2018 NSW ESA Mathematics General 2 Solutions

Section I

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

10	11	12	13	14	15	16	17	18
C	B	D	A	A	B	D	C	A

19	20	21	22	23	24	25
D	C	B	B	A	D	A

Q1 Range $9-2=7$ D

Q2 $3+1=4$ D

Q3 C

Q4 A

Q5 $\frac{8\text{ L}}{100\text{ km}}\times 200\text{ km}=16\text{ L}$ A

Q6 C

Q7 $180°+34°=214°$ C

Q8 $\$15\times 8=\$120$ D

Q9 27% of $500=135$ B

Q10 $\frac{56}{n}=\frac{29}{47}$, $n\approx 91$ C

Q11 B

Q12 $\cos\theta=\frac{8^2+9^2-10^2}{2\times 8\times 9}$, $\theta\approx 72°$ D

Q13 $\frac{1}{3}\times 3x\times 4x\times 2x=8x^3$ A

Q14 Sale price = Cost price $\times 1.30\times 0.70$ = Cost price $\times 0.91$

$\therefore$ Sale price < Cost price A

Q15 B

Q16 $\frac{k^2}{10}\times\frac{k}{5}=\frac{k^3}{50}$ D

Q17 C

Q18 A

Q19 8 periods at 1% per period D

Q20 $\frac{71}{223}\approx 32\%$ C

Q21 $\$890\times(1-0.25)\times 0.20=\$133.50$ B

Q22 $\frac{1}{4}\times 2\pi\times 8+8+6+10\approx 36.6$ B

Q23 $\frac{99.7\%-68\%}{2}=15.85\%$ A

Q24 $\frac{\theta}{180}=\frac{5700}{6400\pi}$, $\theta\approx 51°$, $39-51=-12$, i.e. 12° S D

Q25 A

Section II

Q26a $\frac{48}{150}=0.32$

Q26b $90=\frac{w\times 325}{70}$, $w\approx 19$ kg

Q26c $\$100\times 12\times 5=\$6000$

Q26di 3 months

Q26dii Sydney, smaller spread in rainfall

Q26e First quartile (11th score) is 2, third quartile (32nd score) is 5, interquartile range $=5-2=3$

Q26f $6\times(6-1)=30$

Q26gi Measured length of $AG=8$ cm, 8 cm : 24 m $\therefore$ 1 cm : 3 m

Q26gii Grassed area $\frac{1}{2}(18+24)\times 9=189\text{ m}^2$

Fertiliser $=26.5\times 189=5008.5\text{ g}\approx 5\text{ kg}$

Q26h $\$23\,900\times(1-0.115)^3\approx\$16\,566.38$

Q27a $50+0.33\times 120+0.26\times 1400=453.60$ dollars

Q27b $3(x+5)-x=7$, $2x=-8$, $x=-4$ and $y=1$

Q27c Area $=\frac{1}{2}\pi\times 3.8\times 10\approx 60\text{ m}^2$

Q27di $\frac{\$360}{3\text{ hours}}=\$120$ per hour

Q27dii $m=\frac{360-75}{3}=95$, $c=95x+75$

Q27diii Cheaper by $120\times 5-(95\times 5+75)=50$ dollars

Q27ei $z=\frac{70-58}{8}=1.5$

Q27eii $\frac{x-64}{10}=1.5$, $x=79$ is Joanna's Biology test mark.

Q28a Area $\approx \frac{7.5}{3}(8.8+4\times7.1+2\times9.8+4\times8.5+4.9)=239.25\text{ m}^2$

Q28b $\frac{2x}{5}+1=\frac{3x+1}{2}$, $\frac{2x+5}{5}=\frac{3x+1}{2}$, $2(2x+5)=5(3x+1)$

$4x+10=15x+5$, $11x=5$, $x=\frac{5}{11}$

Q28c Energy $=1.2\times0.40\times0.75=0.36$ kWh per day
Cost for 180 days $=\$0.25\times0.36\times180=\$16.20$

Q28di $\$849\left(1+0.123\times\frac{24}{365}\right)\approx\$855.87$

Q28dii $\$855.87-\$450+\$3=\$408.87$

Q28e $D=70\,000\times\frac{1.5}{60\times60}+0.01\times70^2\approx78\text{ m}$

Q29a 9.00 am the following day Brisbane time = 4.30 am the following day New Delhi time
Flying time $=4.5+24-3-11.5=14$ hours

Q29b Time taken $=\frac{495\times2^{20}\times8}{82.7\times10^6}\approx50\text{ s}$

Q29ci $D=\frac{k}{A}$, $15=\frac{k}{300}$, $k=4500$, $D=\frac{4500}{A}$

Q29cii $4=\frac{4500}{A}$, $A=1125\text{ cm}^2$

Q29di $\bar{y}=-0.984\bar{x}+c$, $65.01=-0.984\times20+c$
y-intercept $=c=84.69$

Q29dii Using $y=-0.984x+84.69$, $y=0$ when $x\approx86.07$
When $x=87$, $y<0$, .: does not give a valid estimate, the extrapolation is too far beyond the given data.

Q29diii $y=-0.984\times37+84.69\approx48.28$

Q29div $-0.972x+80.44=48.28$, $x\approx33$

Q29e $\$243\times12\times6-\$281\times12\times5=\$636$

Q30a $\pi9^2h=1.26\times1000\text{ m}^3$, $h\approx4.95\text{ m}$

Q30bi Tax $=\$19\,822+\$0.37\times16\,800=\$26\,038$

Q30bii Extra $=\$(1.00-0.37)\times16\,800=\$10\,584$

Q30c $AC=13\sin62°$
$\frac{1}{2}x\times13\sin62°\times\sin40°=30$, $x\approx8.1$

Q30di Box on left: $\frac{3}{20}$
Top box on right: $\frac{3}{19}$
Middle box on right: $\frac{17}{19}$
Bottom box on right: $\frac{2}{19}$

Q30dii Expectation \$:
$\frac{17}{20}\times\frac{16}{19}\times0.20+\frac{17}{20}\times\frac{3}{19}\times2.10+\frac{3}{20}\times\frac{17}{19}\times2.10+\frac{3}{20}\times\frac{2}{19}\times4.00-1.00$
$=-0.23$
The financial expectation of each game is losing 23 cents.

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