6$%).

(c) **M1** Pre-DST leg $22{:}45 \to 01{:}00 = 2$ h 15 min.

M1 Convert Dubai $09{:}20$ to UK BST = $06{:}20$ (Dubai = UK$+3$ post-DST); post-DST leg $02{:}00 \to 06{:}20 = 4$ h 20 min.

A1 Total = **6** h **35** min (cao).

Alt: convert Cardiff departure to Dubai local pre-DST ($02{:}45$ Sun Dubai) then $09{:}20 - 02{:}45 = 6$ h 35 min. Candidate must state at least one compensating effect to earn both M1s.

(d) **M1** Numerical comparison: loss from (b) is £ $11{\cdot}79$, which is greater than the £ $4{\cdot}50$ bank charge alone (oe; accept any clear statement that $11{\cdot}79 > 4{\cdot}50$, or that the exchange-rate-loss £ $7{\cdot}29$ sits on top of the charge).

A1 Comment: friend is right *only as a hypothetical* – the £ $4{\cdot}50$ charge is smaller than the total round-trip loss, but Bethan needed euros to spend in Spain so keeping sterling was not actually an option (oe). Accept any sensible engagement with the spending constraint; reject answers that simply repeat (b).

Question 5 (11 marks)

(a) **M1** First Bank: $\left(1 + \frac{0{\cdot}0396}{12}\right)^{12} - 1$.

A1 AER = **4·033%**.

M1 MBS: $\left(1 + \frac{0{\cdot}0392}{365}\right)^{365} - 1$.

A1 AER = **3·997%**; choose *First Bank*.

(b) **M1** A: $6000 \times (1 + 3 \times 0{\cdot}042) = £\,6{,}756{\cdot}00$.

M1 B: $6000 \times 1{\cdot}035^3 = £\,6{,}652{\cdot}31$.

A1 State $6756 > 6652{\cdot}31$; A is larger. Both values required.

(c) **M1** Test successive years. At $n = 11$: A = £ $8{,}772$, B = £ $8{,}759{\cdot}80$. At $n = 12$: A = £ $9{,}024$, B = £ $9{,}066{\cdot}40$.

A1 Year **12** – B first overtakes (cao).

(d) **M1** State the two growth forms for an equal starting balance P: Account A grows linearly as $P(1 + 0{\cdot}042n)$ (a linear function of n), while Account B grows exponentially as $P \times (1{\cdot}035)^n$.

A1 Argue that since $(1{\cdot}035)^n \to \infty$ as $n \to \infty$, the exponential term will eventually exceed any linear expression in n; the common factor P cancels in the ratio B/A, so the conclusion holds for *any* equal starting balance (oe). Reject answers that merely re-state (c) with the specific £ $6{,}000$ starting figure.

Question 6 (10 (incl. 2 OCW) marks)

(a) *Total takings – with OCW.* **M1** Identify Bree's ratio share as $\frac{4}{12} = \frac{1}{3}$ of total T.

M1 Recognise £ $91{\cdot}80 = 85$% of Bree's share (reverse the 15% reduction; do *not* add 15%).

A1 Bree's share $= 91{\cdot}80/0{\cdot}85 = £\,108{\cdot}00$.

M1 $T = 108 \times 3$.

A1 $T =$ £**324·00** (cao).

A1 Concluding sentence with units (e.g. "The total taken on the stall was £ 324").

C1 (OCW) Working in connected sentences; explicit fraction statement; clear reversal of the 15% reduction; concluding sentence.

C1 (OCW) Correct notation throughout (pound signs, aligned equals, no spelling errors obscuring meaning).

(b) **M1** Amelia $= \frac{5}{12} \times 324$ (ft).

A1 $=$ £**135·00** (cao).

Question 7 (9 marks)

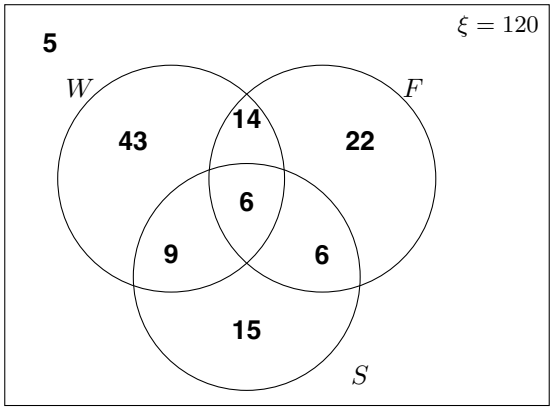
(a) **B1** Cardiff-only sample biased: would over-represent Cardiff customers and miss any branch-level differences in opinion.

B1 Stratified sample reflects the customer split across all three branches in proportion, so generalises better to the chain.

(b) **M1** Total weekday customers $= 2640 + 1680 + 2160 = 6480$; proportions $\frac{2640}{6480}, \frac{1680}{6480}, \frac{2160}{6480}$ of 150.

A1 Cardiff $= 61{\cdot}11\ldots \to$ **61**, Newport $= 38{\cdot}89\ldots \to$ **39**, Swansea $=$ **50** (must sum to 150; accept any sensible rounding that totals 150).

(c) *Venn – built from centre outwards.*



M1 Centre $= 6$; pairwise minus centre: WF only $= 14$, WS only $= 9$, FS only $= 6$.

M1 W only $= 43$; F only $= 22$; S only $= 15$ (at least two of three correct).

M1 None $= 120 - 115 = 5$.

A1 All eight regions correct (cao).

(d) **B1** $P = \dfrac{14 + 9 + 6}{72} = \dfrac{29}{72}$ (already simplest, gcd$(29, 72) = 1$).

Question 8 (11 marks)

(a) **M1** $I = \dfrac{kW}{d^2}$ (combined-proportion form).

M1 Sub $W = 12, d = 4, I = 9$: $9 = \dfrac{12k}{16} \Rightarrow k = 12$.

A1 $\mathbf{I = \dfrac{12W}{d^2}}$ (cao).

(b) **M1** Sub $W = 20, d = 6$: $I = \dfrac{240}{36}$.

A1 $I = \dfrac{20}{3}$ lux (or $6\frac{2}{3}$; reject $6{\cdot}67$ for A1).

(c) **B1** Length: $7{\cdot}35 \le L < 7{\cdot}45$.

B1 Width: $3{\cdot}225 \le W < 3{\cdot}275$.

(d) **M1** UB area $= 7{\cdot}45 \times 3{\cdot}275 = 24{\cdot}3988\,\text{m}^2$; UB unit price $= £38{\cdot}75$.

A1 UB cost $= 24{\cdot}3988 \times 38{\cdot}75 =$ **£945·45** (accept £945).

(e) **M1** Compute LB cost $= 7{\cdot}35 \times 3{\cdot}225 \times 38{\cdot}25 \approx £906{\cdot}67$ and compare bounds at successive roundings (nearest £1, £10, £50, £100).

A1 Both bounds agree only at the nearest £100; reliable answer is **£900** to the nearest £100.

Question 9 (11 marks)

(a) **M1** 28 min $= \frac{28}{60}$ h; speed $= 12{\cdot}6 \div \frac{28}{60}$.

A1 $=$ **27** km/h (cao).

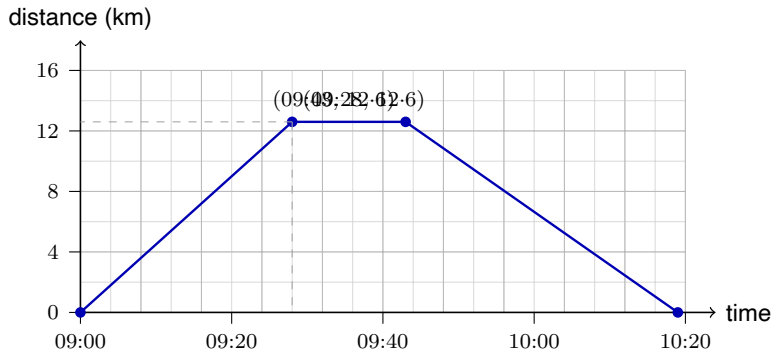
(b) **M1** Total distance $= 25{\cdot}2$ km.

M1 Total time $09{:}00 \to 10{:}19 = 79$ min $= \frac{79}{60}$ h.

M1 Avg speed $= 25{\cdot}2 / \frac{79}{60} \approx 19{\cdot}14$ km/h; convert $\times \frac{5}{8}$.

A1 $\approx$ **12·0** mph (accept $11{\cdot}96$–$12{\cdot}0$; answer must be in mph).

(c)



B1 Outward rising segment $(09{:}00, 0) \to (09{:}28, 12{\cdot}6)$ and horizontal rest segment to $(09{:}43, 12{\cdot}6)$.

B1 Return segment to $(10{:}19, 0)$; the $12{\cdot}6$ km value and key times labelled.

(d) **M1** One ratio part $= 150/15 = 10$; Under-12s $= 40$, Under-14s $= 50$. New Under-12 $= 45$.

M1 New U-14 count from $5 : 4$ ratio: $45 \times \frac{4}{5} = 36$.

A1 Players who left $= 50 - 36 =$ **14** (cao).

Total: $5 + 8 + 4 + 11 + 11 + 10 + 9 + 11 + 11 =$ **80 marks.**

OCW marks (Q6): the 2 OCW marks are included in the question total of 10. To award full OCW the candidate's working must read as connected English sentences.