Please stick the barcode label here.

**TUTGATHER PRACTICE PAPER**

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2027

# **MATHEMATICS** Compulsory Part
# PAPER 1

## Question-Answer Book

Candidate Number

**TUTGATHER**
PRACTICE PAPER · NOT AN OFFICIAL HKEAA PAPER

1 hour 5 minutes

This paper must be answered in English

*Topic practice: Quadratic Equations in One Unknown*

### 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.

TUTGATHER

**SECTION A(1) (16 marks)**

1. Solve $x^2 - 5x + 6 = 0$ by the factor method. **(3 marks)**

2. Form a quadratic equation in $x$ whose roots are $-3$ and $\frac{1}{2}$. Give the equation in the form $ax^2 + bx + c = 0$ with integer coefficients. **(3 marks)**

3. It is given that the quadratic equation $2x^2 + kx + 8 = 0$ has equal roots, where $k > 0$. Find $k$. **(4 marks)**

Answers written in the margins will not be marked.
Answers written in the margins will not be marked.
TUTGATHER

4. Solve $3x^2 + 2x - 7 = 0$. Give the exact answers in surd form, and also the answers correct to 3 significant figures. **(6 marks)**

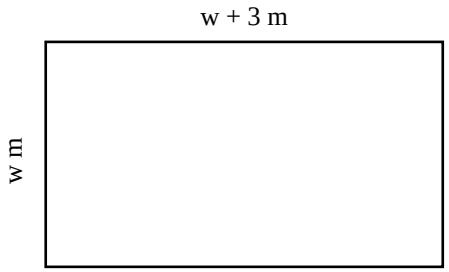
Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

**SECTION A(2) (24 marks)**

5. A rectangular community garden is 3 m longer than it is wide. Its area is 40 $m^2$. **(7 marks)**
Find the dimensions of the garden.




Area = 40 m²

*Diagram not drawn to scale*

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

6. Let $\alpha$ and $\beta$ be the roots of $x^2 - 4x + 1 = 0$. Without solving the equation, find (a) $\alpha^2 + \beta^2$, and (b) $\frac{1}{\alpha} + \frac{1}{\beta}$. **(8 marks)**

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

7. Consider the graph of $y = x^2 - 6x + 5$.

(a) By completing the square, express $y$ in the form $(x - h)^2 + k$. **(3 marks)**

(b) State the vertex and the axis of symmetry of the graph. **(2 marks)**

(c) Find the $x$-intercepts of the graph. **(2 marks)**

(d) Describe the transformation that maps the graph of $y = x^2$ to the graph of $y = x^2 - 6x + 5$. **(2 marks)**

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

**SECTION B (10 marks)**

8. A ball is thrown vertically upwards from a point 1.5 m above the ground. Its height $h$ metres above the ground after $t$ seconds is modelled by $h = -5t^2 + 20t + 1.5$, where $0 \leq t \leq 4.1$.

(a) By completing the square, show that $h = -5(t-2)^2 + 21.5$. **(3 marks)**

(b) Hence state the maximum height reached by the ball and the time at which it occurs. **(2 marks)**

(c) Find the time, correct to 3 significant figures, when the ball reaches the ground. **(3 marks)**

(d) Find the time interval during which the ball is at least 18 m above the ground. Give your answer correct to 3 significant figures. **(2 marks)**

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

TUTGATHER

**END OF PAPER**