GENERAL MATHEMATICS

Units 3 & 4 – Written examination 2

TSSM™
Creating VCE Success

2024 Trial Examination

SOLUTIONS

Question 1.

a. 2 (*ID* and *neonatal care*)

1 mark

b. $\frac{10}{15} \times 100 = 66.7\%$

1 mark

c.

i. 3613.7

1 mark

ii. 3481.0

1 mark

iii. $IQR = 4122 - 3100 = 1022$

1 mark

d. $\bar{x} = 38.8,\ S_x = 3.55$
$\bar{x} + 2S_x = 45.9$

1 mark

e. $Upper\ fence = 41 + 1.5(41 - 37) = 47$
$Maximum = 45$
Since the maximum is less than the upper fence, hence it is not an outlier.

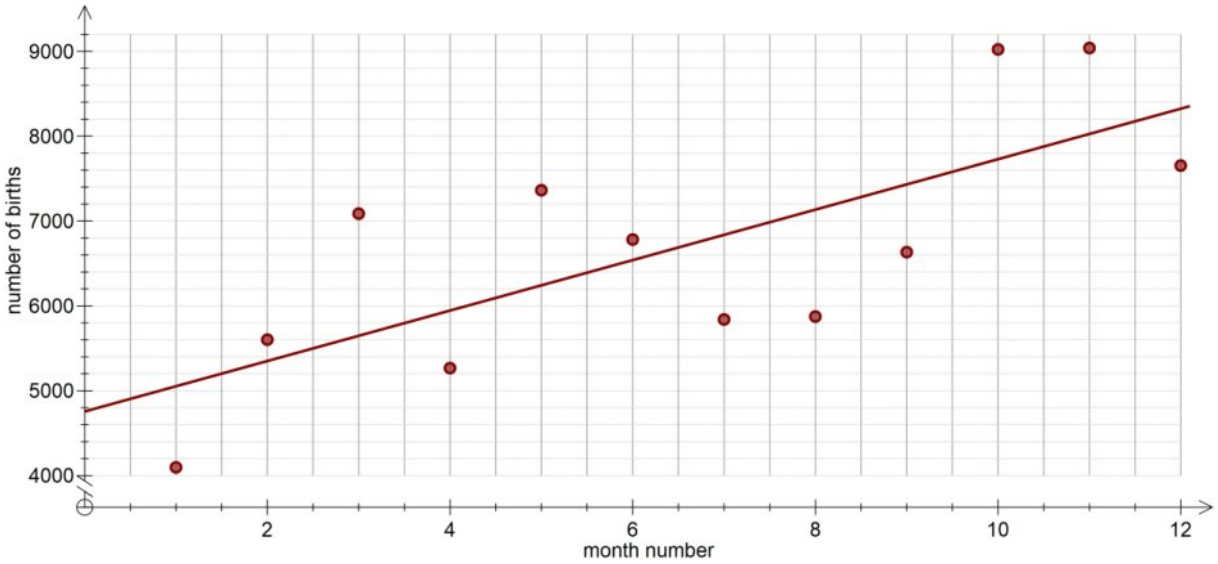
1 mark

Question 2.

a. $Number\ of\ births = 297.3 + 4756 \times month\ number$

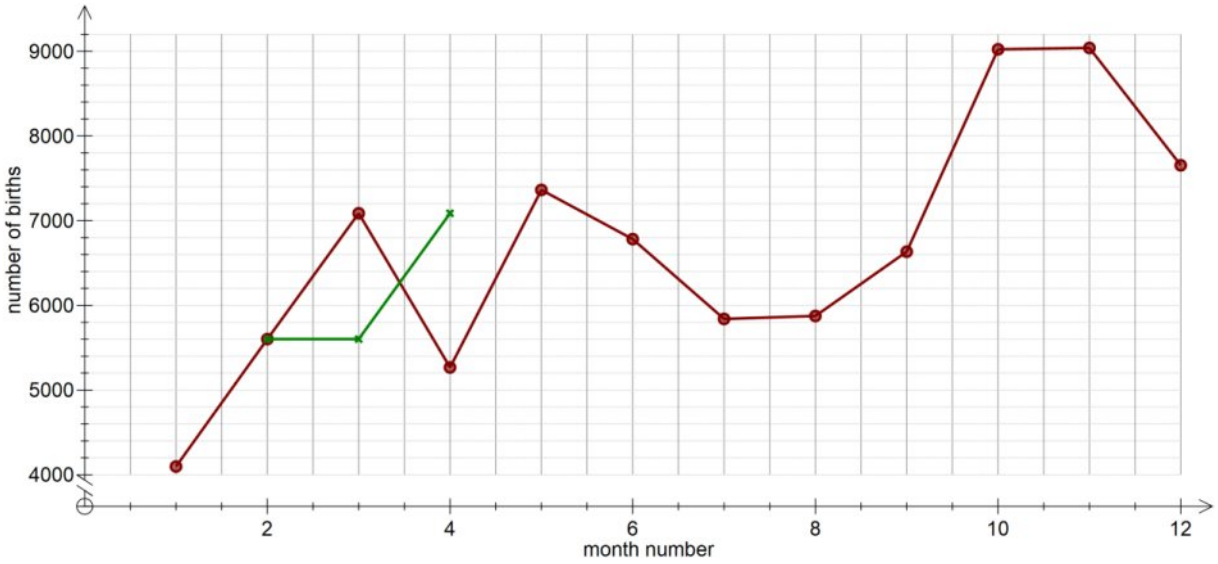
2 marks

b.



1 mark

c.



2 marks

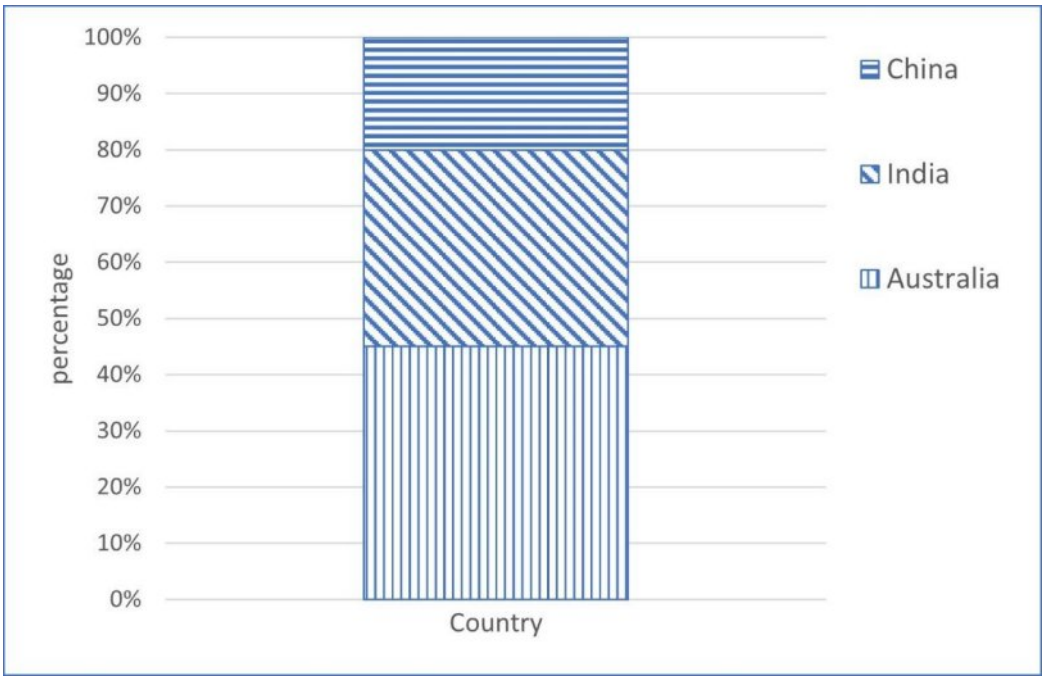
Question 3.

a.

	Frequency	
Country	**Number**	**Percentage (%)**
Australia	9	45
India	7	35
China	4	20
Total	20	100

2 marks

b.



1 mark

c.

i. *Location*

1 mark

ii. Yes, there is an association between age group and location. In Victoria, 40% of newborn babies were born to others in the age group 30-34 years as compared to only 33% of newborn babies born to mothers in the age group 30-34 years.

2 marks

Question 4.

a.

i. $r = \sqrt{0.5820} = 0.7629$

1 mark

ii. The association between month number and number of people employed is positive, linear and strong.

1 mark

b. February 2023 is month number 50. Hence this prediction is an extrapolation.

1 mark

Question 5.

$$Yearly\ average$$
$$= \frac{650 + 758 + 790 + 810 + 1020 + 1134 + 1765 + 1468 + 1673 + 650 + 518 + 422}{12}$$
$$= 971.5$$
$$Seasonal\ index\ for\ June = \frac{1134}{971.5} = 1.17$$

2 marks

Question 6.

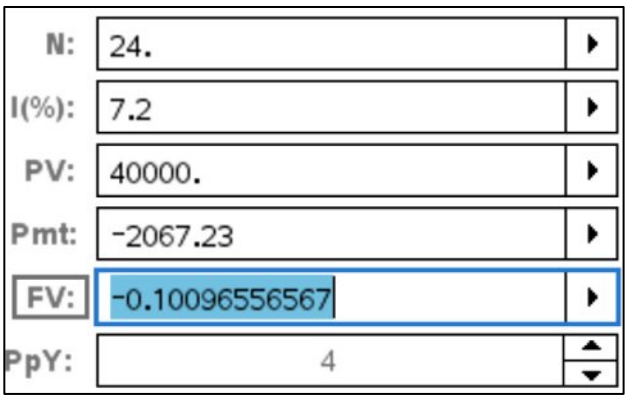
a. $\frac{7.2}{4} = 1.8\%$

1 mark

b. $L_1 = 1.018 \times 40000 - 2067.33 = 38652.67$
$L_2 = 1.018 \times 38652.67 - 2067.33 = 37281.09$

1 mark

c.



Final repayment = 2067.23 + 0.10 = 2067.33

1 mark

d. $2067.33 \times 24 + 0.10 = 49616.02$
$\frac{9616.02}{40000} \times 100 = 24\%$

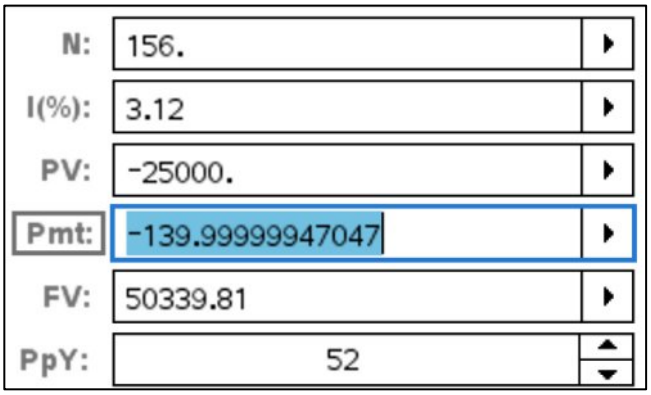
1 mark

Question 7.

a. $1 + \frac{r}{5200} = 1.006 \rightarrow r = 3.12\%$

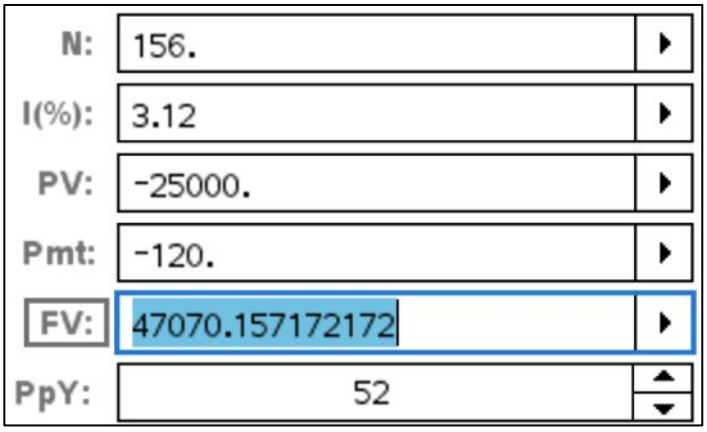
1 mark

b. \$140



1 mark

c.



$Interest = 47070.16 - 156 \times 120 - 25000 = \$3350.16$

2 marks

Question 8.

a. $\frac{2300}{500000} \times 100 = 0.46\%$

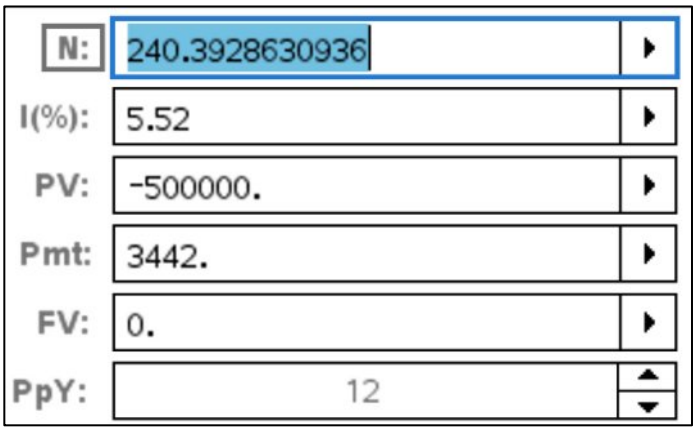
1 mark

b.

Payment number	Payment ($)	Interest ($)	Principal reduction ($)	Balance ($)
0	0.00	0.00	0.00	500 000.00
1	3442.00	2300.00	1142.00	498 858.00
2	3442.00	2294.75	1147.25	497 710.75
3	3442.00	$\frac{0.46}{100} \times 497710.75 = 2289.47$	$3442 - 2289.47 = 1152.53$	496558.22

2 marks

c.



$240\ months\ or\ 20\ years$

1 mark

Question 9.

a. p_{31}

1 mark

b. $N = [182 \quad 145 \quad 218]$

1 mark

c. $[1 \quad 0 \quad 1]\begin{bmatrix} 28 \\ 36 \\ 102 \end{bmatrix} = [130]$

1 mark

Question 10.

a.

$$R \times \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} = [4543400]$$

The total revenue collected by selling tickets on the first five days of the theme park opening.

2 marks

b.

$$\begin{bmatrix} \frac{1}{5} \end{bmatrix} \times R \times \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} = [908680]$$

2 marks

c. $k = 0.9$

1 mark

Question 11.

a. *A-B-D-C-E*

1 mark

b. $r = 2$

1 mark

Question 12.

$$\begin{bmatrix}790\\410\end{bmatrix} = \begin{bmatrix}0.85 & 0.80\\0.15 & 0.20\end{bmatrix}\begin{bmatrix}760\\395\end{bmatrix} + B$$

$$\begin{bmatrix}790\\410\end{bmatrix} = \begin{bmatrix}962\\193\end{bmatrix} + B$$

$$B = \begin{bmatrix}790\\410\end{bmatrix} - \begin{bmatrix}962\\193\end{bmatrix} = \begin{bmatrix}-172\\217\end{bmatrix}$$

2 marks

Question 13.

a.

i.

5	+	3	=	6	+	2	
v		f		e			

1 mark

ii. Planar

1 mark

b. Sum = 3 + 1 + 3 + 3 + 2 = 12

1 mark

c. *AB*

1 mark

Question 14.

a. *M-P-Q-R*
Minimum distance = 0.7 km

1 mark

b.

i. *M-N-O-T-S-R-Q-P-M*

1 mark

ii. Hamiltonian cycle

1 mark

c.

i. Eulerian trail

1 mark

ii. For an Eulerian trail to exist, all vertices must be even or exactly two vertices must be odd. In this graph there are four vertices with odd degree (*M*, *N*, *R*, *P*)

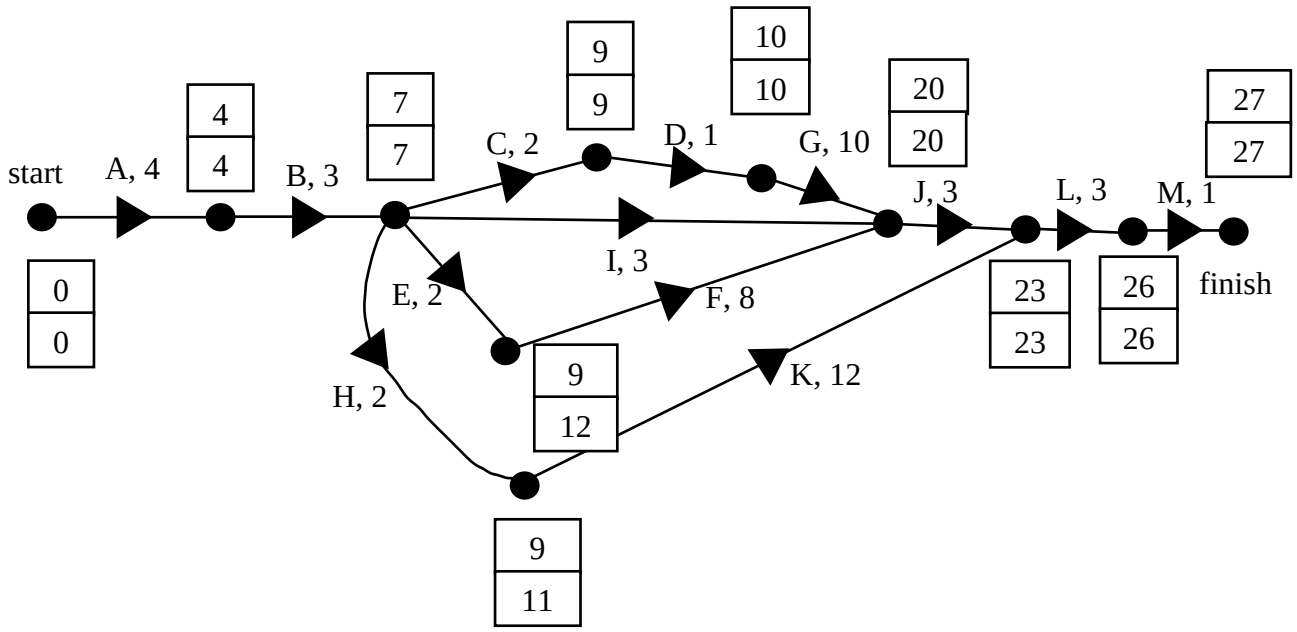
1 mark

Question 15.

a. L

1 mark

b.



Float time for activity E is 3 days (12 – 9)

1 mark

c. *K* is not on the critical path, hence crashing it will not reduce the completion time of the project.

1 mark