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TUTGATHER PRACTICE PAPER

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2027

Candidate Number

MATHEMATICS Compulsory Part
PAPER 1

Question-Answer Book

TUTGATHER
PRACTICE PAPER · NOT AN OFFICIAL HKEAA PAPER

1 hour 5 minutes

This paper must be answered in English

Topic practice: More about Equations

INSTRUCTIONS

(1) This paper consists of THREE sections, A(1), A(2) and B.

(2) Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins.

(3) Unless otherwise specified, all working must be clearly shown.

(4) Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

(5) The diagrams in this paper are not necessarily drawn to scale.

(6) Calculators and mathematical drawing instruments may be used.

(7) The marks for each question are shown in brackets.

(8) No extra time will be given after the 'Time is up' announcement.

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SECTION A(1) (16 marks)

1. Solve the simultaneous equations **(3 marks)**

$$y = 2x - 1 \quad \text{and} \quad y = x^2 - 4.$$

2. Solve $x^4 - 13x^2 + 36 = 0$. **(3 marks)**

Answers written in the margins will not be marked.

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3. The graph of $y = x^2 - 2x - 3$ is shown in Figure 1.

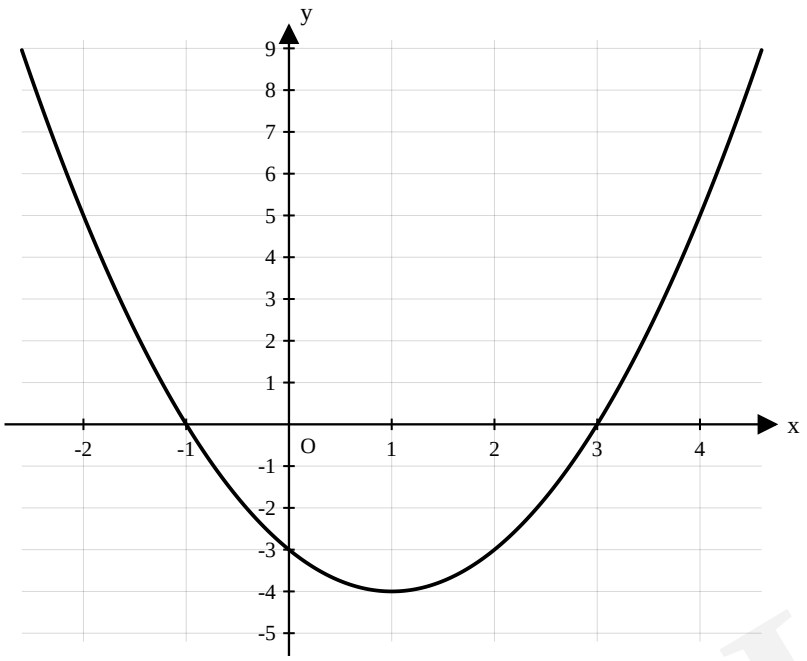


Figure 1: the graph of $y = x^2 - 2x - 3$

(a) Using the graph, solve $x^2 - 2x - 3 = 0$. **(1 mark)**

(b) By drawing the straight line $y = 5$ on the graph, solve $x^2 - 2x - 8 = 0$. **(3 marks)**

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4. A school is arranging chairs for a concert. The chairs are placed in rows, and the number of chairs in each row is 2 more than the number of rows. There are 288 chairs in total.

(a) Let the number of rows be n. Write down an equation in n. **(2 marks)**

(b) Solve the equation in (a) to find the number of rows and the number of chairs in each row. **(4 marks)**

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SECTION A(2) (24 marks)

5. The straight line L has equation $y = mx + 3$, where m is a constant. The curve C has equation $y = x^2 - 2x + 5$.

(a) Find the range of values of m for which L and C intersect at two distinct points. **(4 marks)**

(b) When L passes through $(2, 5)$, find the coordinates of the other intersection point of L and C. **(3 marks)**

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6. Consider the equation

$$\frac{3}{x-1} + \frac{2}{x+2} = 1.$$

(a) Show that the equation can be written as $x^2 - 4x - 6 = 0$. **(3 marks)**

(b) Solve the equation in (a), giving your answers in surd form. **(3 marks)**

(c) Hence solve $\frac{3}{x^2-1} + \frac{2}{x^2+2} = 1$. **(2 marks)**

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7. The graph of $y = -x^2 + 4x + 1$ is shown in Figure 2.

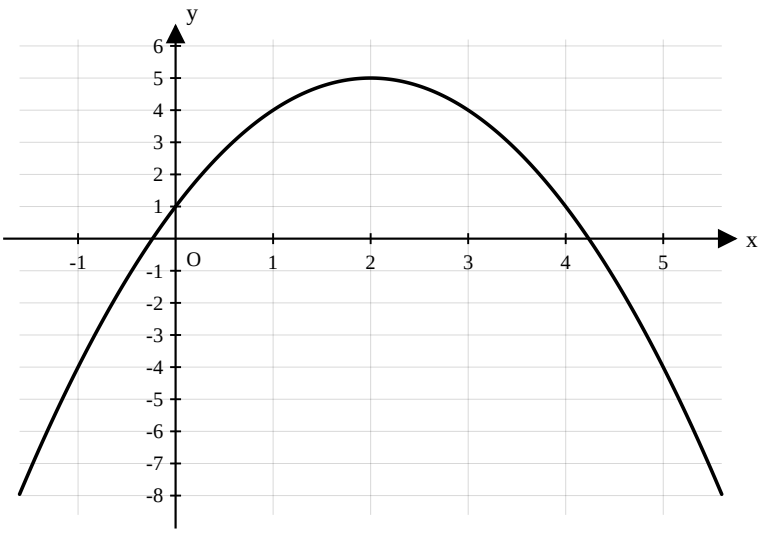


Figure 2: the graph of $y = -x^2 + 4x + 1$

(a) Using the graph, solve $-x^2 + 4x + 1 = 0$, giving your answers correct to 1 decimal place. **(2 marks)**

(b) By drawing a suitable straight line on the graph, solve $x^2 - 3x + 2 = 0$. **(4 marks)**

(c) The equation $-x^2 + 4x + 1 = x + k$ has two distinct real roots, where k is a constant. Using the graph, find the range of values of k. **(3 marks)**

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SECTION B (10 marks)

8. A swimming pool is filled by two inlet pipes, A and B. When working alone, pipe A takes 4 hours longer than pipe B to fill the pool. When both pipes are used together, the pool is filled in 4.8 hours.

(a) Let x hours be the time pipe B alone takes to fill the pool. Write down an equation in x. **(3 marks)**

(b) Solve the equation in (a). Explain why one root must be rejected. **(3 marks)**

(c) Find the time pipe A alone takes to fill the pool. **(1 mark)**

(d) Suppose pipe A alone is used for 2 hours, and then both pipes are used until the pool is full. Find the total time taken. **(3 marks)**

END OF PAPER

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