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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: Functions and Graphs

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. Let $f(x) = \sqrt{5 - 2x}$.

(a) Find $f(-2)$. **(1 mark)**

(b) Find the domain of f. **(2 marks)**

2. The graph of $y = kx^2$ passes through the point $(3, -18)$.

(a) Find the value of k. **(1 mark)**

(b) State whether the graph opens upwards or downwards, and write down the coordinates of its vertex. **(2 marks)**

3. Let $f(x) = 2x^2 + bx + c$, where b and c are constants. It is given that $f(1) = 3$ and $f(-2) = 21$. Find b and c. **(4 marks)**

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4. A locksmith charges a call-out fee plus a fixed charge for each kilometre travelled. The graph shows the total charge \$$y$ for a journey of x km.

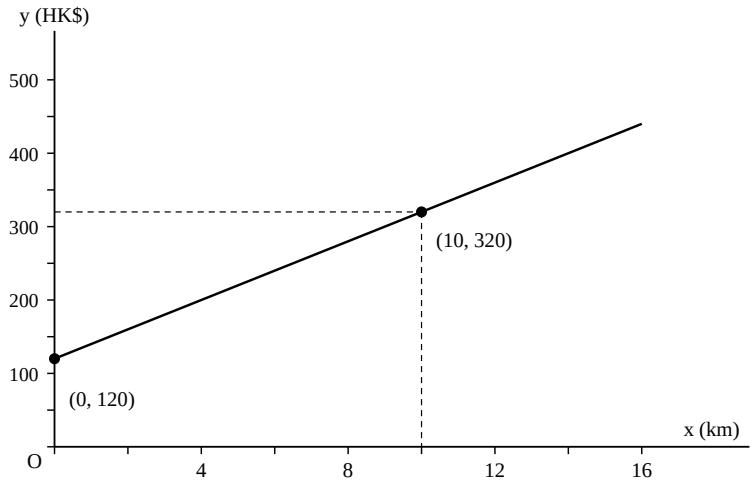


Diagram not drawn to scale

(a) Write down the y-intercept of the graph and explain what it represents. **(2 marks)**

(b) Find the charge per kilometre. **(2 marks)**

(c) Find the total charge for a journey of 15 km. **(2 marks)**

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SECTION A(2) (24 marks)

5. Let $f(x) = \frac{2x+3}{x-1}$, where $x \neq 1$.

(a) Find $f(4)$ and $f(-1)$. **(2 marks)**

(b) Find the value of x for which $f(x) = 5$. **(2 marks)**

(c) A student claims that there is a real number x such that $f(x) = 2$. Show that this claim is false, and hence state the range of f. **(3 marks)**

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6. Let $f(x) = (x - 2)^2 - 9$.

(a) Write down the coordinates of the vertex of the graph of $y = f(x)$, the equation of its axis of symmetry, and the coordinates of its x-intercepts. **(3 marks)**

(b) The graph of $y = g(x)$ is obtained from the graph of $y = f(x)$ by reflecting it in the x-axis, then translating it 1 unit to the left and 4 units upwards. Find $g(x)$ in the form $a(x - h)^2 + k$. **(3 marks)**

(c) Find the x-intercepts of the graph of $y = g(x)$, giving your answers in exact form. **(2 marks)**

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7. A stall sells boxes of cookies. When the price of a box is \$$x$, the stall's profit is \$$P(x)$, where $P(x) = -2x^2 + 32x - 56$.

(a) Express $P(x)$ in the form $a(x-h)^2 + k$. Hence find the price that gives the maximum profit, and the maximum profit. **(3 marks)**

(b) Find the break-even prices, i.e. the prices for which the profit is zero. **(3 marks)**

(c) Find the range of prices for which the profit is at least \$40. **(3 marks)**

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SECTION B (10 marks)

8. The figure shows the graph of $y = f(x)$, where f is a quadratic function, and the line L: $y = 2x - 3$. The graph of $y = f(x)$ cuts the x-axis at $(-1, 0)$ and $(3, 0)$, and cuts the y-axis at $(0, -3)$. The line L meets the graph of $y = f(x)$ at $(0, -3)$ and at the point P.

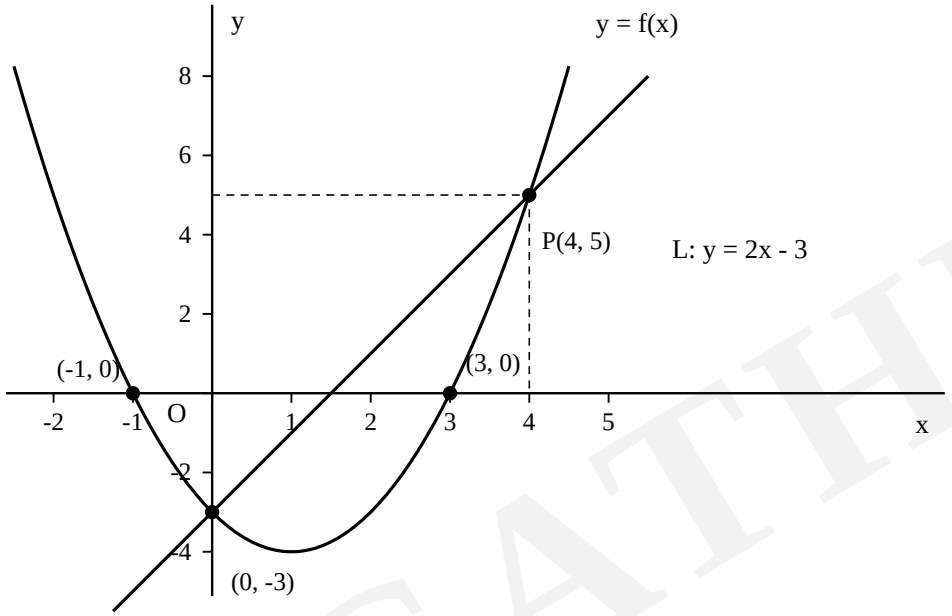


Diagram not drawn to scale

(a) Find $f(x)$. **(3 marks)**

(b) Show that the x-coordinate of P is 4, and hence find the coordinates of P. **(2 marks)**

(c) Using the graphs, write down the range of values of x for which $f(x) < 2x - 3$. **(2 marks)**

(d) The graph of $y = f(x) + k$ touches the line L at exactly one point. Find k. **(3 marks)**

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END OF PAPER

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