



2019 NSW ESA Mathematics Standard 2 Solutions

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Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	B	C	D	C	D	B	A	A	C	D	C	B	A

Q1 **A**

Q2 **B**

Q3 $1000 \times 1.035^2 \approx 1071.23$ **B**

Q4 **C**

Q5 Auckland is 17 hours ahead. When Chicago is 2 pm Thursday, Auckland is 7 am Friday. **D**

Q6 **C**

Q7 $28 \times 1.02 \times 4 = 114.24$ **D**

Q8 0.05 kg or 50 grams **B**

Q9 $800 \times 0.03 \times \frac{x}{12} = 2x$ **A**

Q10 $92\% - 86\% = 6\%$ **A**

Q11 $3x - 1 = 4y$, $y = \frac{3x-1}{4}$ **C**

Q12 $\frac{7}{\sin 32^\circ} \approx 13.2$ **D**

Q13 **C**

Q14 **B**

Q15 50% of candidate scores are between LQ and UQ. **A**

Section II

Q16 $V = \frac{1}{2} \times \frac{4}{3} \pi \times 8^3 \approx 1072 \text{ cm}^3$

Q17 $x = \sqrt{11^2 + 13^2 - 2 \times 11 \times 13 \cos 80^\circ} \approx 16 \text{ cm}$

Q18a $30:25:40 = 6:5:8$

Q18b Let x be the number of runs scored by the whole team.

$$(30 + 25 + 40) : x = 19 : 36, 95 : x = 19 : 36, x = \frac{95 \times 36}{19} = 180$$

Q19 $IQR = 194 - 185 = 9$, $Q_L - 1.5 \times IQR = 185 - 1.5 \times 9 = 171.5$
 $170 < 171.5$, \therefore the height of the shortest player is an outlier.

Q20 $\frac{1}{37} \times 18500 = 500$

Q21 $\frac{1068.20}{8.75 \times 1526} = 0.08 = 8\%$

Q22 $\cos \theta = \frac{4.9}{\sqrt{2.5^2 + 6^2}}$, $\theta \approx 41^\circ 5'$

Q23a $r \approx 0.98$

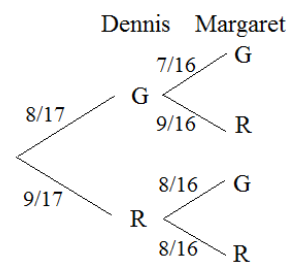
Q23b Positive, strong

Q23c Height = $0.866 \times 143 + 23.7 \approx 147.54 \approx 148 \text{ cm}$

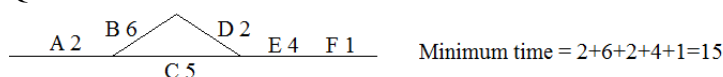
Q24 $\frac{2180}{80 \times 4.184} \approx 6.5$

Q25

$$\text{Probability} = \frac{8}{17} \times \frac{7}{16} + \frac{9}{17} \times \frac{8}{16} = \frac{8}{17}$$



Q26a



Q26b Float time of C $LST - EST = (15 - 10) - 2 = 3$

Q27 Interest = $3700 \times \left(1 + \frac{18.25}{100 \times 365}\right)^{11} - 3700 \approx 20.40$

Closing balance ≈ 3720.40

Minimum payment = $2\% \times 3720.40 \approx 74.41$

Q28 $N = 1.2 \times 3 + 1 \times 4 = 7.6$, $H = 12.5 - 6.25 = 6.25$ hours

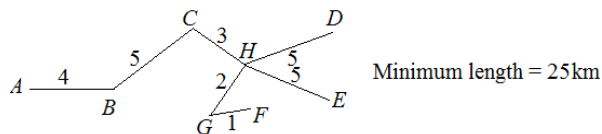
$$BAC_{\text{Female}} = \frac{10 \times 7.6 - 7.5 \times 6.25}{5.5 \times 60} \approx 0.0883$$

Time required $\approx \frac{0.0883}{0.015} \approx 5.887$ hours

Time in the morning $\approx 0.5 + 5.887 = 6.387$ i.e. 6:23 am

Q29 $A = 7.70$, $B = 36.25 - 7.70 - 5.00 - 8.50 - 3.20 - 2.85 = 9.00$

Q30a



Q30b $CGHE$

Q31a A and w are measurements, they must be positive values.

Q31b Read from the graph, $A = 18$ when $w = 2$

\therefore length = $\frac{18}{2} = 9 \text{ cm}$ and perimeter = $2(9 + 2) = 22 \text{ cm}$

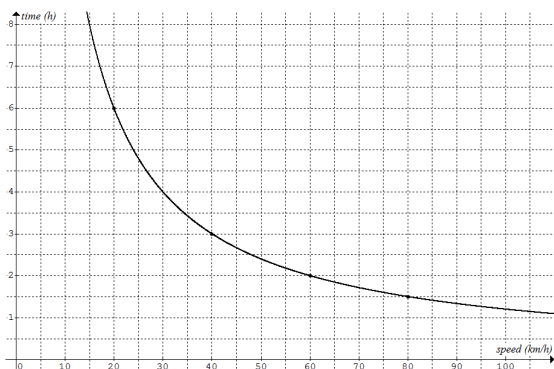
Q32 Taxable income (\$) = $\frac{1934.80}{2\%} = 96740$

Tax payable (\$) = $20797 + 0.37(96740 - 90000) = 23290.80$



Q33a Distance = $80 \times 1.5 = 120$ km

Q33b



Q34a $p = \frac{4}{7}d$

Q34b $d = \frac{y}{76} = \frac{93100}{76} = 1225$, $p = \frac{4}{7} \times 1225 = 700$

Q35 $\frac{1}{2} \times 16 \times 25 \sin \angle BOC = 198$, $\angle BOC \approx 82^\circ$

Bearing $\approx 125^\circ + 82^\circ = 207^\circ$

Q36a 20 bird houses

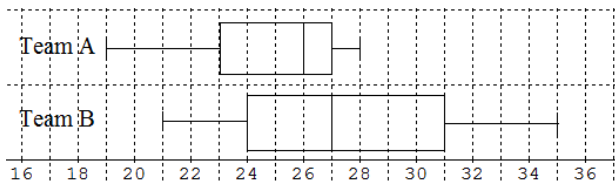
Q36b $C = 15x + 500$, $R = 40x$

Profit (\$) = $R - C = 25x - 500 = 1900$, $x = 96$

Q37 Value (\$) = $24950 \times \left(\frac{21457}{24950}\right)^{10} = 5521.47$

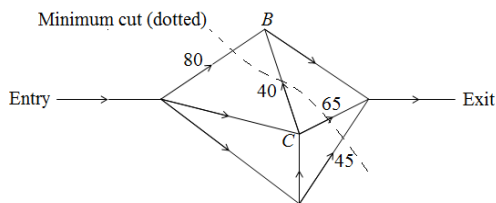
Q38 $\mu = 3000$, $\sigma = \frac{3000 - 1600}{2} = 700$, $z = \frac{3497 - 3000}{700} = 0.71$

Q39 Team A scored lower than Team B with respect to minimum score, Q_L , median, Q_U and maximum score. Team A scores were negatively skewed, Team B scores were positively skewed.



Q40a Capacity = $130 + 90 + 70 = 290$

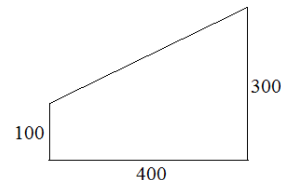
Q40b Recommended change: Increase the capacity of checkpoint between C and B from 40 to 50.



Q41a Distance between cinema and supermarket = $3000 \times \frac{10}{60} = 500$ m

$\therefore 5 \text{ cm} : 500 \text{ cm}$, i.e. $1 \text{ cm} : 100 \text{ cm}$

Q41b Volume $\approx \frac{1}{2}(100 + 300)400 \times 0.020 = 1600 \text{ m}^3$



Q42 Amount after the 7th contribution (\$) = $2000 \times 6.633 \times 1.05 + 2000 = 15929.30$

Please inform mathline@itute.com re conceptual and/or mathematical errors.