Poole High School Sixth Form

Further Maths - Transition Courses

You must complete **both** the Maths and Further Maths summer tasks.

Your solutions need to be laid out as detailed in the A Level Maths Summer task. The only difference is there are no answers provided for these tasks – bring your solutions and notes to your first Further Maths lesson in September.

Part A - Skills Check

1 Solve the following simultaneous equations:

(i) $2x + 5y = 11$, $2x - y = 5$

(ii) $x + 2y = 6$, $4x + 3y = 4$

(iii) $3a - 2b = 4$, $5a + 4b = 3$

(iv) $2p - 5q = 5$, $3p - 2q = -9$

2 Solve the following simultaneous equations.

(i) $7x^2 + y^2 = 64$, $x + y = 4$

(ii) $3x^2 - 2y^2 = -5$, $y - x = 1$

(iii) $p^2 + pq = 2$, $q - p = 3$

(iv) $8a^2 - b^2 = 2$, $2a + b = 1$

3 Simplify the following:

(i) $\dfrac{2^5 \times 4^{1/2}}{2}$

(ii) $\left(3^5\right)^{3/2} \times 9^{-7/4}$

(iii) $\sqrt{\dfrac{x^{4/3}}{x^{1/3} \times x^{8/3}}}$

4 Simplify:

(i) $\dfrac{16x^{\frac{1}{2}}}{2^3 x^{-\frac{1}{2}}}$

(ii) $\dfrac{x^{\frac{5}{4}} x^{-1}}{\sqrt[4]{x^3}}$

5 Simplify the following:

(i) $3^{5/2} - 3^{1/2}$

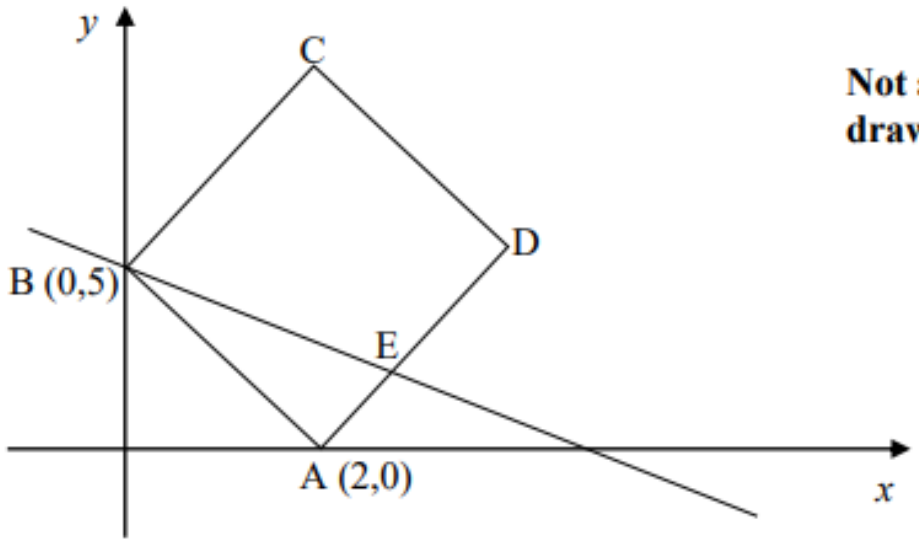
(ii) $2^{1/2} + 2^{3/2} + 2^{5/2}$

(iii) $y^{1/2} - y^{-1/2}$

6 (a) For the points A(3, 1) and B(7, 4) calculate
(i) the gradient of AB
(ii) the gradient of a line perpendicular to AB
(iii) the midpoint of AB
(iv) the distance AB
(v) the coordinates of the point C which divides AB in the ratio
(b) Repeat part (a) for the points A(-2, 9) and B(3, -1).

7 Given the points A(3, 1), B(6, y) and C(12, -2) find the value(s) of y for
(i) the line AB has gradient 2
(ii) the distance AB is 5
(iii) A, B and C are collinear
(iv) AB is perpendicular to BC
(v) the lengths AB and BC are equal

8 ABCD is a square. Point E cuts AD in the ratio 1:2.



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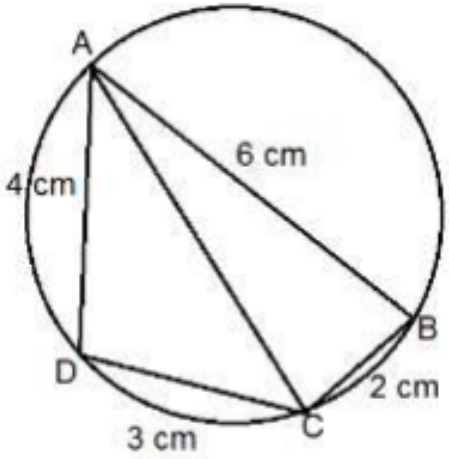
Find the coordinates of the point where line BE crosses the x-axis.

9 In the diagram below, ABCD is a cyclic quadrilateral.
AB = 6 cm, BC = 2 cm, CD = 3 cm, AD = 4 cm.



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Prove that triangles ABC and ADC have equal area.

Part B – New Knowledge Exploration

1	Research "complex numbers" How were they discovered? Why are they useful? You should read about what "i" represents, in the context of complex numbers.
2	Use what you have learned to simplify the following, using i $\sqrt{-9}$ $\sqrt{-8}$ $\sqrt{-200}$ i^2 i^3
3	How about… i^{11} ? i^{106} ?
4	Use what you have learned to expand and simplify the following: $(2+i)(7-8i)$ $(9i-5)(3+2i)$ $(17i-17)(3i-1)$ $(5i-1000)($
5	Research the "discriminant" test and what it is used for. It is related to the quadratic formula.
6	For the following equations, i) Use the discriminant test to show that their solutions will be complex (not real) ii) Solve using the quadratic formula, giving your answers as exact complex numbers $7x^2-3x+11=0$ $\frac{x^2}{2}=5x-17$ $3x^2+10=4x$ $x+\frac{5}{x}=$
7	Show that $(x+7)(x^2+3x+8) \equiv x^3+10x^2+29x+56$ Hence, find the 3 solutions to the equation: $x^3+10x^2+29x+56=0$