

MATHEMATICAL METHODS (CAS)

Unit 1 – Written examination 1



2007 Trial Examination

SOLUTIONS

Question 1

a. $V(t) = 25t + 150$

A1

b. $V(60) = 25(60) + 150 = 1650$ L

A1

c. Solve for $2500 = 25t + 150$, to get $t = 94$ minutes

A1

d. $V(t) = 25t + 150 - 15t$, so $V(t) = 10t + 150$

A1

Question 2

a.
$$\begin{array}{r} x^2 - 6x - 1 \\ x-1 \overline{) x^3 - 7x^2 + 5x - 8} \end{array}$$
 Correct working out

M1

$$\begin{array}{r} x^3 - x^2 \\ -6x^2 + 5x \\ -6x^2 + 6x \\ \hline -x - 8 \\ -x + 1 \\ \hline -9 \end{array}$$

Quotient is $x^2 - 6x - 1$

M1

Therefore, the answer is -9

b. $f(1) = (1)^3 - 7(1)^2 + 5(1) - 8 = 1 - 7 + 5 - 8 = -9$

A1

A1

Question 3

a. $11 \leq 2n + 3 \leq 15$

Correct internal expression involving n

M1

Correct double inequality expression

A1

b. Solving for n : $8 \leq 2n \leq 12$, so $4 \leq n \leq 6$.

M1

Therefore, between 4 and 6 boys, inclusive.

A1

Question 4

a. $6x + 4y = 7$

A1

$2x + 7y = 8$

A1

b. Solving using simultaneous equations, $x = 0.5$ and $y = 1$. Therefore, oranges are \$0.50

M1

and bananas are \$1.00 each.

A1

Question 5

a. Marking scheme: y -intercept at $(0, -4)$ and x -intercept at $(2, 0)$

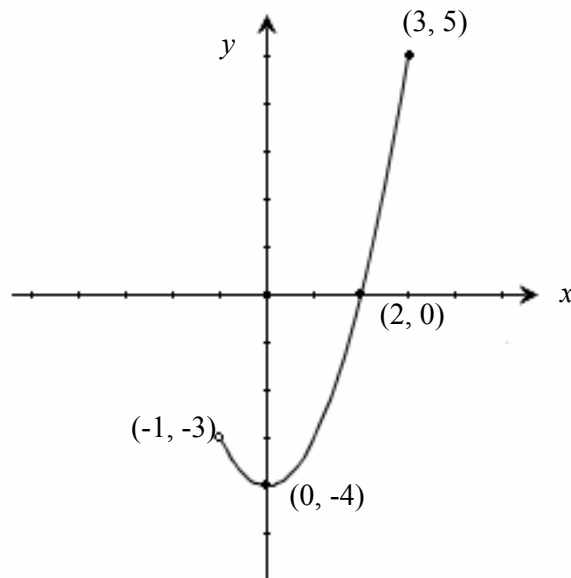
M1

End points at $(-1, -3)$ exclusive and $(3, 5)$ inclusive

M1

Correct graph

M1



b. Range: $[-4, 5]$

A1

Question 6

a. The function is $x = \begin{cases} 4t & , 0 \leq t \leq 2 \\ 8 & , 2 < t \leq 8 \\ -3.2t + 33.6 & , 8 < t \leq 10.5 \end{cases}$

A1
A1
A1

Showing work A1

b. $x(10) = -3.2(10) + 33.6 = -32 + 33.6 = 1.6 \text{ cm}$

A1

Question 7

The graph contains the points $(-3, 0)$ and $(-1, 4)$, the latter of which is a turning point.
Therefore $h = -1$ and $k = 4$

M1

To find a : $0 = a(-3+1)^3 + 4$, so $a = \frac{1}{2}$

A1

Question 8

First, $f(-2) = 4(-2)^2 - 6(-2) + 3 = 31$ and $f(4) = 4(4)^2 - 6(4) + 3 = 43$.

A1

Now set up the equation: $\frac{f(4) - f(-2)}{4 - (-2)}$

M1

Solving: $\frac{43 - 31}{6} = 2$

A1

Question 9**a.**

		Roll 1					
		1	2	3	4	5	6
Roll 2	1	1,1	2,1	3,1	4,1	5,1	6,1
	2	1,2	2,2	3,2	4,2	5,2	6,2
	3	1,3	2,3	3,3	4,3	5,3	6,3
	4	1,4	2,4	3,4	4,4	5,4	6,4
	5	1,5	2,5	3,5	4,5	5,5	6,5
	6	1,6	2,6	3,6	4,6	5,6	6,6

Marking scheme: Correct order of results (first roll, second roll)

M1

Correct results

A2

b. First determine the number of successful outcomes (highlighted on the table) = 10

M1

$$\Pr(\text{at least a total of 9}) = \frac{10}{36} = \frac{5}{18}$$

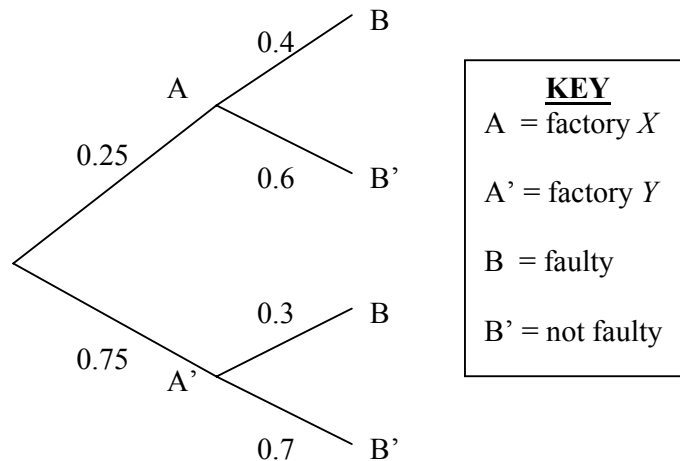
A1

Question 10**a.** Marking scheme: Key to terms and letters

M1

Correct probabilities

A1

**b.** $\Pr(\text{faulty globe}) = (0.25)(0.4) + (0.75)(0.3)$

M1

$$= 0.10 + 0.225 = 0.325$$

A1