2015 NSW BOS Mathematics General 2 Solutions

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Section I

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

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

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

Q1 D

Q2 $4x+3y-x-5y=4x-x+3y-5y=3x-2y$ A

Q3 $952.25-(180.93+85.70+21.40+38.15)=626.07$ B

Q4 A

Q5 B

Q6 The percentage between 40 minutes (Q_L) and 60 minutes (median) is 25%. C

Q7 $\angle AOB=(360-300)°+51°=111°$ B

Q8 $\text{Volume}=\frac{1}{3}\times 35^2\times 22=8983\frac{1}{3}$ C

Q9 Let x m be the distance. $\tan 42°=\frac{67}{x}$, $x\approx 74$ B

Q10 Exponential decay:
When $t=5$, $\text{value}=56000(1-0.08)^5\approx 37000$ A

Q11 $3x^0+5x=3\times 1+5x=3+5x$ D

Q12 $\text{Percentage error}=\frac{0.5}{49}\times 100\%\approx 1\%$ C

Q13 Gradient $=-2$, y-intercept is $(0,2)$, $\therefore\ y=-2x+2$ A

Q14 Difference in longitudes: $131°-18°=113°$
Difference in time (minutes): $\frac{113°}{15°}\times 60=452$ C

Q15 Let $\$x$ be the price without GST.
$1.12x=449$, $\therefore\ x\approx 401$ B

Q16 D

Q17 Let $\$x$ be the amount invested now. There are 20 quarters in 5 years. Interest rate per quarter is 1%.
$x\times 1.01^{20}=60000$, $x\approx 49173$ C

Q18 ${}^5C_3=10$ A

Q19 Remaining years of life for a 45-year-old female : 34.0 years
She was 65 years old 20 years later and .: 14.0 years remained.
In 1995 at age 65, remaining years of life was 19.8 years according to the table. Difference $=19.8-14.0=5.8$ years D

Q20 7.96 is a standard deviation lower than the mean.
$\text{Percentage}=\frac{100\%-68\%}{2}=16\%$ A

Q21 $3\times 3\times 2\times 1=18$ C

Q22 $\frac{1}{2}\times 30x\sin 44°=250$, $x\approx 24$ D

Q23 Three small white and two large red
$=3\times 0.9+2\times 1.5=5.7$ standard drinks
$BAC(\text{for 62-kg female in 5 hours})=\frac{10\times 5.7-7.5\times 5}{5.5\times 62}\approx 0.057$ D

Q24 $\frac{2x}{3}-4=\frac{5x}{2}+1$, $\frac{2x}{3}=\frac{5x}{2}+1+4$ B

Q25 $870\times 0.85\times 0.80-50\approx 541.60$ C

Section II (next page)

Section II

Q26a Let N be the total number. $\frac{18}{N}=\frac{4}{26}$, $N=117$

Q26b Number of tablets $=\frac{35\times3150}{70}\div525=3$

Q26c $\ell=\frac{40°}{360°}\times2\pi\times6400\approx4468$ km

Q26d Amount $=320\times1.029^5\approx369.17$ dollars

Q26ei Relative frequency of selecting a red jelly bean
$=1-(0.32+0.13+0.14+0.24)=0.17$

Q26eii $\Pr(\text{not black})=1-0.14=0.86$

Q26f $0.71(4\pi\times6400^2)\approx3.7\times10^8$ km^2

Q26g Calls: $561-550=11$ dollars
Data: $(1.7\times1024-500)\times0.0293=36.36$ dollars
Phone bill amount $=49.00+11.00+36.36=96.36$ dollars

Q27a Let x m be the length of the shadow.
$\frac{x}{19.2}=\frac{5}{1.65}$, $x\approx58.18$

Q27b Number of drops per minute $=\frac{2400}{12\times60}\times15=50$

Q27ci Second equation $-$ first equation: $18y=1260$, $y=70$ and
$x=1510-18\times70=250$

Q27cii Number of months to repay the loan in full
$=\frac{4800-250}{70}=65$

Q27di IQR $=680-490=190$; $680+1.5\times190=965$
$970>965$, .: 970 is an outlier

Q27dii The distribution is translated by 20 in the positive direction and the standard deviation remains the same.

Q27e 42 megabytes $=42\times1024$ kilobytes $=42\times1024^2$ bytes
$=42\times1024^2\times8$ bits
Download rate $=500$ kilobits per second $=500000$ bits per second
.: download time $=\frac{42\times1024^2\times8}{500000}\approx704.643$ seconds
≈11 minutes 45 seconds

Q28a Area (cm^2) $=\pi(5^2-3^2)\approx50.27$

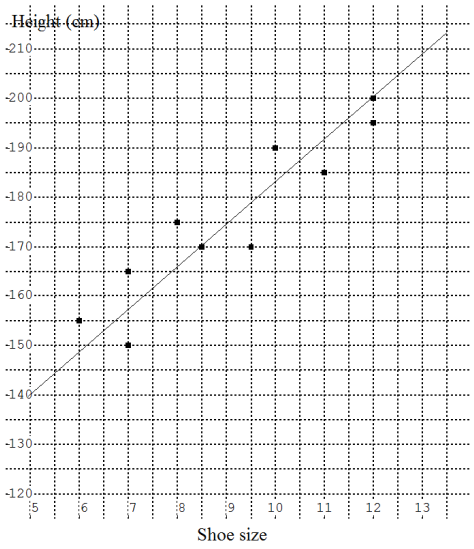
Q28b Mathematics: $z=\frac{74-70}{6.5}\approx0.6154$

English: $z=\frac{80-75}{8}=0.625$
$0.625>0.6154$, .: Kristoff is correct.

Q28c $V=\frac{15}{3}(45+4\times180+35)=4000\,\text{cm}^3=4$ litres

Q28d Transpose to make F the subject of the formula,
$F=\frac{9C}{5}+32=\frac{9\times3}{5}+32\approx37.4°$

Q28ei

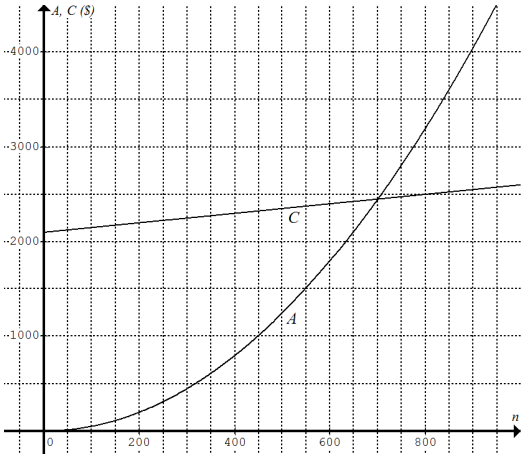


Q28eii Height difference $=175-162=13$ cm

Q28eiii Correlation coefficient $=1$ cannot be correct because the data points are not in line.

Q28fi $\$C=2100+0.50n$

Q28fii Make $n=700$ calls to break even.



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Q29a Interest $= 425 \times 0.184 \times \dfrac{12}{365} \approx 2.57$

Amount paid (\$) $= 425 + 2.57 = 427.57$

Q29b Jamal repaid the loan fully 8 years (96 months) earlier,
∴ he paid $\$1880 \times 96 = \$180480$ less.

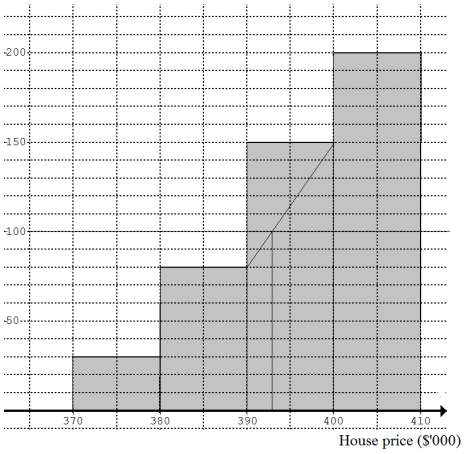
Q29ci By measurement the length
$= 1.5 \times$ the length of the dotted line $= 1.5 \times 12 = 18$

Area (m^2) $18 \times 12 = 216$

Q29cii Volume of rain (m^3) $= 216 \times 0.005 = 1.08$

$\pi 1.8^2 \Delta h = 1.08$, increase in depth $\Delta h \approx 0.1061\,\text{m} = 106.1\,\text{mm}$

Q29di \$393000



Q29dii

Class Centre (\$'000)	*Frequency*
375	30
385	50
395	70
405	50

Mean house price (\$'000)

$= \dfrac{1}{200}(375 \times 30 + 385 \times 50 + 395 \times 70 + 405 \times 50) = 392$

i.e. \$392000

Q29e Label the vertical axis as the y-axis. Locate the *y*-intercept and the turning point (maximum), read the *y*-coordinates of the two points and calculate the difference between them.

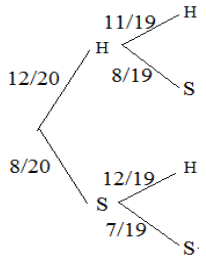
Q30a Total power $= 21 \times 20 = 420\,\text{W} = 0.42\,\text{kW}$

Time $= 11 \times 7 \times 24 = 1848\,\text{h}$

Total energy consumption (kWh) $= 0.42 \times 1848 = 776.16$

Savings (\$) $= 0.31 \times 776.16 \approx 240.61$

Q30b



$\Pr(HS \cup SH) = \Pr(HS) + \Pr(SH) = \dfrac{12}{20} \times \dfrac{8}{19} + \dfrac{8}{20} \times \dfrac{12}{19} = \dfrac{48}{95}$

Q30ci PV (\$) $= 55.68446 \times 200 \approx 11136.89$

Q30cii 6 years = 72 months ; 10.8% per annum = 0.0090 per month

Monthly repayment (\$) $= \dfrac{21500}{52.82118} \approx 407$

Q30d Distance (m) travelled in 2 seconds $= \dfrac{110}{3.6} \times 2 \approx 61.1$

Stopping distance (m) $= 61.1 + 59.2 \approx 120$

Q30ei

Length of $PC = \sqrt{5.4^2 + 1.8^2 - 2 \times 5.4 \times 1.8 \cos 108°} \approx 6.197$ m

Q30eii Let $\theta°$ be the measure of $\angle PCS$.

$\dfrac{\sin\theta°}{5.4} = \dfrac{\sin 108°}{6.197}$, $\theta° \approx 55.97°$

$PE = 2.1 + h = 6.197 \sin(90° - 55.97°)$

$h = 1.368$ m

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

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