NSW BOS General Mathematics Solutions 2006

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Section I

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

9	10	11	12	13	14	15	16
C	**C**	**A**	**B**	**D**	**A**	**A**	**C**

17	18	19	20	21	22		
D	**D**	**B**	**C**	**B**	**B**		

Q1 A

Q2 $V = \frac{4}{3}\pi(2)^3 = 33.51$ D

Q3 $\frac{30}{x} = \tan 65^0,\ x = \frac{30}{\tan 65^0} = 14.0\,\text{m}$ B

Q4 $\frac{28+38}{2} = 33$ C

Q5 In two weeks $2(200) + 40n = 2640,\ n = 56$ B

Q6 $60 \times \frac{1}{6} = 10$ B

Q7 $m = \frac{1}{2},\ c = 1,\ y = \frac{1}{2}x + 1$ D

Q8 C

Q9 $\text{Area} = \frac{1}{2}(39)(47)\sin 21^0 = 328\,\text{m}^2$ C

Q10 $\frac{4}{24} = \frac{1}{6}$ C

Q11 $\frac{27 \times 1000}{3600} = 7.5\ \text{ms}^{-1}$ A

Q12 $\frac{62 \times 5 + 14}{6} = 54$ B

Q13 D

Q14 A

Q15 $\binom{6}{2} = 15$ A

Q16 C

Q17 $\mu - \sigma < X < \mu + 2\sigma$,

$68\% + \frac{95-68}{2}\% = 81.5\%$ D

Q18 $4p = 5t + 2q^2,\ q^2 = \frac{4p-5t}{2},\ q = \pm\sqrt{\frac{4p-5t}{2}}$ D

Q19 Distance apart = arc length $l = \frac{\pi r\theta}{180}$

$= \frac{\pi 6400(16+52)}{180} \approx 7600$ km B

Q20 Before the increase, radius $= r$, $A = 4\pi r^2$.
After the increase, radius $= 1.10r$, $A = 4\pi(1.10r)^2 = 1.21(4\pi r^2)$.
$\therefore \Delta A = 0.21(4\pi r^2)$,
$\%\Delta A = \frac{\Delta A}{A} \times 100\% = 0.21 \times 100\% = 21\%$ C

Q21 Amount owing
$= 420000\left(1 + \frac{7.2}{12 \times 100}\right) - 4000 = \$418520$ B

Q22 Increase $80000 - 50000 = 30000$.
From 50001 to 70000, additional tax $= 0.35 \times 20000 = \$7000$.
From 70001 to 80000, additional tax $= 0.52 \times 10000 = \$5200$.
Total additional tax $= 7000 + 5200 = \$12200$.
% of increase $= \frac{12200}{30000} \times 100\% = 40.7\%$ B

Section II

Q23a $\frac{ab^2}{w} \times \frac{4w}{3b} = \frac{4ab}{3}$.

Q23bi $19°C$

Q23bii Feb

Q23biii May, June, July, August and September.

Q23ci Assign a natural number from 1 to n to each name on the list of students, where n is the number of students at Vicki's school. Use a calculator to generate 200 random numbers between 1 and n (inclusive).

Q23cii $\bar{x} = \frac{2 \times 69 + 7 \times 72 + 12 \times 38 + 17 \times 21}{200} = 7.275$ hours

Q23di \$6.00

Q23dii 4 kg or 7 kg

Q23diii $4 < w \le 6$ or $w > 7$

Q23div Rate $= \frac{12}{8} = \$1.50$ per kilogram

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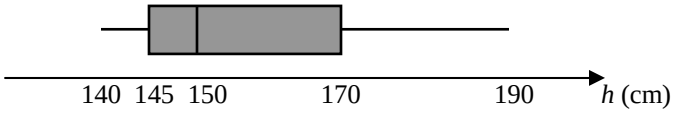
Q24a Number of sales of Y appears to be double that of X. Volume of Y sold appears to be 8 times that of X.

Q24bi $\cos\theta = \dfrac{44}{130}$, $\theta = \cos^{-1}\left(\dfrac{44}{130}\right) = 70°$

Q24bii $x = \sqrt{44^2 + 130^2 - 2(44)(130)\cos 53°} = 109$ cm

Q24c Median $= \dfrac{145+155}{2} = 150$, $Q_L = 145$,

$Q_U = \dfrac{165+175}{2} = 170$, min $= 140$, max $= 190$



Q24di Volume $= 1890 \times 300 = 567000$ cm^3.

Capacity $= \dfrac{567000}{1000} = 567$ litres.

Q24dii $A = \pi ab$, $2 \times 1890 = \pi\left(\dfrac{80}{2}\right)d$, $d = 30$ cm.

Q25ai $3! = 6$

Q25aii $\Pr(J) = \dfrac{2}{6} = \dfrac{1}{3}$

Q25aiii $\Pr(notC) = 1 - \Pr(C) = 1 - \dfrac{1}{3} = \dfrac{2}{3}$.

Q25bi From 23May to 20June, 29 days.

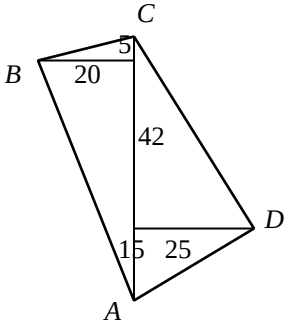
Q25bii Interest $= 617.72 \times \dfrac{0.0498}{100} \times 29 = \$8.92$

Q25ci $\Pr(first) = \dfrac{1}{180} \times 3 = \dfrac{1}{60}$

Q25cii $\Pr(first \ \& \ second) = \dfrac{3}{180} \times \dfrac{2}{179} = \dfrac{1}{5370}$

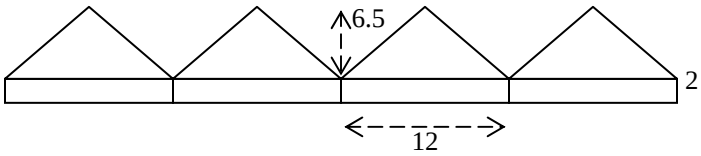
Q25d For Martha, $E = \dfrac{\left(1 + \dfrac{6}{100 \times 12}\right)^{48} - 1}{48} = 0.005635$ per month or $0.005635 \times 12 = 0.0676 = 6.76\%$ per annum. Martha has a better deal than Paul's 6.1% per annum.

Q26ai



Q26aii $CD = \sqrt{47^2 + 25^2} = 53$ m

Q26bi



Q26bii Surface area $= 4\left(12 \times 2 + \dfrac{1}{2} \times 12 \times 6.5\right) = 252$ m^2.

Q26ci $A = 200 - (74 + 12 + 16) = 98$

Q26cii $\Pr(positive result) = \dfrac{74}{74+12} = \dfrac{37}{43}$

Q26ciii $12 + 16 = 28$

Q26d 0° E and 120° E are 120° apart, $\therefore \dfrac{120}{360} \times 24 = 8$ hours apart. $\therefore$ 9.30 am Monday (London time) was 5.30 pm Monday (Manila time). Cassie arrived in Manila at 4.00 pm Tuesday (Manila time), a difference of 22.5 hours. Take off the stopping time of 5 hours, the total flying time was 17.5 hours.

Q27ai \$130000, 30 years.

Q27aii Extra interest
$= 1338.30 \times 240 - 1529.04 \times 180 = \$45964.80$

Q27bi A person's height must be greater than zero, i.e. $x > 0$.

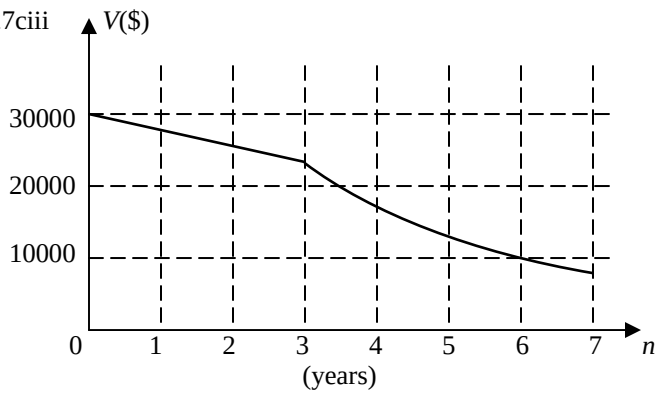
Q27bii $\Delta L = m\Delta h = \dfrac{25-19}{180-160} \times 10 = 3$ cm

Q27biii The calculated correlation coefficient is
(1) negative instead of positive,
(2) not within $-1 \le r \le 1$.

Q27ci Value $= 30000 - 2000 \times 3 = \$24000$

Q27cii $V = V_0(1-r)^n = 24000\left(1 - \dfrac{25}{100}\right)^4 = \$7593.75$

Q27ciii



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Q28ai
$2 + 50c;
$1 + $1 + 50c
$1 + 50c + 50c + 50c
50c + 50c + 50c + 50c + 50c

Q28aii She must select a $2 coin and a 50c coin.

$$\Pr(\$2.50) = \Pr(\$2 + 50c) + \Pr(50c + \$2) = \frac{3}{11} \times \frac{2}{10} + \frac{2}{11} \times \frac{3}{10} = \frac{6}{55}$$

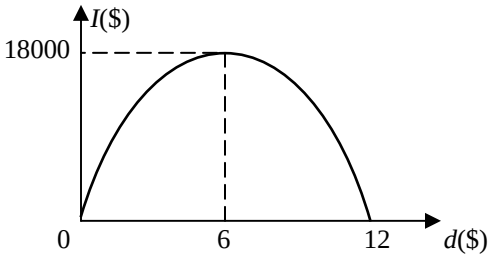
Q28aiii Total value $= 2x + y + 0.5w$ dollars.

Q28bi $\frac{6000}{500} = \$12$

Q28bii Number of vehicles $6000 - 500 \times 5 = 3500$
Daily income $= 5 \times 3500 = \$17500$

Q28biii $v = 6000 - 500d$

Q28biv Daily income $I = dv = d(6000 - 500d)$ dollars.



Anne is incorrect because what she said is not always true.
When $d = 6$,
daily income is maximum $I_{\max} = 6(6000 - 500 \times 6) = \$18000$.

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

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