Paper E   IB SL Paper 1 Practice Papers

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

No Calculator to be used in this examination.

Section A [35 marks]

1.   *[Maximum mark 4]*

    Find the vector equation of the straight line, in the for $\mathbf{r} = \mathbf{p} + t\mathbf{d}$, that joins the two points $A(4, 2)$ and $B(-5, 10)$.

2.   *[Maximum mark 4]*

    Find the coefficient of the x^6 in the expansion of $(2 + 3x^2)^5$.

3.   *[Maximum mark 6]*

    The probability that world class darts player Eric Bistoo hits the bulls eye when he throws a dart is $\frac{1}{3}$. This is independent of previous throws.

    Find the probability that Eric Bistoo scores at least 3 bulls eyes when he throws 5 darts.
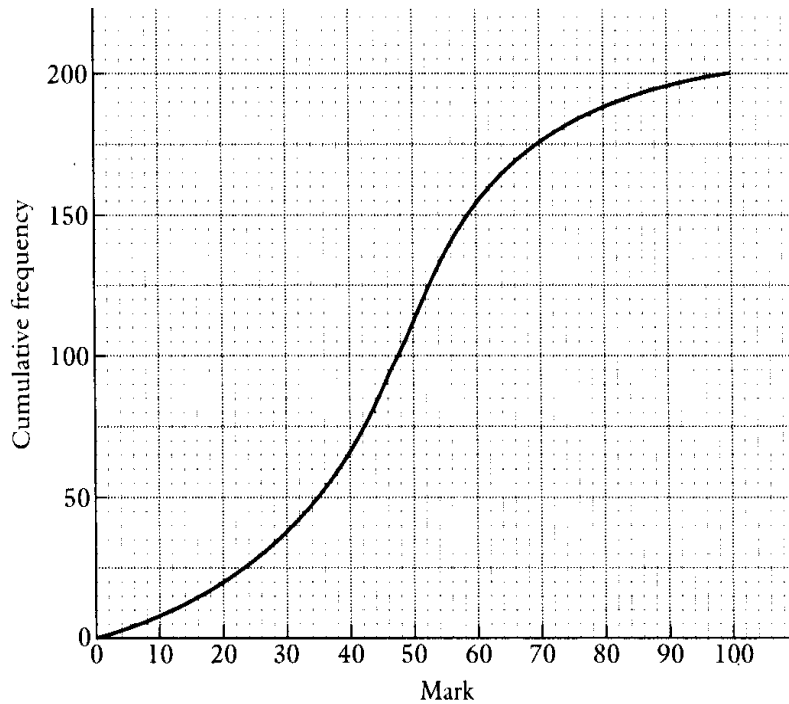
4.   *[Maximum mark 6]*

    The 2x2 matrix is defined as,

    $$A = \begin{bmatrix} x & 2 \\ 3 & y \end{bmatrix}$$

    Find the values of x and y if $A^2 = \begin{bmatrix} 7 & 16 \\ 24 & 87 \end{bmatrix}$.

5.   *[Maximum mark 4]*

      The diagram below shows the marks of 200 students who sat an IB
      maths examination.

      Use your diagram to find,

      a)   find the median,

      b)   the interquartile range,

      c)   the value of the 60th percentile.

6.   *[Maximum mark 6]*

      $f(x) = \dfrac{x-3}{5}$ and $g(x) = x^2 + 1$.

      a)   Find $f^{-1}(2)$.

      b)   Find an expression for $f^{-1}og(x)$.

      c)   Solve $f^{-1} \circ g(x) = 188$

7.   *[Maximum mark 5]*

The following are all vector equations of straight lines.

a = 5**i** + 2**j**   **b** = 6**i** - 15**j**   **c** = 4**i** - 10**j**   **d** = 6**i** - 7**j**

a)   Find a pair of vectors that are parallel.

b)   Find a pair of vectors that are perpendicular.

c)   Find a pair of vectors that are neither parallel nor perpendicular.

Section B [25 marks]

8.   *[Maximum mark 25]*

i)   a)   Find the equation of a tangent to the curve $y = e^{3x} + 5$ at the point (0,6).   *[4 marks]*

b)   Find the area bounded by the curve $y = e^{3x} + 5$, the *x*-axis, and the lines $x = \dfrac{1}{2}$ and $x = 1$.

Leave your answer in terms of *e*.   *[6 marks]*

ii)   The acceleration, in m/s^2 of a particle in space is given by

$$\dfrac{dv}{dt} = \dfrac{5}{t+1}, t \geq 0.$$

If the particle has an initial speed of 8 m/s, find the velocity after 12 seconds.   *[5 marks]*

iii)   Evaluate $\int_{0}^{\pi} 3\sin(\theta)\,d\theta$. Show all working out involved in obtaining your answer.   *[4 marks]*

iv)   The function $f(x) = 7 + 4x^3 - 3x^4$ has two stationary points. Find the coordinates of the stationary points and distinguish between the points, stating if the points are maximum, minimum or a point of inflextion.   *[6 marks]*

Answers

1. $r = \begin{pmatrix} 4 \\ 2 \end{pmatrix} + t\begin{pmatrix} -9 \\ 8 \end{pmatrix}$ or $r = \begin{pmatrix} -5 \\ 10 \end{pmatrix} + t\begin{pmatrix} 9 \\ -8 \end{pmatrix}$

2.   1080

3. $\dfrac{17}{81}$

4. $x = -1, y = 9$

5.   a) ≈ 48 b) ≈ 22 c) ≈ 52

6.   a)   13   b) $5x^2 + 8$ c) $x = \pm 6$

7.   a)   **b** and **c**   b)   **a** and **b** or **a** and **c**

      c)   Any vector paired with **d**

8.   i)   a) $y = 3x + 6$ b) $\dfrac{1}{3}e^{\frac{5}{2}} - \dfrac{5}{2}$

      ii) $v = 5\ln(t + 1) + 8$

      iii)   6

      iv) $(0,7)$ point of inflexion

            $(1,0)$ maximum point