

SECTION A Core: Data analysis

1	2	3	4	5	6	7	8	9	10	11	12	13
D	E	B	A	C	B	D	C	C	E	E	C	D

SECTION B

Module 1: Number patterns and applications

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

Module 2: Geometry and trigonometry

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

Module 3: Graphs and relations

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

Module 4: Business-related mathematics

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

Module 5: Networks and decision mathematics

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

Module 6: Matrices

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

SECTION A Core: Data analysis

- Q1 Read from box plot. D
- Q2 E
- Q3 $25\% \times 79 = 19.75$ B
- Q4 For positively skewed distribution the mean is greater than the median. A
- Q5 Data: 0 0 0 1 1 2 2 2 2 3 3 4 4 5
 Use graphics calc. to find $\bar{x} = 2.1$, $s = 1.6$. C
- Q6 50% is less than the mean. B
- Q7 2.5% is lower than $\mu - 2\sigma$, 16% is greater than $\mu + \sigma$.
 Total 18.5% D
- Q8 Read from graph. C
- Q9 Read from graph. C
- Q10 The correlation coefficient has a negative value. E
- Q11 Seasonality cannot be determined over a 12-month period.
 Increasing trend is obvious over the period. E

Q12 For 3rd, 4th, 5th and 6th months, the mean is 359.
 For 4th, 5th, 6th and 7th months, the mean is 361.5.

Centring: $\frac{359+361.5}{2} = 360.25$ C

Q13 December 2009 is the 36th month.

Number of users = $346 + 2.77 \times 36 = 445.72$ D

SECTION B

Module 1: Number patterns and applications

Q1 2 times the previous number + 1 to get the next number.
 $2 \times 15 + 1 = 31$ E

Q2 $8600 - 25 \times 60 = 7100$ D

Q3 Read from graph, $a = 100$. The terms alternate between + and -, $\therefore r$ is a negative value. $r = -0.9$ to get the second term. B

Q4 Geometric sequence: $a = B_0 = 800$, $r = 1 + \frac{15}{100} = 1.15$. E

Q5 Geometric sequence: 9, x , 121.
 $r = \frac{x}{9} = \frac{121}{x}$, $x^2 = 9 \times 121$, $x = -33$ or 33. B

Q6 The sequence 15, 19, 23, 27 is arithmetic. $a = 15$, $d = 4$,
 $S_{12} = \frac{12}{2}(2 \times 15 + (12 - 1)4) = 444$. D

Q7 $12 + 15 = 27$, $15 + 27 = 42$ etc. A

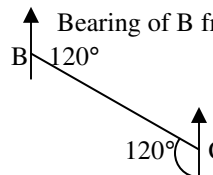
Q8 The length increases form a geometric sequence with
 $a = 3.6$ and $r = 0.75$.
 The maximum total increase = $\frac{a}{1-r} = \frac{3.6}{0.25} = 14.4$
 The maximum length = $14.2 + 14.4 = 28.6$ D

Q9 $T_1 = 0.98 \times 50000 + 500 = 49500$
 $T_2 = 0.98 \times 49500 + 500 = 49010$
 $T_3 = 0.98 \times 49010 + 500 = 48529.8$
 $T_4 = 0.98 \times 48529.8 + 500 = 48059.204$ D

Module 2: Geometry and trigonometry

Q1 $a = 180 - 73 - 73 = 34$ B

Q2 Bearing of B from C = $180^\circ + 120^\circ = 300^\circ$ D



Q3 $s = \frac{7.0+8.0+12.3}{2} = 13.65$

$A = \sqrt{13.65(13.65-7.0)(13.65-8.0)(13.65-12.3)} \approx 26.3$ D

Q4 $V = \pi r^2 h$, $490.87 = \pi r^2 \times 25.15$, $r \approx 2.5$ A

Q5 The sine rule: $\frac{\sin x^\circ}{4} = \frac{\sin 125.1^\circ}{8}$, $\sin x^\circ = \frac{\sin 125.1^\circ}{2}$. A

Q6 Total = base + 2 semicircles + curved surface
 $= (1.5)(2.5) + 2 \times \frac{1}{2} \pi (0.75^2) + \pi (0.75)(2.5) \approx 11.4$ D

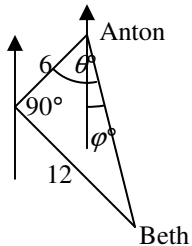
Q7 $V = \frac{1}{3} \pi r^2 h = \frac{1}{3} \pi (1.3^2)(1.2) \approx 2.1$ A

Q8 Use the centre to divide the hexagon into 6 congruent triangles (base = 3.0, height = 2.6).

$A = 6 \left(\frac{1}{2} \times 3.0 \times 2.6 \right) = 23.4$

Q9 $\theta = \tan^{-1} \left(\frac{12}{6} \right) = 63.43$, $\phi = 63.43 - 45 = 18.43$

Bearing = $180 - 18.43 \approx 162^\circ$



Module 3: Graphs and relations

Q1 Read from graph.

Q2 $2t$ litres flow out after t minutes. $V = 5000 - 2t$

Q3 The graph is not linear.

Q4 Monday at Easypark, Tuesday at Safepark:
 $8 + 2.50 \times 3 = \$15.50$

Q5 $2x + 3y = 12$
 $y = 4$ when $x = 0$ and $x = 6$ when $y = 0$

Q6 $4d + 6b = 14.70$ and $3d + 5b = 11.90$.
 Solve to find $d = 1.05$ and $b = 1.75$.
 $\therefore 1d + 2b = \$4.55$

Q7 Gradient of y vs x^2 graph is $\frac{1}{4}$. $\therefore y = \frac{1}{4} x^2$.

Q8 (4,6) satisfies the two inequalities. D

Q9 The gradient of the objective function must be between the gradients of the two given lines, -2.5 and -0.5 .
 $Z = x + y$ has a gradient of -1 . A

Module 4: Business-related mathematics

Q1 Full price = $300 + 300 \times 0.10 = \330 E

Q2 $Q = \frac{Pr}{100n} = \frac{800000 \times 5.8}{100 \times 26} \approx 1785$ D

Q3 $V = P \left(1 - \frac{r}{100} \right)^t$, $2000 = 6000 \left(1 - \frac{r}{100} \right)^4$
 $1 - \frac{r}{100} = 0.75984$, $r \approx 24$ B

Q4 $4200 - 600 = 3600$, interest = $0.06 \times 3600 = 216$.
 Total repayment = $3600 + 216 = 3816$

Monthly instalment = $\frac{3816}{12} = \$318$ C

Q5 Effective rate = $\frac{100I}{Pt} \times \frac{2n}{n+1} = \frac{100 \times 216}{3600 \times 1} \times \frac{2 \times 12}{12+1} \approx 11.1$ B

Q6 Sam: $A = 5000 + \frac{5000 \times 7.5 \times 3}{100} = \6125

Charlie: $A = 5000 \times 1.075^3 = \6211.48
 Difference = $6211.48 - 6125 = \$86.48$ A

Q7 The rate at which the amount paying off the principal increases over the period because of the effect of reducing balance. B

Q8 Use TVM Solver: $N = 80$, $PV = 300000$,
 $PMT = -6727.80$, $FV = 0$, $F/Y = 4$, $C/Y = 4$, $PMT:END$
 to obtain $I\% = 6.500001746$ B

Q9 $P = 8000$, $R = 1 + \frac{7.2}{100 \times 4} = 1.018$

Q9 4th year interest = total amount for the 4 years - total amount for the first 3 years. C

Module 5: Networks and decision mathematics

Q1 Read from graph. C

Q2 B

Q3 There are 9 vertices. Start and finish at the same vertex. A

Q4 B

Q5 The addition of one further edge, e.g. connecting C and D , will result in only 2 odd-degree vertices. E

Q6 $6+6+8+9+7+2+4=42$ D

Q7 $v+f-e=2, 5+f-9=2, f=6$ C

Q8 C

Q9 A

Module 6: Matrices

Q1 $1+d=11, d=10$ D

Q2 E

Q3 C

Q4 B

Q5 $3x-2 \times 6=9, x=7$ E

Q6 Use graphics calculator:

$$\begin{bmatrix} 0 & -3 & 2 \\ 1 & 1 & 1 \\ -2 & 0 & 3 \end{bmatrix}^{-1} \begin{bmatrix} 11 \\ 5 \\ 8 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ 4 \end{bmatrix}$$

B

Q7 20% of 2800 = 560 A

$$Q8 \quad T^{100} = \begin{bmatrix} 0 & 0 & 0 & 0 \\ \frac{3}{4} & 1 & \frac{2}{3} & 0 \\ 0 & 0 & 0 & 0 \\ \frac{1}{4} & 0 & \frac{1}{3} & 1 \end{bmatrix}$$

D

$$Q9 \quad \begin{bmatrix} 0.35 & 1 & 0.15 & 0 \end{bmatrix} \begin{bmatrix} x \\ x \\ x \\ x \end{bmatrix} = \begin{bmatrix} 6000 \end{bmatrix}$$

$\therefore 0.35x + x + 0.15x = 6000, \therefore x = 4000, 4x = 16000.$ D

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