TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

MARKING GUIDELINES

2021

Mathematics Standard 2

Section I

15 marks

Questions 1-15 (1 mark each)

Question	Answer	Content	Syllabus Assessed	Targeted Performance Bands
1	D	Commission	MS-F1.2	2-3
2	В	Minimum spanning tree	MS-N2.2	2-3
3	D	Non-linear relationships	MS-A4.2	2-3
4	A	Direct variation	MS-A2	3-4
5	В	Rates	MS-M7	3-4
6	A	Standard form	MS-M1.1	3-4
7	С	Mean and standard deviation	MS-S1.2	3-4
8	A	Trigonometry	MS-M6	3-4
9	D	Pareto chart	MS-S1.1	4-5
10	С	Scale	MS-M7	4-5
11	A	Algebra	MS-A1	4-5
12	В	Inflation	MS-F4.1	4-5
13	С	Theoretical and experimental probability	MS-S2	4-5
14	D	Trigonometry	MS-M6	5-6
15	С	Networks	MS-N3	5-6

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1

Section II

85 marks

Questions 16 – 41

Question 16 (3 marks)

16(a) (2 marks)

Content: MS-S4

Outcomes assessed: MS2-12-2

Targeted Performance Bands: 2-3

Solution	n								P 000	Criteria Mar
	8	=12								1 mark for some correct values shown on scatterplot
bs (y)	6					•				2 marks for correct scatterplot
Number of jobs (y)			 							Section i
Num	4 -				•					2
	2		 						1	Beeth as 1-15 (1 mark each)
	0	J	F	M	A	M	J	J		Auguston August Con
			004	992	ith (x)		-			molecimico G

16(b) (1 mark)

Content: MS-S4

Outcomes assessed: MS2-12-2
Targeted Performance Bands: 2-3

Sample	So	luti	on	CI	7.7					mission	Criteri	ia	Mark
	1										1 mark for a correct	line of best fit	
	8										Pareto chart		
3											Scale		
Number of jobs (y)	6										Algebra		
per of						1	1				inflation		
Num	4	_		-		•	-		1777	a lastromer	repro bus Imitsacouff		1
						-					Trigonomeny		
	2				-						Metwardes		
						-							
	0			F	M	A	M	J	,				
				Fag		nth (x)							

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Question 17 (2 marks)

Content: MS-F1.2

Outcomes assessed: MS2-12-5
Targeted Performance Bands: 2-3

Solution	Criteria	Marks
Hours = $15 + 6 \times 1\frac{1}{2} = 24$	1 mark for calculation of hours or similar progress	-
\$27.60 × 24 = \$662.40	2 marks for correct working and answer	2

Question 18 (2 marks)
Content: MS-M7

Outcomes assessed: MS2-12-3

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
$$200 \div $1.79 = 111.7318436 $ litres	1 mark for calculation of number of litres or similar progress	Conten
$111.73 \div 6.2 \times 100 = 1802.13$	2 marks for correct working and answer	2
Ethel can travel 1802 km	Criteria Lunaric for valent sien of length of	il spie 2.

Question 19 (3 marks)

19(a) (1 mark) Content: MS-M2

Outcomes assessed: MS2-12-3

Targeted Performance Bands:2-3

Solution	Criteria	Marks
$63^{\circ} - 18^{\circ} = 45^{\circ}$	1 mark for correct answer	(1 may 2 may 1)

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19b (2 marks)

Content: MS-M2

Outcomes assessed: MS2-12-3
Targeted Performance Rands: 3-4

Criteria	Mark
1 mark for calculation of 3 hours of time difference	2010H
2 marks for correct working and	827.60
answer	2
	2 marks for correct working and

Question 20 (2 marks)

Content: MS-A2

Outcomes assessed: MS2-12-1

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
From graph: 40 Euros = \$A66	1 mark for reading ≈ \$A66 from graph	
Conversion rate: $$A1 = $US0.75$ $\therefore 66 \times 0.75 = $US49.50$	2 marks for correct conversion into \$US	2
	Gillene SM-2M	Canada

Question 21 (4 marks)

21(a) (1 mark) Content: MS-S1.2

Outcomes assessed: MS2-12-2

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$\bar{x} = \frac{2214}{12} = 184.5 \text{ cm}$	1 mark for correct answer	1

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21(b) (3 mark)

Content: MS-S1.2

Outcomes assessed: MS2-12-2
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
I mark for at least three content	1 mark for one or two correct values displayed	
165 170 175 180 185 190 195	2 marks for three or four correct values displayed	3
	3 marks for all five correct values displayed	

Question 22 (3 marks) Content: MS-M1.2

Outcomes assessed: MS2-12-4
Targeted Performance Bands: 3-4

Solution	Criteria	Marks
Length of unmarked side: $x^2 = 4.8^2 + 4.8^2$	1 mark for calculation of length of unmarked side	
$x = \sqrt{4.8^2 + 4.8^2}$ $x = 6.788 \text{m}$	2 marks for calculation of perimeter	
$P = (4.8 \times 4) + 6.788$ = 25.988 m	3 marks for complete correct working and answer	3
	Languett for consequences (extrem	
$Cost = 52×25.988	\$20.4-23A	
= \$1351.39	es assertada MSI-12-1	
	Performance Cent's: 3-4.	

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Question 23 (5 marks)

23(a) (4 marks)

Content: MS-A4.2

Outcomes assessed: MS2-12-1

Targeted Performance Bands: 3-4

Solut					221 = -		Criteria	Marks
Height, h, (metres)	t h	0 1	2 13	4 17	6 13	8 1	Criteria 1 mark for at least three correct values in table 2 marks for all five correct value in table 3 marks for correct values in table and correct values graphed 4 marks for all five correct value in table, values graphed as parabola drawn	es ble
00 to	0	2		(seconds)	6	8		

23(b) (1 marks)

Content: MS-A4.2

Outcomes assessed: MS2-12-1

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
t = 4 seconds	1 mark for correct answer	1

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Question 24 (3 marks)

24(a) (2 marks) Content: MS-N2.1

Outcomes assessed: MS2-12-8 Tarastad Daufanna B

riteria	Marks
artly correct m or features rrect and labelled m such as the one	- ndot
eds to leave home i 8:46 am —15 min =8:31 am	2
	eria (

24(b) (1 mark) Content: MS-N2.1

Outcomes assessed: MS2-12-8

Targeted Performance Bands: 2-3

Solution	Criteria	Marks
7 + 18 + 26 + 10 = 61 km	1 mark for correct answer	1

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Question 25 (4 marks)

Content: MS-M7

Outcomes assessed: MS2-12-3

Targeted Performance Bands: 3-4

Solution	Criteria	Mark
$Harry = \frac{3}{5} \times 60$	1 mark for calculation of how	
= 36 mins	long Harry or John takes to get to school	
$John = \frac{3}{12} \times 60$	2 marks for calculation of how	
= 15 mins	long Harry and John take to get to school	
Harry arrival = 8:10 am + 36 mins = 8:46 am	3 marks for how long Harry and John take to get to school and	4
John needs to leave home 15 mins before 8:46 am 8:46 am -15 mins = 8:31 am	calculation of Harry's arrival time at school	
O.S. T WILL	4 marks for complete correct working and answer	

Question 26 (3 marks)

Content: MS-F4.1

Outcomes assessed: MS2-12-5

Targeted Performance Bands: 3-4

Solution	Criteria	Marks
$Cost = 500 \times $2.35 = 1175	1 mark for correct calculation	
Brokerage on purchase = $2\% \times \$1175 = \23.50	of purchase cost	
Total purchase cost = \$1175 + \$23.50 = \$1198.50	2 marks for correct sale payment	
Selling price = $500 \times $3.50 = 1750	3 marks for complete correct	
Brokerage on sale = $3\% \times \$1750 = \52.50	working and answer	3
Total sale payment = $$1750 - 52.50		
= \$1697.50	1 mark for correct answer	
Profit = \$1697.50 - \$1198.50 = \$499		

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Question 27 (4 marks)

27(a) (2 marks)

Content: MS-M6

Outcomes assessed: MS2-12-4

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$\frac{BC}{\sin 70^{\circ}} = \frac{80}{\sin 50^{\circ}}$	1 mark for use of sine rule	
$BC = \frac{80 \sin 70^{\circ}}{\sin 50^{\circ}}$	2 marks for correct working and answer	2
= 98.1345	0.1	2
≈ 98 m		

27(b) (2 marks) Content: MS-M6

Outcomes assessed: MS2-12-4

Targeted Performance Rands: 3-4

Solution	Criteria	Marks
$\cos 30^{\circ} = \frac{w}{98.1345}$	1 mark for progress towards answer	
$w = \cos 30^{\circ} \times 98.1345 \dots$	2 marks for correct working and	2
= 84.98699	answer (polymen 5) 05 m	Questic
≈ 85 m	West March M	nome.

Question 28 (3 marks)

28(a) (1 mark)

Content: MS-S5 Outcomes assessed: MS2-12-7

Targeted Performance Bands: 3-4

Solution $x - \mu$	Criteria	Marks
$z = \frac{x - \mu}{\sigma}$ $z = \frac{4.25 - 3.5}{1.0}$	1 mark for correct answer	1
z = 0.75	E WAS TO SEE THE SEE T	

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28(b) (2 marks)

Content: MS-S5

Outcomes assessed: MS2-12-7

Solution	Criteria	Marks
$z = \frac{x - \mu}{\sigma}$	1 mark for calculation of 2.5%	Soluti Se Sin 70
$z = \frac{1.5 - 3.5}{1.0}$	2 marks for correct working and answer	= 39
z = -2 Less than z-score of -2 :	m 9	2
$\frac{100\% - 95\%}{2} = 2.5\%$	spiritures and term secretary	CMANES
2.5% = 8 1% = 3.2	MS-M6	Conten
100% = 320 babies	1. Perjormance sumast 2001	Soluti

Question 29 (2 marks)

Content: MS-A1

Outcomes assessed: MS2-12-1 Targeted Performance Bands:3-4

Solution	Criteria	Marks
$c = \frac{x^2 - a}{b}$	1 mark for some correct algebra towards answer	Unest 28(a) (Conto
$cb = x^{2} - a$ $cb + a = x^{2}$ $a = x^{2} - cb$	2 marks for correct working and answer	2

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Question 30 (3 marks)

30(a) (2 marks)

Content: MS-M1.2, MS-M7
Outcomes assessed: MS2-12-4
Targeted Performance Bands: 4-5

Solution	Criteria	Mark
$A \approx \frac{12.5}{2}(19 + 22) + \frac{12.5}{2}(22 + 18) + \dots$	1 mark for attempted use of four applications of trapezoidal rule	
$\frac{12.5}{2}(18+21)+\frac{12.5}{2}(21+32)$		
	2 marks for correct working and answer	2
$A \approx 256.25 + 250 + 243.75 + 331.25$	1 /0	
$A \approx 1081.25 \text{ m}^2$		
21.12.24.1 M 3-34		

30(b) (1 mark)

Content: MS-M1.2

Outcomes assessed: MS2-12-4

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$\frac{1081.25}{50\times50} \times 100$	1 mark for correct answer	Ourcei Targe
Criteria Mark	80	1
= 43.25% alaman la pen sance nel dram	50 000(1.0025) - 750	= ,A

Question 31 (3 marks)

Content: MS-F5

Outcomes assessed: MS2-12-5

Targeted Performance Rands: 4-5

Solution	Criteria	Marks
$FV = 4.1836 \times 2200 = \$9203.92	1 mark for value from table	nwonsk
Investment = $$2200 \times 4$	2 marks for calculation of future value	
= \$8800 Interest = \$9203.92 - \$8800 = \$403.92	3 marks for correct working and answer	3

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Question 32 (2 marks)

Content: MS-N3

Outcomes assessed: MS2-12-8
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
source 12 8 16 20 sink	1 mark for correct minimum cut or maximum flow 2 marks for both correct	2
Maximum flow = 26	11,25 m²	012 A

Question 33 (3 marks)

Content: MS-F5

Outcomes assessed: MS2-12-5

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$A_1 = 50\ 000(1.0025) - 750$ = \$49 375	1 mark for some use of formula	= 43.2
$A_2 = 49375(1.0025) - 750$ = \$48 748.44 $A_3 = 48 748.44(1.0025) - 750$ = \$48 120.31	2 marks for correct calculation of balance after three repayments 3 marks for correct working and answer	3
Amount paid off = \$50 000 - \$48 120.31 = \$1879.69	.1836 × \$2200 59203.92	= V7 =

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Question 34 (4 marks)

34(a) (2 marks) *Content:* MS-S4

Outcomes assessed: MS2-12-2
Targeted Performance Bands: 4-5

Solution	Criteria	Marks
v = 0.03w + 18.75	1 mark for one correct value or values in incorrect place	
	2 marks for correct answer	2

34(b) (2 marks) *Content:* MS-S4

Outcomes assessed: MS2-12-2 Targeted Performance Bands: 4-5

Solution	Criteria	Marks
r = 0.199	1 mark for one correct value of r	
The data does not confirm the predicted negative association. Rather there is a weak, positive association.	2 marks for correct value of r and correct interpretation of value	2

Question 35 (3 marks)

35(a) (2 mark) *Content:*MS-M7

Outcomes assessed: MS2-12-3

Targeted Performance Bands: 5-6

Solution	Criteria	Mark
2025 kJ = 2025000 J	1 mark for conversion into joules or other progress	
$2\ 025\ 000\ J \div 90 \div 60 = 375\ W$	2 marks for correct working and answer	2

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35(b) (1 mark)

Content: MS-M7

Outcomes assessed: MS2-12-3

Targeted Performance Bands: 4-5

Solution	Criteria	Ma
$375 \div 1000 \times \$0.3159 = \$0.11846 \dots$ = \\$0.12	1 mark for correct answer	1
and the state of t	(7.81 mm20	.n == 1

Question 36 (3 marks)

36(a) (1 mark) Content: MS-S2

Outcomes assessed: MS2-12-2

Targeted Performance Bands: 4-5

Solution	and the second s	Criteria	Ma
	first counter second counter	1 mark for correct values (simplified or unsimplified)	0 = 0.
	6 black	th does not confirm the or view	ib sil
7 19	black 12 18	tion.	isoci
19	18 red	Cartesia	Mer
		n 35 (3 marks)	restin
12 19	7 18 black	mark)o noitalunian escuentiale MS-M7 aramyana	(a) (2)
	red	es assessed: MS2-12-3	acon.
Tast -	$\frac{11}{18}$ red	TO STATE OF THE PROPERTY OF	chulo
The same of	santi for conversion into	q = 2.025 000 f	025

36(b) (2 marks) *Content:* MS-S2

Outcomes assessed: MS2-12-2

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
$P_{\text{same}} = \left(\frac{7}{19} \times \frac{6}{18}\right) + \left(\frac{12}{19} \times \frac{11}{18}\right)$	1 mark for correct calculation of at	Salatie
	least one probability.	
$=\frac{29}{57}$		
Turn 1 = 104 764 - 554 000	2 marks for correct calculations and	
$P_{\text{different}} = 1 - \frac{29}{57}$ OR	statement.	
$P_{\text{different}} = \left(\frac{7}{19} \times \frac{12}{18}\right) + \left(\frac{12}{19} \times \frac{7}{18}\right)$	Pull (1) (1) (2)	2
		2
$=\frac{28}{57}$	to make on committeening and	
(ii) Samerks for correct activers.	G 10 1 (6)	
: Lucas is more likely to select two counters		
that are the same colour.		
$\tau = 190795$	The state of the s	

Question 37 (3 marks) Content: MS-A4.1

Outcomes assessed:MS2-12-1

Targeted Performance Bands:4-5

Solution	Criteria	Marks
	1 mark for one line graphed correctly	Centen Outcon Parke
7	2 marks for both lines graphed correctly	Soluti
$y = \frac{x}{2} + 4$	3 marks for both lines graphed correctly and correct point of intersection	3
Co-ordinates of the point of intersection = $(-2,3)$	(1 - x) / 000(1 - 8.3%) ¹⁰ 2.703.20	S = 2

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Question 38 (5 marks)

38(a) (4 mark)

Content: MS-N3

Outcomes assessed: MS2-12-8

Targeted Performance Bands:5-6

Solution	Criteria	Mai
	1 mark for basic attempt to draw network diagram	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2 marks for correct network diagram with incorrect or missing ESTs and LSTs 3 marks for correct network diagram with some correct ESTs and LSTs 4 marks for correct network diagram with all correct ESTs and LSTs	4

38(b) (1 mark)
Content: MS-N3

Outcomes assessed: MS2-12-8

Targeted Performance Bands: 4-5

Solution	Criteria	Mar
Critical path = B E F I	1 mark for correct answer	1

Question 39 (4 marks)

39(a) (1 mark)

Content: MS-F4.2

Outcomes assessed: MS2-12-5

Targeted Performance Bands:4-5

Solution	Criteria	Mai
$S = V_0 (1 - r)^n$ = 54 000(1 - 8.3%) ¹⁰ = \$22 703.20	1 mark for correct answer	1

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39(b) (3 marks)

Content: MS-F4.2

Outcomes assessed: MS2-12-5

Targeted Performance Bands: 4-5

Solution	Criteria	Marks
Total repayment = $$723 \times 10 \times 12$ = $$86760$	1 mark for calculation of total repayment	Marks
Interest paid = \$86 760 - \$54 000 = \$32 760	2 marks for calculation of total repayment and amount of interest	922.66
I = Prt	paid	3
$$32760 = $54000 \times r \times 10$	3 marks for correct working and	3
$r = \frac{32760}{54000\times 10}$	answer	
r = 6.07%	MS-M1.2, MS-M6	

Question 40 (4 marks)

40(a) (2 marks) Content: MS-F5

Outcomes assessed: MS2-12-5

Targeted Parforman

Solution Release of start of the start of t	Criteria	Marks
Balance at start of second month = \$1200	1 mark for some correct working	1,141,143
Interest in first month = $$1200 \times 3.2\% \times \frac{1}{12}$ = $$3.20$	2 marks for complete correct working	
Balance at start of second month =	88.777.880	
\$1200 + \$3.20 + \$1200 = \$2403.20	852410	
Interest in second month = \$2403.20 \times 3.2% $\times \frac{1}{12}$	mmelt	2
= \$6.41	mm EE = 1:00 - 7:00 - 33 mm	
Balance at end of second month = \$2403.20 + \$6.41 = \$2409.61	ne the me teagth, XV is 33 mm longs	
Balance at end of second month = \$2403.20 + \$6.41 = \$2409.61	es the are length, XY is 33 mm long	

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40(b) (2 marks)

Content: MS-F4.1

Outcomes assessed: MS2-12-5
Targeted Performance Rands: 5-6

Solution	Criteria	Marks
Beth = $21 600 (1 + \frac{3.2\%}{12})^{18}$ = \$22 660.64	1 mark for correct calculation of Bethany's FV	
\$22 660.84 - \$22 155.56 = \$505.08	2 marks for a correct working and answer	2
Beth has \$505.08 more than Ella	February of the second of the I	

Question 41 (5 marks)

Content: MS-M1.2, MS-M6
Outcomes assessed: MS2-12-4

Targeted Performance Bands: 5-6

Solution	Criteria	Marks
Arc XY = $\frac{\theta}{360} \times 2\pi r$ = $\frac{50}{360} \times 2 \times \pi \times 1200$ = 1047.197 = 1047 mm	mark for progress towards calculation of arc length or interval length marks for correct calculation of arc length or interval length or some progress on both	Questie 49a) (2 Ciestera Outcom Targate balunt
Interval XY: $XY^2 = 1200^2 + 1200^2 - 2 \times 1200 \times 1200 \times \cos 50^\circ$ = 1028771.68 XY = 1014.28 = 1014 mm	3 marks for correct calculation of arc length or interval length and progress on the other length 4 marks for correct working and calculation of both arc length and interval length	5
Difference = $1047 - 1014 = 33 \text{ mm}$ Therefore the arc length, XY is 33 mm longer than the interval XY.	5 marks for correct working and calculation of both arc length and interval length and calculation of the difference between the two lengths	