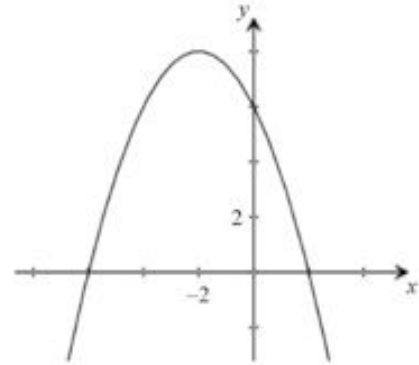


Math SL PROBLEM SET 55

Section A (Short Answer)

1. **(SP5.5 - R) (CI)** A bag contains 4 green marbles and 6 yellow marbles. Sam selects one marble from the bag and then **without** replacement, he selects a second marble. **(Oxford 3.5, p89)**
- Write down the probability that the first marble Sam selects is green.
 - Find the probability that Sam selects two green marbles.
 - Find the probability that Sam selects two marbles of different colour.

2. **(F2.4 - R) (CI)** Here is part of the graph of a quadratic function, $f(x)$, as shown below. The graph passes through the points $(-6,0)$, $(-2,8)$ and $(2,0)$. **(Cirrito 2.4, p39)**



- Write down the equation of the axis of symmetry
 - Write the function f in the form $f(x) = a(x - h)^2 + k$.
3. **(SP5.7 - R) (CI)** Here is a probability distribution for a discrete random variable X in the table below. Given that $E(X) = 2.8$, find the value of a and the value of b . **(Cirrito 16.2, p535)**

x	0	1	3	4
$P(X = x)$	0.1	a	0.5	b

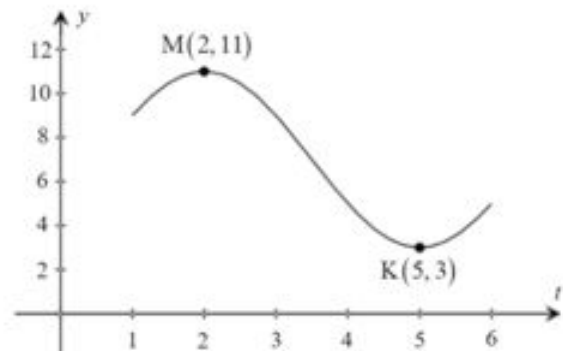
4. **(T3.4 - R) (CI)** Part of the graph of $f(x) = a\cos(b(t-c)) + d$ is shown. There is a maximum point at $M(2, 11)$ and a minimum point at $K(5, 3)$. **(Cirrito 10.3, p337)**

- Write the equation as $f(x) = a\cos(b(t-c)) + d$

The transformation T is given by a vertical stretch of a

scale factor of $\frac{1}{3}$, followed by a translation of $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$

- Let M' be the image of M under T . Find the coordinates of M' .



Math SL PROBLEM SET 55

5. **(F2.1, F2.5 - R) (CI)** Given the functions $f(x) = \frac{1}{x}$ and $g(x) = \frac{a}{x} - 1$, where $a \neq 0$. **(Cirrito 5.3.5, p144)**
- Find $g^{-1}(x)$.
 - Find $g \circ f(x)$.
 - Solve the equation $g^{-1}(x) = g \circ f(x)$ and express answers for x in terms of a (HINT: Use QF but DO NOT attempt to simplify!!)
6. **(C6.2 - E) (CI)** Find the first four derivatives of $y = e^{2x} + e^{-2x}$ and then write a generalization for finding $\frac{d^n y}{dx^n}$ for this function. **(Cirrito 19.3, p618; Cirrito 19.4, p636)**

Section B (Extended Response/Investigation)

7. **(C6.3 - R) (CI)** Given the quartic function $f(x) = 2x^4 - 4x^3 - 4$ on the domain of $-1 \leq x \leq 2$. **(Cirrito 20.2, p649)**
- Find the x co-ordinates of the extrema and classify them as minimum(s), maximum(s) or neither. Show/explain your justification for your classification of the extrema.
 - Determine the x co-ordinates of the inflection points and the intervals of concavity.
 - Evaluate $f(0)$.
 - Given your analysis in Q(a) and Q(b) and Q(c), sketch the function.
8. **(V4.2, V4.3 - R) (CI)** Given quadrilateral PQRS with its vertices at P(5,10), Q(-5,8), R(-7,-8) and S(7,0). **(Cirrito 12.7, p444)**
- Find vector **PR** and **QS**.
 - Show that vector **PR** is perpendicular to vector **QS**.
- The lines PR and QS can be written in vector form.
- Find a vector equation for line PR and find a vector equation for line QS.
- The vectors **PR** and **QS** intersect at the point T .
- Using your vector equations from Q(c), find the coordinates of T .

