

**Section A: Core**

1	2	3	4	5	6	7
D	E	D	C	C	B	B

8	9	10	11	12	13
B	A	C	A	D	E

Q1 Arrange the data in ascending order:-  
 $-5.5\%$ ,  $-4.7\%$ ,  $-4.6\%$ ,  $-4.4\%$ ,  $-1.1\%$ ,  $0.3\%$ ,  $2.9\%$   
 The middle one is  $-4.4\%$ . D.

Q2 Range = max – min  
 $= 2.9\% - (-5.5\%) = 8.4\%$  E.

Q3 52 and 76 are one standard deviation from the mean,  $\therefore 68\%$  of scores are between 52 and 76.  
 $68\% \times 2500 = 1700$ . D.

Q4 Total weight =  $72 \times 12 = 864\text{kg}$ . C.

Q5 Since everyone puts on 2kg, the mean increases to 74kg but the standard deviation stays the same. C.

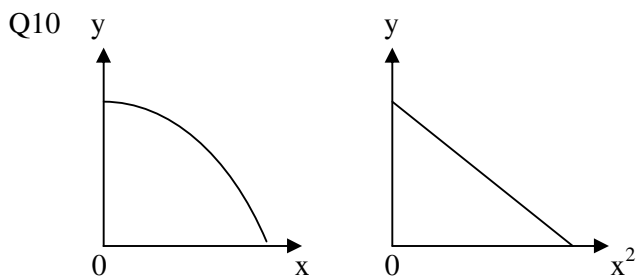
Q6 Number of standard sized houses  
 $= 14 + 71 + 47 = 132$ .

$\frac{47}{132} \times 100\% = 35.6\%$  B.

Q7 B.

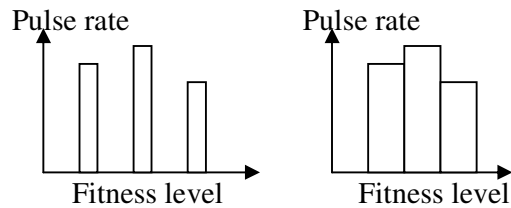
Q8 Read from graph, 4.6 errors. B.

Q9  $r^2 = 0.8198$ ,  $r = \pm 0.91$ . The regression line has a negative gradient, therefore  $r$  is negative. A.



C.

Q11 A bar graph or a histogram. A.



Q12

Year	No. of ac.	Mov. av.	Centred
1993	13		
1994	7		
1995	3	8	7.625 D.
1996	9	7.25	
1997	10		

Q13  $4.00 - 1.05 - 0.84 - 0.92 = 1.19$  E.

**Section B: Module 1 Number patterns and applications**

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

Q1 Arith. sequence,  $a = 4$ ,  $d = 6$ ,  $n = 10$ .

$$S_{10} = \frac{10}{2} [2 \times 4 + (10 - 1)6] = 310 \quad \text{C.}$$

Q2 The difference between the 2<sup>nd</sup> and the 4<sup>th</sup> term is  $2d = 20 - 36$ ,  $\therefore d = -8$ .

$$a + (-8) = 36, \therefore a = 44 \quad \text{C.}$$

Q3 Arith. Sequence,  $a = 47$ ,  $d = -4$ ,  $n = 11$ .

$$t_{11} = 47 + (11 - 1)(-4) = 7 \quad \text{C.}$$

Q4 No. of women =  $480 - 180 = 300$

The ratio of men : women  
 $= 180 : 300 = 3 : 5 \quad \text{D.}$

Q5 B because  $\frac{1.1}{1} \neq \frac{1.01}{1.1} \neq \frac{1.001}{1.01}$ . It has no common ratio.

Q6 It takes  $18000 \div 120 = 150$  minutes to empty the tank. Three hours (180 minutes) later, the tank would be empty. A.

Q7 Infinite geometric series,  $a = 8$ ,  $r = 0.5$ .

$$S_{\infty} = \frac{8}{1-0.5} = 16. \text{ Max height} = 20 + 16 = 36 \text{ cm} \quad \text{B.}$$

Q8 The ratio  $\frac{t_{n+1}}{t_n} = 0.4$  is a constant, the sequence

has a common ratio of 0.4. Since the common ratio is a positive number less than 1, the following term is less than its predecessor. The first term is positive, the rest are also positive. The sequence is a decreasing geometric sequence with all positive terms. B.

Q9 The sum of two  $R - C$  consecutive terms always equals 30, i.e.  $t_{n+1} + t_n = 30$ ,  $\therefore t_{n+1} = 30 - t_n$ . E.

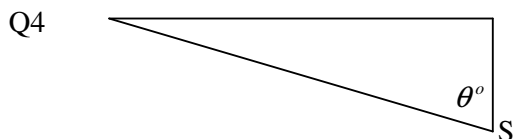
### Module 2 Geometry and trigonometry

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

Q1  $58^\circ + 73^\circ = 131^\circ$  E.

Q2 The sine rule,  $\frac{\overline{PR}}{\sin 73^\circ} = \frac{36}{\sin 58^\circ}$ ,  
 $\overline{PR} = 40.6$  C.

Q3 Length =  $\sqrt{50^2 + (65 + 240)^2} = 309$  metres C.



$$\tan \theta^\circ = \frac{65 + 240}{50}, \theta = 81$$

The bearing of R from S is  $N81^\circ W$  or  $279^\circ T$ . D.

Q5  $1:10000 = 5\text{cm}:50000\text{cm}$   
 $= 5\text{cm}:0.5\text{km}$  A.

Q6 The shortest distance between two adjacent contour lines is the steepest section. D.

Q7 Since  $A \propto l^2$ , if each length is five times the original, the total surface area becomes 25 times the original area, i.e.  $220 \times 25 = 5500\text{cm}^2$ . C.

Q8 The cosine rule,  $\cos \theta^\circ = \frac{2.1^2 + 3.5^2 - 4.2^2}{2(2.1)(3.5)}$   
 $\theta = 93.8$  D.

Q9 The vertical cross-sections of the two cones are two similar triangles, ratios of corresponding sides are equal.

$$\frac{d}{12} = \frac{9}{15}, d = 7.2\text{cm} \quad \text{E.}$$

### Module 3 Graphs and relations

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

Q1 Between 4 and 8, and between 20 and 28, total time =  $4 + 8 = 12$  seconds. C.

Q2  $-2 = \frac{k}{3^2}$ ,  $k = -18$ . A.

Q3 Gradient =  $\frac{c-0}{0-8} = \frac{3-0}{6-8}$   
 $\frac{c}{-8} = \frac{3}{-2}$ ,  $c = 12$ . C.

Q4 D is not true because  $R = 25 \times 1000 = 25000$

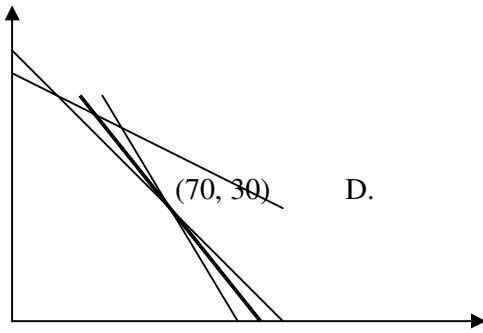
Q5 Profit =  $R - C$   
 $= 25x - (15000 + 15x)$   
 $= 10x - 15000$  B.

Q6  $2x - 3y = 7$  (1)  
 $3x + y = 5$  (2)

(1) + 3(2),  $11x = 22$ ,  $x = 2$ ,  $y = -1$ . E.

Q7 A.

Q8



- Q9 Works at least 18 hours,  $x + y \geq 18$ .  
 Works at least 4 hours at nursery,  $x \geq 4$ .  
 Works at most 16 hours at restaur.,  $y \leq 16$ .  
 Works at least twice as many hours in restaur.  
 than at the nursery,  $y \geq 2x$ . D.

**Module 4: Business-related mathematics**

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

- Q1 Balance =  $960 - 120 = 840$   
 Monthly payment  $\frac{840}{6} = 140$ . C.
- Q2  $I = \frac{PrT}{100}$ ,  $975 = \frac{26000 \times r \times 1.5}{100}$ ,  $r = 2.5$  C.

Q3  $n = 5$ ,  $P = 45000$ ,  $R = 1 + \frac{4}{100} = 1.04$ ,  
 $I = P(R^n - 1)$ ,  $I = 45000(1.04^5 - 1) = 9750$ . D.

Q4  $n = 60$ ,  $R = 1 + \frac{0.5167}{100} = 1.005167$ ,  
 $P = 150000$ ,  $Q = 1100$ .  
 $A = PR^n - \frac{Q(R^n - 1)}{R - 1}$ ,  
 $A = 150000 \times 1.005167^{60} - \frac{1100(1.005167^{60} - 1)}{1.005167 - 1}$   
 $A = 127211$ . C.

Q5 Depreciation =  $6500 - 2000 = 4500$   
 Annual depreciation  $4500 \div 5 = 900$  B.

Q6 Interest rate per month =  $\frac{3}{12}\% = 0.25\%$ .  
 Start,  $A = P = 12200$   
 After 1 month,  $A = 12200\left(1 + \frac{0.25}{100}\right) - 5 = 12225.50$   
 After another month,  $A = 12225.50(1.0025) - 5$   
 $= 12251.06$  A.

Q7  $P = 8000$ ,  $n = 20$ ,  $R = 1 + \frac{r}{4 \times 100} = 1 + \frac{r}{400}$   
 $A = PR^n = 8000\left(1 + \frac{r}{400}\right)^{20}$  D.

Q8 April,  $I = 6452.40 \times 0.25\% = 16.131$   
 May,  $I = 5992.40 \times 0.25\% = 14.981$   
 June,  $I = 14.981$   
 Balance =  $5992.40 + 16.131 + 2 \times 14.981 = 6038.49$   
 B.

- Q9 A is not true because  $555 \times 12 \times 10 = 66600$ .  
 B is not true because total repayment is \$33300 and principle owing is \$46700 plus interest.  
 C is not true because the monthly repayment is higher than the monthly interest and thus the balance owing is reduced monthly. Hence the monthly interest decreases.  
 D is true because weekly repayment of 132 is equivalent to monthly repayment of 572, in addition there is extra benefit of weekly compounding in reducing the period.  
 E is not true because extra payment earlier reduces the total owing and can save interest.

**Module 5 Networks and decision mathematics**

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

Q1 Anna  $\rightarrow$  Task 4, Hakim  $\rightarrow$  Task 3. Since Task 1 is to be undertaken by Hakim or Kirsten and Hakim has taken Task 3, therefore Kirsten  $\rightarrow$  Task 1. Similar reasoning results in Tina  $\rightarrow$  Task 2 and Peter  $\rightarrow$  Task 5. A.

Q2 E because  $out\ deg(Q) = 0$ .

Q3 Joining  $S$  to  $U$  reduces the number of odd degree vertices to exactly 2. B.

Q4  $1 + 4 + 3 + 3 + 3 + 2 = 16$  E.

Q5 Euler's formula  $v + f = e + 2$   
 Given  $v = f$  and  $e = 20$ , then  $v + v = 20 + 2$ .  
 $\therefore v = 11$ . C.

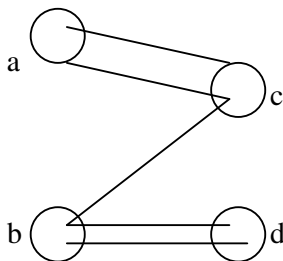
Q6 45 C.

Q7  $J-P-U$  10,  $K-R-T-U$  20,  $J-M-O-S-U$  19,  
 $K-N-Q-T-U$  23,  $K-N-M-O-S-U$  22 D.

**Note:** There are 13 tasks, NOT 12 tasks.

Q8  $7 + 2 + 2 + 2 + 3 + 7 = 23$  B.

Q9 Graph N is a connected graph. B.



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