STADIRA
TRAINING INSTITUTE

Mathematics – Applications and Interpretation
Standard Level
Paper 1 – Marking Key

Marks: 80
1 hour 30 minutes

DP MOCK EXAMINATION – SET 1

Last-Minute Revision Series · stadira.co.bw

NAME	
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Instructions to candidates

- This marking key uses IB-style notation: M = method mark, A = accuracy mark, R = reasoning mark, AG = answer given, FT = follow through from previous part.
- Award FT marks where a candidate uses an incorrect earlier answer correctly in later working.
- Accept answers correct to three significant figures, or the accuracy specified in the question.
- GDC boxes show one efficient TI-Nspire CX II method; any valid method receives full credit.
- Screens shown are drawn recreations of the TI-Nspire CX II display.

Information

- This marking key has 9 pages.
- The number of marks for each question or part question is shown in brackets [ ].

Question 1

Question	Solution / Working	Marks	Notes
1(a)	5.46×10^7 km	A1	
1(b)	$\dfrac{5.46 \times 10^7}{3.00 \times 10^5}$ = 182 s (= 1.82×10^2 s) **TI-Nspire:** On a Calculator page type `5.46E7 ÷ 3E5` (use the EE key for ×10ⁿ).	M1 A1	
1(c)	$\dfrac{182}{60}$ = 3.03 minutes (3.03333…)	A1	FT from (b)

Total: [4 marks]

Question 2

Question	Solution / Working	Marks	Notes
2(a)	$\dfrac{\lvert 630 - 634 \rvert}{634} \times 100$ = 0.631 % (0.630915…)	M1 A1	M1 for correct % error formula with 634 as denominator
2(b)	lower bound = 375 m, upper bound = 385 m	A1 A1	
2(c)	5 × 375 = 1875 m	A1	FT from (b)

Total: [5 marks]

Question 3

Question	Solution / Working	Marks	Notes
3(a)	$u_{30} = 22 + 29 \times 4$ = 138 seats	M1 A1	
3(b)	$S_{30} = \dfrac{30}{2}(22 + 138)$ = 2400 seats	M1 A1	FT from (a)
3(c)	2400 × 150 = 360 000 pesos	A1	FT from (b)

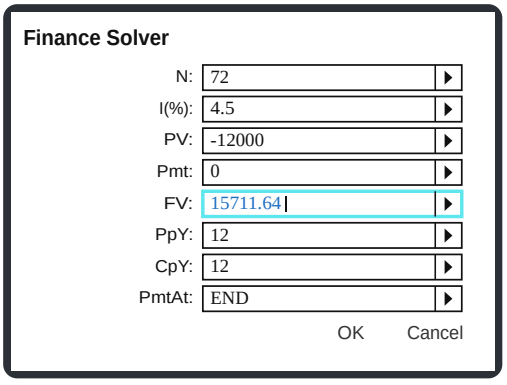
Total: [5 marks]

Question 4

Question	Solution / Working	Marks	Notes
4(a)	$u_8 = 800 \times 1.35^7$ = 6540 views (6537.72…)	M1 A1	
4(b)	$S_8 = \dfrac{800(1.35^8 - 1)}{1.35 - 1}$ = 22 900 views (22 931.2…)	M1 A1	
4(c)	day 12 (day 11: 16 085 < 20 000; day 12: 21 715 > 20 000) **TI-Nspire:** `nSolve(800·1.35^(n−1)=20000,n)` gives n = 11.7…, so first whole day is 12; or table of values (ctrl T).	A1	

Total: [5 marks]

Question 5

Question	Solution / Working	Marks	Notes
5(a)	$FV = 12000\left(1 + \dfrac{0.045}{12}\right)^{72}$ = 15 700 BWP (15 711.64) **TI-Nspire:** menu → 8: Finance → 1: Finance Solver. Enter N=72, I=4.5, PV=−12000, Pmt=0, PpY=CpY=12, then move to FV and press enter. 	M1 A1 A1	M1 for compound interest or TVM setup; A1 unrounded; A1 3 s.f.
5(b)	$\dfrac{15711.64}{1.028^6}$ = 13 300 BWP (13 312.60)	M1 A1	FT from (a)
5(c)	purchasing power has increased since 13 300 > 12 000	R1	

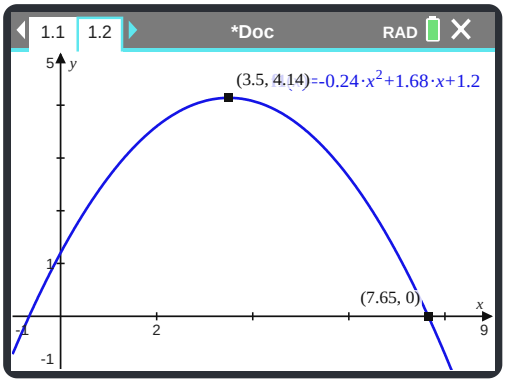
Total: [6 marks]

Question 6

Question	Solution / Working	Marks	Notes
6(a)	the cost per kilometre (65 KES for each additional km travelled)	**A1**	
6(b)	C = 200 + 65 × 12 = 980 KES	**M1 A1**	
6(c)	$1500 = 200 + 65d \implies d = \dfrac{1300}{65}$ = 20 km	**M1** **A1**	

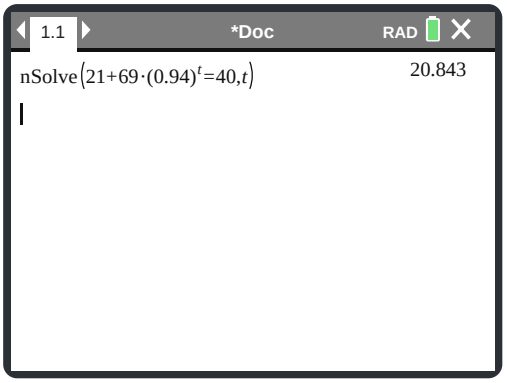
Total: [5 marks]

Question 7

Question	Solution / Working	Marks	Notes
7(a)	1.2 m	**A1**	
7(b)	maximum height = 4.14 m (at x = 3.5 m) **TI-Nspire:** Graph `f1(x)=−0.24x²+1.68x+1.2`, then menu → 6: Analyze Graph → 3: Maximum. For (c) use 1: Zero. 	**M1 A1**	M1 for graph or vertex method
7(c)	h(x) = 0 $\implies$ x = 7.65 m (7.65331…)	**M1 A1**	Ignore negative root
7(d)	0 ≤ x ≤ 7.65	**A1**	FT from (c)

Total: [6 marks]

Question 8

Question	Solution / Working	Marks	Notes
8(a)	T(0) = 21 + 69 = 90 °C	**A1**	
8(b)	$T(10) = 21 + 69 \times 0.94^{10} = 58.2$ °C (58.1644…)	**M1 A1**	
8(c)	$21 + 69 \times 0.94^{t} = 40$ t = 20.8 minutes (20.8429…) **TI-Nspire:** menu → 3: Algebra → 1: Numerical Solve, or graph both sides and find the intersection. 	**M1** **A1**	

Total: [5 marks]

Question 9

Question	Solution / Working	Marks	Notes
9(a)	h = 80 tan 84.5° = 831 m (830.831…)	**M1** **A1**	Degree mode!
9(b)	distance from tower = 80 + 40 = 120 m $\tan\theta = \frac{830.831\ldots}{120}$ θ = 81.8° (81.7814…)	**M1** **M1** **A1**	FT from (a); accept 81.8° from 831

Total: [5 marks]

Question 10

Question	Solution / Working	Marks	Notes
10(a)	$BC^2 = 140^2 + 95^2 - 2 \times 140 \times 95 \times \cos 68°$ $BC^2 = 18\,660.5\ldots$ $BC = 137$ m (136.603…)	M1 A1 A1	M1 cosine rule; A1 substitution or value; A1 answer
10(b)	$\text{Area} = \frac{1}{2} \times 140 \times 95 \times \sin 68°$ $= 6170$ m² (6165.77…)	M1 A1	
10(c)	$\frac{\sin B}{95} = \frac{\sin 68°}{136.603\ldots} \Rightarrow B = 40.2°$ (40.1510…)	A1	FT from (a)

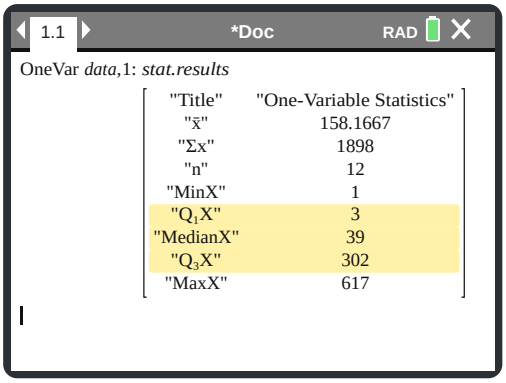
Total: [6 marks]

Question 11

Question	Solution / Working	Marks	Notes
11(a)	$V = \pi \times 4.5^2 \times 11 + \frac{2}{3}\pi \times 4.5^3$ $= 222.75\pi + 60.75\pi$ $= 891$ m³ (890.641…)	M1 M1 A1	M1 cylinder; M1 hemisphere
11(b)	$0.85 \times 890.641\ldots = 757$ m³ (757.045…)	M1 A1	FT from (a)

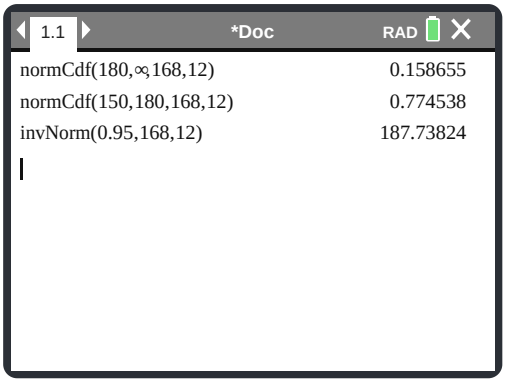
Total: [5 marks]

Question 12

Question	Solution / Working	Marks	Notes
12(a)	ordered data: 1, 2, 3, 3, 13, 14, 64, 92, 264, 340, 485, 617 $\textbf{median} = \frac{14+64}{2} = 39$ mm **TI-Nspire:** Enter data in Lists & Spreadsheet, then menu → 4: Statistics → 1: Stat Calculations → 1: One-Variable Statistics. 	**A1**	
12(b)	$Q_1 = 3$ mm, $Q_3 = 302$ mm	**A1 A1**	
12(c)	$Q_3 + 1.5 \times \text{IQR} = 302 + 1.5 \times 299 = 750.5$ $617 < 750.5$, so 617 is not an outlier	**M1** **A1**	FT from (b)

Total: [5 marks]

Question 13

Question	Solution / Working	Marks	Notes
13(a)	$P(X > 180) = 0.159$ (0.158655…) **TI-Nspire:** menu → 6: Statistics → 5: Distributions → 2: Normal Cdf. Use ∞ (or 9E999) for an open bound; 3: Inverse Normal for (c). 	**M1 A1**	M1 for normCdf or correct sketch or region
13(b)	$P(150 < X < 180) = 0.775$ (0.774538…)	**M1 A1**	
13(c)	$P(X > k) = 0.05 \implies k = \text{invNorm}(0.95, 168, 12)$ $k = 188$ g (187.738…)	**M1** **A1**	

Total: [6 marks]

Question 14

Question	Solution / Working	Marks	Notes
14(a)	$P(D) = 0.6 \times 0.03 + 0.4 \times 0.08$ $= 0.018 + 0.032$ $= 0.05$	**M1** **M1** **A1**	M1 each correct branch product
14(b)	$P(A \mid D) = \dfrac{0.018}{0.05}$ $= 0.36$	**M1** **A1**	FT from (a)
14(c)	$2000 \times 0.05 = 100$ phones	**A1**	FT from (a)

Total: [6 marks]

Question 15

Question	Solution / Working	Marks	Notes
15(a)	$\frac{dy}{dx} = 3x^2 - 18x + 24$	**A1 A1**	A1 for each pair of correct terms
15(b)	$3(1)^2 - 18(1) + 24 = 9$	**A1**	
15(c)	$3x^2 - 18x + 24 = 0 \implies x^2 - 6x + 8 = 0$ $x = 2,\ x = 4$	**M1** **A1**	
15(d)	$2 < x < 4$	**A1**	FT from (c); accept $2 \le x \le 4$

Total: [6 marks]