ALBA MATHEMATICS
Course Revision Questions
Task Sheet 4

1. Show that the roots of $3px^2 + 3x - p = 0$ are real for all values of p.

2. Show that the curve with equation $y = 4x^3 + 3x - 5$ is always increasing.

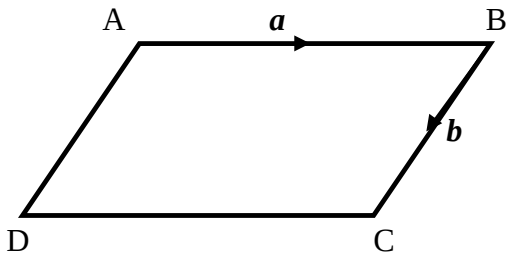
3. A function has equation $f(x) = \frac{1}{2}x^4 - 2x^3 + 4$.
   Find the stationary points of $f(x)$ and determine their nature.

4. Fully factorise $f(x) = x^3 + x^2 - 30x - 72$ and state the roots of this function.

5. A straight line passes through the point $(-1, \sqrt{3})$ and makes an angle of $^{2\pi}/_{3}$ with the positive direction of the x-axis. Find the equation of the line.

6. Solve the equation $\sin 2x° = \frac{1}{2}\cos x°$ for $0° < x < 360°$

7. The diagram below shows a parallelogram ABCD with vectors $\boldsymbol{a}$ and $\boldsymbol{b}$ shown.



   Calculate **a.b** where AB = 5, BC = 4 and angle ABC is 30°

8. a) State the condition for a trinomial to have equal roots

   b) Find the value(s) of p for which the equation $2x^2 + 5 = 6px$ has equal roots

9. a) Show clearly that $\sin(2x + 90)° + \cos(2x + 90)° = \cos 2x° - \sin 2x°$

   b) Hence, express $\sin(2x + 90)° + \cos(2x + 90)°$ in the form $k\cos(2x - a)°$ for $0° < a < 360°$

10. Find the equation of the perpendicular bisector of the line AB where A has coordinates $(-7, 2)$ and B has coordinates $(-1, -6)$