INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION
MAY 2023

QUANTITATIVE REASONING: PAPER II

MARKING GUIDELINES

Time: 3 hours 150 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

Q1	Marking guideline		Marks
KEY	**a** accuracy **m** method **mca** method continued accuracy	**ca** continued accuracy **ma** method accuracy **r** rounding	
1.1.1	Wildlife sanctuary		
1.1.2	Four		
1.1.3	Yes there are aeroplane icons at some of the camps which are labelled 'Runway' in the key		
1.1.4	A 3 **OR** 3 A		
1.1.5	South West (SW) **OR** West South West (WSW)		
1.1.6	Von Lindequist Gate		
1.1.7	9 km		
1.1.8	Toilet & picnic spot		
1.1.9	No it has a restricted access sign. **OR** It states 'open to Dolomite residents only'		
1.2.1	(a) Square		
	(b) 295 cm ÷ 100 = 2,95 m		
	(c) 122 cm – 75 cm = 47 cm		
1.2.2	(a) 16,4% × 60 tons = 9,84 tons		
	(b) 100% – 82,4 – 16,4 – 0,76 = 0,44% **OR** 100% – (82,4 + 16,4 + 0,76) = 100% – 99,56% = 0,44%		
	(c) 60 × 1 000 = 60 000 kg		
	(d) 60 000 kg ÷ 1857 = 32,3 cars **OR** 32 **OR** 33 (don't penalise rounding at all)		

Q2	Marking guideline		Marks
KEY	**a** accuracy **m** method **mca** method continued accuracy	**ca** continued accuracy **ma** method accuracy **r** rounding	
2.1	Omuthiya		
2.2	Highlight Windhoek.		
2.3	2,6 cm : 200 km 2,6 cm : 20 000 000 cm 1 cm : x cm x = 1÷ 2,6 × 20 000 000 x = 7 692 307,692 cm 1 : 7 692 300 **OR** 1÷ 2,6 × 200 = 76,92307692 km = 1 : 7 692 307,69 cm ≈ 1 : 7 692 300 **OR** 20 000 000 ÷ 2,6 = 1 : 7 692 300 Accept 2,5 cm – 2,7 cm = 8 000 000 – 7 407 400		
2.4	0,9 cm : 50 miles 5,5 cm : x miles **OR** 5,5 ÷ 0,9 × 50 = 305,56 miles Accept 5,4 – 5,6 = 300 – 311,11		

2.5	1 km : 0,6214 miles x km : 300 miles 300 ÷ 0,6214 × 1 = 482,780 = 483 km r	
2.6.1	Swakopmund to Omaruru = 236 km Omaruru to Windhoek = 242 km Total distance: 236 km + 242 km = 478	
2.6.2	(a) 816 km	
	(b) $\text{Speed} = \frac{\text{distance}}{\text{time}}$ $= \frac{816\text{ km}}{8\text{h}30}$ **from (a) Substitution** $= 96\text{ km/h}$	
	(c) Lüderitz to Mariental = 555 km Petrol consumption = 8 litres / 100 km 8 litres : 100 km x litres : 555 km 555 ÷ 100 × 8 = 44,4 litres The tank only holds 45 litres. By calculation it is possible but not wise because perhaps the tank was not filled to capacity. Discuss tank capacity and calc litres	

	(d) 1 litre : 0,264 gallons x litres : 13 gallons 13 ÷ 0,264 × 1 = 49,24 litres 49,24 litres : 60 sec x litres : 1 sec 1 ÷ 60 × 49,24 = 0,820707… litres = 820,71 ml / sec	

Q3	Marking guideline		Marks
KEY	**a** accuracy **m** method **mca** method continued accuracy	**ca** continued accuracy **ma** method accuracy **r** rounding	
3.1.1	half		
3.1.2	Area $= \frac{1}{2}\pi r^2$ $= \frac{1}{2}\pi(3{,}7m)^2$ $= 21{,}504\ldots$ $\approx 21{,}5\ \text{m}^2$ $½ \times 3{,}14 \times (3{,}7)^2$ $= 21{,}4933\ \ldots$ $= 21{,}49$ OR $21{,}5$		
3.2	$6{,}5\ \text{m}^2 \times 100^2 = 65\ 000\ \text{cm}^2$		
3.3	1 : 80 2,9 : x $x = 2{,}9 \div 1 \times 80$ $x = 232$ cm		
3.4	Diameter for fencing = 7,4 m + 2 × 5m = 17,4 m C = πnd – gate = $\pi \times$ 17,4 m – 2,5 m = 54,663… m – 2,5 m = 52,163… ≈ 52,2 m **OR** Radius for fencing = 3,7 m + 5 m = 8,7 m C = $2\pi r$ – gate = $2 \times \pi \times$ 8,7 m – 2,5 m = 54,663… m – 2,5 m = 52,163… ≈ 52,2 m		
3.5.1	(a) Matt (b) 0,1		

3.5.2	P(tiled; gloss) = 0,8 × 0,1 = 0,08 P(concrete; matt) = 0,2 × 0,9 = 0,18 P(tiled; gloss **OR** concrete; matt) = 0,08 + 0,18 = 0,26 = 26% **OR** P = (0,8 × 0,1) + (0,2 × 0,9) × P = 0,08 + 0,18 P = 0,26 P = 26%	
3.6.1	Area tile = $(0,3\text{ m})^2$ = $0,09\text{ m}^2$ Number of tiles = $\frac{43}{0,09}$ = 477,8 **OR** 478 $43\text{ m}^2 = 43 \times (1000)^2$ = 43 000 000 Area tile = $(300)^2$ = 90 000 Number of tiles needed 43 000 000 ÷ 90 000 = 477,8 Tiles needed = 477,8 OR 478	

477,8 tiles	**478 tiles**
477,8 + $(477,8 \times \frac{3}{100})$	478 + $(478 \times \frac{3}{100})$
= 477,8 +14,334	= 478 +14,3
= 492,134	= 492,3
≈ 493 **up**	≈ 493 **up**
OR	**OR**
477,8 × 103%	478 × 103%
= 492,134	= 492,34
≈ 493 **up**	≈ 493 **up**

3.6.2	Boxes needed = 2 465 ÷ 12 = 205,416… ≈ 206 boxes **up**	

Q4	Marking guideline		Marks
KEY	**a** accuracy **m** method **mca** method continued accuracy	**ca** continued accuracy **ma** method accuracy **r** rounding	
4.1	1 foot : 0,3048 m 300 ft : x m 300 ÷ 1 × 0,3048 =91,44 m		
4.2.1	2022 – 1808 = 215 years (214)		
4.2.2	$\frac{253,5-9,5}{9,5}\times 100\% = \frac{244}{9,5}\times 100\%$ = 2 568,421..% ≈ 2 568,4%		
4.2.3	(120 km/h – 90 km/h) ÷ 5 = 30 ÷ 5 = 6 **OR** any major division difference = 30 ÷ 5 = 6 90 km/h + 6 km/h = 96 km/h		
4.3.1	330 000 : 700 000 = 33 : 70		
4.3.2	70 ÷ 24 = 2,917 days 2 days + 0, 917 × 24 hours = 2 days 22 hours		
4.3.3	700 000 m^3 / 70 hours $= \frac{700\,00}{70} : \frac{70}{70}$ = 10 000 m^3 / h		
4.3.4	1 m^3 : 1 000 litre 730 000 m^3 : x litre x = 730 000 ÷ 1 × 1 000 x = 730 000 000 litres ÷ 1 000 x = 730 000 kl **OR** 1 m^3 : 1 000 litre 1 m^3 : 1 kilolitre 730 000 m^3 = 730 000 kl		

4.3.5	**From the statement** $\frac{730\,000}{300}$ = 2433,33 m^3 **OR** kl Volume of the pool = 50 m × 25 m × 2 m = 2 500 m^3 Yes the capacity/volume is almost the same, remembering a pool is not filled to the brim. **OR** 2 500 m^3 × 300 pools = 750 000 Statement incorrect as 750 000 is much more than 730 000	

Q5	Marking guideline		Marks
KEY	**a** accuracy **m** method **mca** method continued accuracy	**ca** continued accuracy **ma** method accuracy **r** rounding	
5.1.1	Q at 04:00 and R at 09:00 Q at 4 am and R at 9 am		
5.1.2	(i) lowest		
	(ii) Diagram B		
	(iii) 09:00 **OR** 9 am		
	(iv) will not		
	(v) 8:00 p.m. **OR** 20:00		
5.1.3	32 000 mWh including × 1 000 – 26 000 mWh = 6 000 mWh (P1U)		
5.1.4	(a) The vertical axis does not start at zero **OR** The vertical axis starts at 20		
	(b) The peaks and lows would be less dramatic.		
5.2.1	108 km		
5.2.2	17:00 – 06:00 = 11 hours		
5.2.3	$\text{Time} = \frac{108\text{ km}}{9{,}7\text{ kmh}}$ = 11,1 h **OR** 11 × 9,7 km = 106,7 km No he will not finish in time		
5.2.4	Simon's Town		

5.2.5	(a)	End of M3 11:30 **OR** M3/Steenberg 11:30	
	(b)	108 km – 88,9 km = 19,1 km **OR** 108 km – 89 km = 19 km	
5.2.6	6:15:00 + 2:37:55 = 08:52:55		

Total: 150 marks