



INTERNATIONAL SECONDARY CERTIFICATE EXAMINATION
NOVEMBER 2022

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			
KEY	a	accuracy	ca	continued accuracy
	m	method	ma	method accuracy
	mca	method continued accuracy	r	rounding
1.1.1	Studio 47			
1.1.2	Eatery / Restaurant / Café / Diner. The Company's Garden			
1.1.3	N1 and N2 OR 1 and 2			
1.1.4	District Six Museum			
1.1.5	Roeland Street			
1.1.6	A3 or 3A			
1.1.7	North-west OR NNW			
1.2.1	11:00 – 07:45 = 3 hrs 15 min			
1.2.2	120 kg × 1 000 = 120 000 g ignore units			
1.2.3	120 000 g ÷ 300 g = 400 meals. Must make sense – no decimal meals accepted			
1.2.4	$\frac{1}{3} \times 31$ million tons = 10,3 million tons include million (accept 10 million including 2 nd step) OR 0,33 × 31 million = 10 230 000 OR $\frac{1}{3} \times 31\,000\,000 = 10\,333\,333,33$ tons No rounding penalty			
1.3.1	1 730 mm			
1.3.2	(a) 213 cm ÷ 100 cm = 2,13 ≈ 2 No decimals – must be an understanding of packaging			
	(b) 420 cm ÷ 120 cm = 3,5 ≈ 3 No decimals – must be an understanding of packaging			
	(c) Number of pallets = 2 × 3 ≈ 6 If (a) and (b) solutions were decimals then 0 for (a) and (b) for each but marks for (c) 2,13 × 3,5 = 7,455 ≈ 7			

Q2	Marking guideline			
KEY	a	accuracy	ca	continued accuracy
	m	method	ma	method accuracy
	mca	method continued accuracy	r	rounding
2.1.1	Column B			
2.1.2	Column A			
2.1.3	Column C			
2.2	12 km			
2.3	673 km			
2.4	N7 OR 7			
2.5	Route no. 27 OR R27 OR 27			
2.6	Moorreesburg			
2.7	5 Hospitals			
2.8	$45 + 67 + 7 + 42 = 161 \text{ km}$ OR $606 - 445 = 161 \text{ km}$ OR $228 - 67 = 161 \text{ km}$			
2.9	It is a route map used by travellers and the distances are given on the map. There is no need for calculations using scale. OR The gap between Ceres and Porterville shows 18 km but is longer than the gap between Porterville and Piketberg which is 26 km. OR No scale given Differences in km in some places Inconsistent lengths for distances (Take language barrier into consideration)			

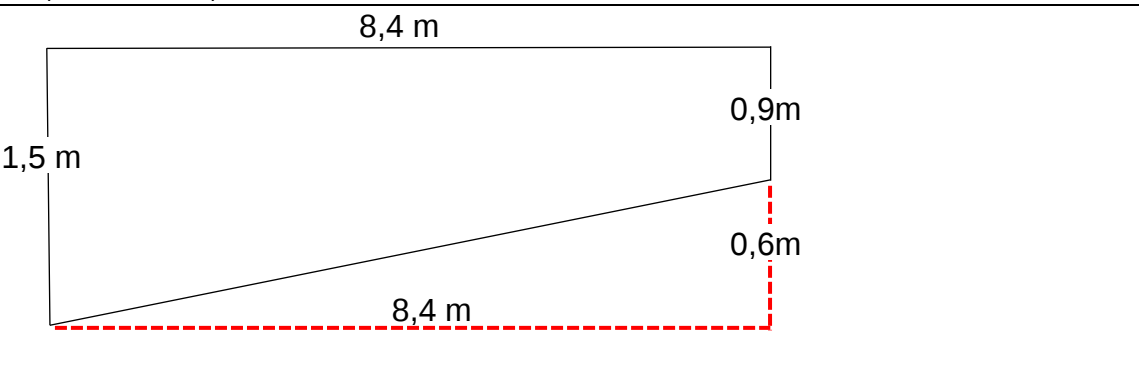
2.10.1	$= \frac{673 \text{ km}}{110 \text{ km/h}}$ $= 6,11818... \text{ h}$ $= 6 \text{ h} + 0,118 \times 60 \text{ min}$ $= 6 \text{ h } 7,08 \text{ min (Accept 7 min)}$ $\text{(Unrounded value 6h 7min 5,45s)}$ 06:07:05,45 OR 06:07:05 No rounding penalty
2.10.2	$8,6 \text{ litres} : 100 \text{ km} = 40 \text{ litres} : x \text{ km}$ $\frac{8,6}{100} = \frac{40}{x}$ $8,6x = 4\,000$ $\frac{8,6x}{8,6} = \frac{4\,000}{8,6}$ $x = 465,12 \text{ km}$ OR $40 \text{ l} \div 8,6 \text{ l} \times 100 \text{ km} = 465,12 \text{ km}$ OR $100 \div 8,6 \times 40 = 465,12$ OR per litre $x = 1 \div 8,6 \times 100$ $= 11,63 \text{ km/l}$ For 40 l $x = 40 \times 11,63$ $= 465,2 \text{ km}$ OR per km $x = 1 \div 100 \times 8,6$ $x = 0,086 \text{ l/km}$ For 40 l $x = 40 \div 0,086$ $= 465,12 \text{ km}$ Not permitted to start with 465 km (0)

2.10.3	Clanwilliam is 225 km = 15 km more to go after 210 km <u>Must discuss BOTH resting and fuel</u> <u>Resting:</u> Clanwilliam is 225 km 2 hours driving @ 110km/h = 220 km NO because its greater than 220 km. OR 225 > / more than 210. OR 15 km too far. <u>Petrol:</u> $\frac{1}{2}$ tank of petrol = $465 \div 2 = 232,5$ km OR $20 \ell \div 8,6 \ell \times 100 \text{ km} = 232,6 \text{ km}$ YES, they have enough petrol.
2.10.4	Money rounding was penalised in this question (P1M) 8,6 litres : 100 km = x litres : 690 km $\frac{8,6}{100} = \frac{x}{690}$ $100x = 5\,934$ $\frac{100x}{100} = \frac{5\,934}{100}$ $x = 59,34 \text{ litres}$ 59,34 litres $\times$ R17,10 = R1 014,71 OR 690km $\div$ 100 $\times$ 8,6 = 59,34 ℓ needed 59,34 ℓ $\times$ R17,10 = R1 014,71 Using the given value in Q2.10.2 of (465 km) and 0,086 l/km 1 tank = 40 litres 2nd tank 690 – 465 km = 225 km left to travel $0,086 \times 225 = 19,35$ litres 19,35 litres + 40 litres =59,35 litres 59,35 $\times$ R17,10 = R1014,90 OR 8,6l / 100km

	$8,6 : R1710 = R146,06$ For 600 km $R146,06 \times R146,06 = R882,36$ $90\% \times 8,6 = 7,74$ $7,74 \times R17,10 = R132,354$ $R882,36 + R132,354 = R1014,71$
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Q3	Marking guideline			
KEY	a	accuracy	ca	continued accuracy
	m	method	ma	method accuracy
	mca	method continued accuracy	r	rounding
3.1	Living / Dining Room.			
3.2	Bath OR second bathroom has 2 basins / 2 taps (extra basin) OR bidet any ONE			
3.3	If guests visit, they do not go through the bedroom to get to the bathroom. OR shorter route OR accommodate everyone			
3.4	Balcony 2 as there is a door to this balcony from the living room. OR Balcony 2 is bigger Balcony 1 you would have to go through the main bedroom. OR Balcony x 1 has chairs to sit on			
3.5	$1,56 \text{ m} - 1,25 = 0,31 \text{ m}$			
3.6	$3,96 \text{ m} \times 3 = 11,88 \text{ m}$ OR repeated addition with no wall interference i.e. $3,96 + 3,96 + 3,96$ OR $3,81 + 3,96 + 3,81 = 11,58 + \text{wall thickness of } 0,3$ MUST include wall thickness otherwise (0)			
3.7	CHECK FINAL PRINTOUT $13,5 \text{ cm} : 11,88 \text{ m} = 13,5 \text{ cm} : 1\,188 \text{ cm}$ $= \frac{13,5}{13,5} : \frac{1\,188}{13,5} \div$ $= 1 : 88$ (P1 if units included) Accept $13,4 - 13,6 = 87 - 89$			
3.8	Area living room = $3,96 \times 6,87 = 27,2052 \text{ m}^2$ No rounding penalty $\frac{27,21}{115} \times \text{fraction} \times 100\% = 23,66\%$ OR 23,7% OR 24%			

[illegible]

4.2.3	$\frac{1}{2} \text{circumference} = \frac{1}{2} \pi d$ $= \frac{1}{2} (\pi \times 24 \text{ in})$ $= \frac{1}{2} (75,398 \dots \text{ in}) \div 2$ $= 37,69999 \dots$ $\approx 37,7 \text{ in} \div 2 \text{ irrespective of diam \& r swapping}$ OR $\frac{1}{2} (2\pi \times 12)$ $\frac{1}{2} (75,398 \dots \text{ in})$ $= 37,7 \div 2 \text{ irrespective of diam \& r swapping}$ (Accept) 38 in $\frac{1}{2} (\pi \times 32)$ $\frac{1}{2} (100,53 \dots \text{ in})$ $= 50,265 \div 2 \text{ irrespective of diam \& r swapping}$ $\frac{1}{2} (2\pi \times 16)$ $\frac{1}{2} (100,53 \dots \text{ in})$ $= 50,265 \div 2 \text{ irrespective of diam \& r swapping}$		
4.2.4	Penalty for units (P1U) $337 \times 2,54 = 855,98 \text{ cm}$ $\approx 8,56 \text{ m OR } 8,6 \text{ m}$		
4.3			
	<table border="0"> <tr> <td data-bbox="284 1478 790 2045"> Area rect $= 8,4 \text{ m} \times 1,5 \text{ m}$ $= 12,6 \text{ m}^2$ Area triangle $= \frac{1}{2} \times 8,4 \times 0,6$ $= 2,52 \text{ m}^2$ Total area $= 12,6 \text{ m}^2 - 2,52 \text{ m}^2$ $= 10,08 \text{ m}^2$ Volume $= 10,08 \text{ m}^2 \times 5,4 \text{ m}$ $= 54, 432 \text{ m}^3$ </td><td data-bbox="790 1478 1428 2045"> Area rect $= 8,4 \text{ m} \times 0,9 \text{ m}$ $= 7,56 \text{ m}^2$ Area triangle $= \frac{1}{2} \times 8,4 \times 0,6$ $= 2,52 \text{ m}^2$ Total area $= 7,56 \text{ m}^2 + 2,52 \text{ m}^2$ $= 10,08 \text{ m}^2$ Volume $= 10,08 \text{ m}^2 \times 5,4 \text{ m}$ $= 54, 432 \text{ m}^3$ </td></tr> </table>	Area rect $= 8,4 \text{ m} \times 1,5 \text{ m}$ $= 12,6 \text{ m}^2$ Area triangle $= \frac{1}{2} \times 8,4 \times 0,6$ $= 2,52 \text{ m}^2$ Total area $= 12,6 \text{ m}^2 - 2,52 \text{ m}^2$ $= 10,08 \text{ m}^2$ Volume $= 10,08 \text{ m}^2 \times 5,4 \text{ m}$ $= 54, 432 \text{ m}^3$	Area rect $= 8,4 \text{ m} \times 0,9 \text{ m}$ $= 7,56 \text{ m}^2$ Area triangle $= \frac{1}{2} \times 8,4 \times 0,6$ $= 2,52 \text{ m}^2$ Total area $= 7,56 \text{ m}^2 + 2,52 \text{ m}^2$ $= 10,08 \text{ m}^2$ Volume $= 10,08 \text{ m}^2 \times 5,4 \text{ m}$ $= 54, 432 \text{ m}^3$
Area rect $= 8,4 \text{ m} \times 1,5 \text{ m}$ $= 12,6 \text{ m}^2$ Area triangle $= \frac{1}{2} \times 8,4 \times 0,6$ $= 2,52 \text{ m}^2$ Total area $= 12,6 \text{ m}^2 - 2,52 \text{ m}^2$ $= 10,08 \text{ m}^2$ Volume $= 10,08 \text{ m}^2 \times 5,4 \text{ m}$ $= 54, 432 \text{ m}^3$	Area rect $= 8,4 \text{ m} \times 0,9 \text{ m}$ $= 7,56 \text{ m}^2$ Area triangle $= \frac{1}{2} \times 8,4 \times 0,6$ $= 2,52 \text{ m}^2$ Total area $= 7,56 \text{ m}^2 + 2,52 \text{ m}^2$ $= 10,08 \text{ m}^2$ Volume $= 10,08 \text{ m}^2 \times 5,4 \text{ m}$ $= 54, 432 \text{ m}^3$		

	OR Area rectangle $8,4 \times 1,5 = 12,6 \text{ m}^2$ Area triangle $\frac{1}{2} 8,4 \times 0,6 = 2,52 \text{ m}^2$ Volume rectangle $12,6 \times 5,4 = 68,04 \text{ m}^3$ Volume triangle $2,52 \times 5,4 = 13,608 \text{ m}^3$ Volume $68,04 - 13,608$ $= 54,432 \text{ m}^3$ OR $\frac{1}{2} \times 1,5 \times 8,4 = 6,3 \text{ m}^2$ $\frac{1}{2} \times 0,9 \times 8,4 = 3,78 \text{ m}^2$ $6,3 + 3,78 = 10,08 \text{ m}^2$ Volume $10,08 \times 5,4 = 54,432 \text{ m}^3$	OR Area rectangle $8,4 \times 0,9 = 7,56 \text{ m}^2$ Area triangle $\frac{1}{2} 8,4 \times 0,6 = 2,52 \text{ m}^2$ Volume rectangle $7,56 \times 5,4 = 40,824 \text{ m}^3$ Volume triangle $2,52 \times 5,4 = 13,608 \text{ m}^3$ Volume $40,824 + 13,608$ $= 54,432 \text{ m}^3$
	Area trap $\frac{(1,5+0,9)}{2} \times 8,4 = 10,08$ $10,08 \times 5,4 = 54,432 \text{ m}^3$	

Q5	Marking guideline			
KEY	a accuracy m method mca method continued accuracy	ca continued accuracy ma method accuracy r rounding		
5.1	No penalty for rounding $3,785 \ell = 1 \text{ gallon}$ $0,4535 \text{ kg} : 1 \text{ lb} = x \text{ kg} : 4,5 \text{ pounds}$ $\frac{0,4535}{1} = \frac{x}{4,5}$ $x = 2,04 \text{ kg}$ $2,04 \text{ kg} : 3,785 \ell = \frac{2,04}{3,785} : \frac{3,785}{3,785}$ $= 0,5 \text{ kg / litre}$ OR $x = 4,5 \times 0,4535 = 2,04 \text{ kg}$ $x = 1 \div 3,785 \times 2,04$ $= 0,5 \text{ kg/l}$ $2,04 \text{ kg} : 4 \ell = \frac{2,04}{4} : \frac{4}{4}$ $= 0,51 \text{ kg / litre}$			
5.2	$-22 = 1,8 \times ^{\circ} + 32^{\circ}$ $-54 = 1,8 \times ^{\circ}\text{C}$ $-\frac{54}{1,8} = ^{\circ}\text{C}$ $-30 = ^{\circ}\text{C} \div 1,8$			
5.3.1	Volume $= 21 \text{ cm} \times 15 \text{ cm} \times 8 \text{ cm}$ $= 2\,520 \text{ cm}^3 \text{ OR } 2520 \text{ litres}$ Capacity $1\,000 \text{ cm}^3 : 1 \text{ litre} = 2\,520 \text{ cm}^3 : x \text{ litres}$ $\frac{1\,000}{1} = \frac{2\,520}{x}$ $1\,000 x = 2\,520 \div 1000$ $x = 2,520 \text{ litres}$ OR $2\,520 \text{ cm}^3 \div 1\,000 = 2,520 \text{ litres}$			

5.3.2	Containers are never filled to the top there is always some wasted space. Contents are always less than the container can hold – spillage. OR When liquids freeze, they expand so this allowance is needed. Reason must make sense
5.3.3	2 litres $\times \frac{52}{100} = 1,04$ litres = 1 040 ml OR 52% $\times$ 2 000 ml = 1040 ml
5.4.1	the height OR depth decreased by 1 cm
5.4.2	(a) Spaces between each triangle is much wider. OR They have taken every second triangle of chocolate. (b) $\frac{340 \text{ g} - 400 \text{ g}}{400 \text{ g}} \times 100\% =$ = -15% Decrease of 15% OR -15%in chocolate Accept $\frac{400 \text{ g} - 340 \text{ g}}{400 \text{ g}} \times 100\% = \underline{\text{decrease}} / -15\%$

5.5.1	Gender Flavour <pre> graph LR Root(()) --- 0.42 Male Root --- 0.58 Female Male --- 0.3 M_Choc["c) Choc"] Male --- 0.5 M_Vanilla["d) Vanilla"] Male --- 0.2 M_CnC["e) C&C"] Female --- 0.3 F_Choc["f) Choc"] Female --- 0.5 F_Vanilla["g) Vanilla"] Female --- 0.2 F_CnC["h) C&C"] M_Choc --- J1["/ 0,126"] M_Vanilla --- J2["/ 0,21"] M_CnC --- J3["/ 0,084"] F_Choc --- J4["/ 0,174"] F_Vanilla --- J5["/ 0,29"] F_CnC --- J6["/ 0,116"] </pre> Correct order All favours Values not flavours All branches Correct values
5.5.2	$P(F; \text{Vanilla}) = 0,58 \times 0,5 = 0,29$
5.5.3	$P(M; \text{Vanilla}) = 42\% \times 50\% = 21\%$ $P(M; \text{C\&C}) = 42\% \times 20\% = 8,4\%$ $P(M; \text{Vanilla OR C\&C}) = 21\% + 8,4\% = 29,4\%$ OR $P = 0,42 \times (0,5 + 0,2) = 0,294$ $= 0,294 \times 100$ $= 29,4\%$

Total: 150 marks