2023 NSW ESA Mathematics Standard 1 Solutions

Section I

1	2	3	4	5	6	7	8	9	10
C	B	A	D	D	A	C	D	C	B

Q2 $2500\times0.03\times2=150$ B

Q3 $5\times100000=500000$ cm $=5$ km A

Q5 New charges $=85.97+4.64=90.61$ D

Q6 $65000-0.22\times132600=35828$ A

Q7 Price x without GST, $1.1x=880$ $\therefore$ $x=800$, GST $=80$ C

Q9 Old ratio $2:3=60:90$; new ratio $50:80=5:8$ C

Q10 1 year $=60\times24\times365$ min $\quad 4$ mL $=\dfrac{4}{1000}$ L B

Section II

Q11a $A=65000\times15=975000$, $B=3010000$

Q11b Mean $=\dfrac{3010000}{50}=60200$

Q12a $5.200\,\text{m}\times5.940\,\text{m}$

Q12b $\dfrac{320\times360}{40\times40}=72$

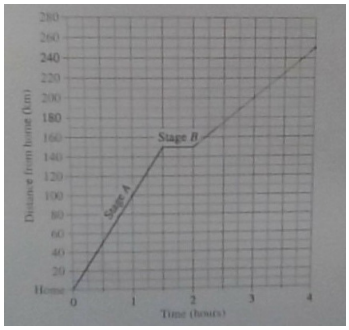
Q12c $\dfrac{72}{10}=7.2$ $\therefore$ 8 boxes

Q13a Mode is 9

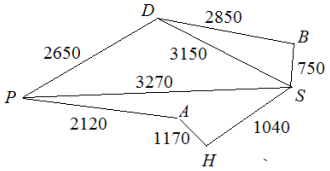
Q13b Negatively skewed, one outlier

Q14a $\dfrac{150}{1.5}=100$ km h^{-1}

Q14b 0.5 of an hour



Q15a



Q15b $1040+3150=4190$ km

Q16 $\dfrac{120}{x}=\tan18°$, $x\approx369$ m

Q17 $P=\dfrac{10\times6-7.5\times2}{9}=5$

Q18a $ABFGD$

Q18b No, not a minimum spanning tree. Disconnecting BC and then joining DC will provide a lower total edge weight.

Q19a $23=0.936x-8.929$, $x\approx34°$

Q19b Extrapolation, the number of ice-creams, 23, and the predicted temperature, 34, are outside the recorded ranges.

Q20 $Q_1=29$, $Q_3=45$, $IQR=45-29=16$
Upper fence $=45+1.5\times16=69$ $\therefore$ 58 is not an outlier.

Q21 Amount $=12000(1+0.01)^{20}\approx14642.28$ dollars

Q22 $(4\times5+2.5\times1.5+3\times2)\times24.05\approx715.49$ dollars

Q23 EC: $\dfrac{35000}{100}\times18\times0.25=1575$, PC: $\dfrac{35000}{100}\times8.6\times1.87=5628.70$
Saving $5628.70-1575=\$4053.70$

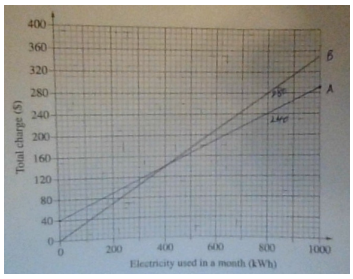
Q24a $A=5090.54\times0.006=30.54324\approx30.54$,
$B\approx5090.54+30.54\approx5121.08$

Q24b $5000\times0.0062\times4=124$ dollars

Q25 $15000\times1.053^8\neq22673.48$ dollars

Q26a $40+400\times0.25=140$

Q26b



Q26c At intersection of the two lines, usage $=400$ kwh per month

Q26d At 800 kwh per month, A charges \$240 and B \$280
$\therefore$ A is cheaper by \$40

Q27 When the game finishes at Town B 1:30 pm, Town A time is 9:30 am.

Q28 $\dfrac{19.1}{0.06}\approx318$ g

Q29a $XP=15\cos(180°-120°)=7.5$ km

Q29b $\cos\angle CXP=\dfrac{7.5}{40}$, $\angle CXP\approx79°$
Bearing of C from $X\approx180+79=259°$

Q30 Declining-balance method would give a lower salvage value.
Straight-line method: Salvage value $=60000-3500\times3=49500$
Declining-balance method:
Salvage value $=60000(1-0.12)^3\approx40888.32$

Q31 Drawing: $\dfrac{1}{2}\times2\times4+\dfrac{1}{2}\times\pi\times2^2+15\approx25.28318$ cm^2

1 cm $\equiv$ 2 m, 1 cm^2 $\equiv$ 4 m^2 $\therefore$ actual area $\approx25.28318\times4\approx101.133$ m^2
Volume $\approx101.133\times0.10\approx10.11$ m^3

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