

As a guideline, this paper should be completed in 1 hour.

You will need a Graphics Display Calculator (GDC) for this examination.

Section A [28 marks]

1. *[Maximum 5 marks]*

Find the coefficient for the x^4 term in the expansion of $(2x - y)^7$.

2. *[Maximum 4 marks]*

Find the acute angle between the following vectors a and b , giving your answer to the nearest degree.

$$a = 4i - 9j + k \text{ and } b = 3i + 5j - 7k$$

3. *[Maximum 6 marks]*

Zadie has a savings account which her parents add to on each birthday. On her first birthday they deposit \$1200, her second \$1800, her third \$2400, on so on.

- Calculate how much her parents deposit on her 18th birthday.
- Find the sum of money in the account on Zadie's 19th birthday, if her parents make the final payment on this birthday.

4. *[Maximum 6 marks]*

An estimate of Mali's population in July 2004 was given as 12 million. It is also known that the population of Mali is/has growing/grown at a steady rate of 2.8% per year.

- Find the population of Mali in July 1994.
- In what year will the population of Mali be 16 million?

5. [Maximum 3 marks]

$$X = \begin{bmatrix} 1 & -1 & 2 \\ 2 & 1 & 4 \\ -1 & -2 & -1 \end{bmatrix}$$

- a) Find $|X|$.
- b) X^{-1} , the inverse of the matrix.

6. [Maximum 4 marks]

In chemistry the PH value measures the acidity or alkalinity of a solution.

The PH value can be measured by the logarithmic equation $\text{PH} = -\log_{10} [\text{H}]$, where H is the quantity of hydrogen ions present in the solution per litre.

- a) What is the PH value for detergent with 1.3×10^{-9} hydrogen ions per litre? Give your answer to 1 decimal place.
- b) Orange juice has PH value of 4.4. How many hydrogen ions are present in a litre of orange juice?

Section B [32 marks]

7. [Maximum mark 15]

In this question $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$ represents a displacement of 1 km north and

$\begin{pmatrix} 1 \\ 0 \end{pmatrix}$ represents a displacement of 1 km east.

Two ships set sail from a port that has the coordinates $P(20,35)$.
Ship X sails on a straight line for one hour to the coordinate $(50,75)$.
Ship Y sails on a straight line for one hour to the coordinate $(-35,10)$.

- i) Find the average speed of ship X in km/h. [2 marks]
- ii) Give the bearing that ship X is sailing on. [3 marks]

- iii) Find the vector equation of the straight line that ship Y is sailing on. *[4 marks]*
- iv) Find the angle between the two ships after one hour. *[3 marks]*
- v) Find how far apart the ships are after one hour. *[3 marks]*

8. *[Maximum mark 17]*

- i) a) Find $\int (7x - 3\sqrt{x}) dx$. *[2 marks]*
- b) Find $\int \left(\frac{2}{x} + 3^x \right) dx$. *[2 marks]*
- ii) Evaluate $\int_0^2 \sin(3\pi x) dx$. *[5 marks]*
- iii) a) Sketch the curve $y = 1 - \frac{3}{x^2}$. *[2 marks]*
- a) The region R is bounded by the lines $x = 2$, $x = 3$ and the x -axis. Evaluate the area R .
- c) Find the volume generated when R is completely rotated about the x -axis. *[6 marks]*

Paper C

IB SL Paper 2 Practice Papers

Answers

1. -560

2. 81°

3. a) \$11400

b) \$34200

4. a) 9.104 million

b) 2014

5. a) $|X| = 3$

b) $X^{-1} = \begin{pmatrix} \frac{7}{3} & -\frac{5}{3} & -2 \\ -\frac{2}{3} & \frac{1}{3} & 0 \\ -1 & 1 & 1 \end{pmatrix}$

6. a) 8.89

b) 3.98×10^{-5}

7. i) 50 km/h

ii) 047°

iii) $\begin{pmatrix} 20 \\ 35 \end{pmatrix} + t \begin{pmatrix} -55 \\ -25 \end{pmatrix}$

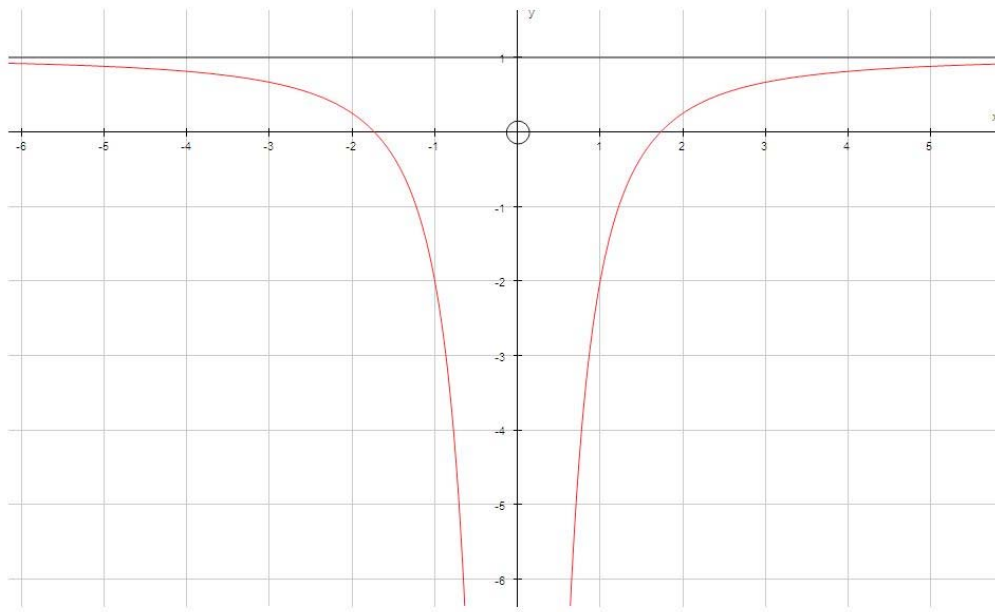
iv) 151°

v) 106.9 km

8. i) a) $\frac{7x^2}{2} - 2x^{\frac{3}{2}} + c$ b) $\ln x + \frac{3^x}{\ln 3} + c$

ii) $\frac{2\pi}{3}$

iii) a)



b) $\frac{1}{2}$ units²

c) 13.4 units³