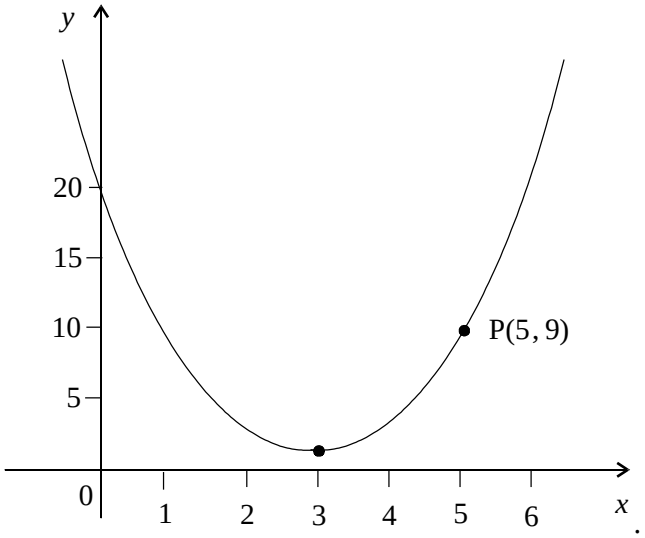
XV. GIMNAZIJA
Zagreb, Croatia

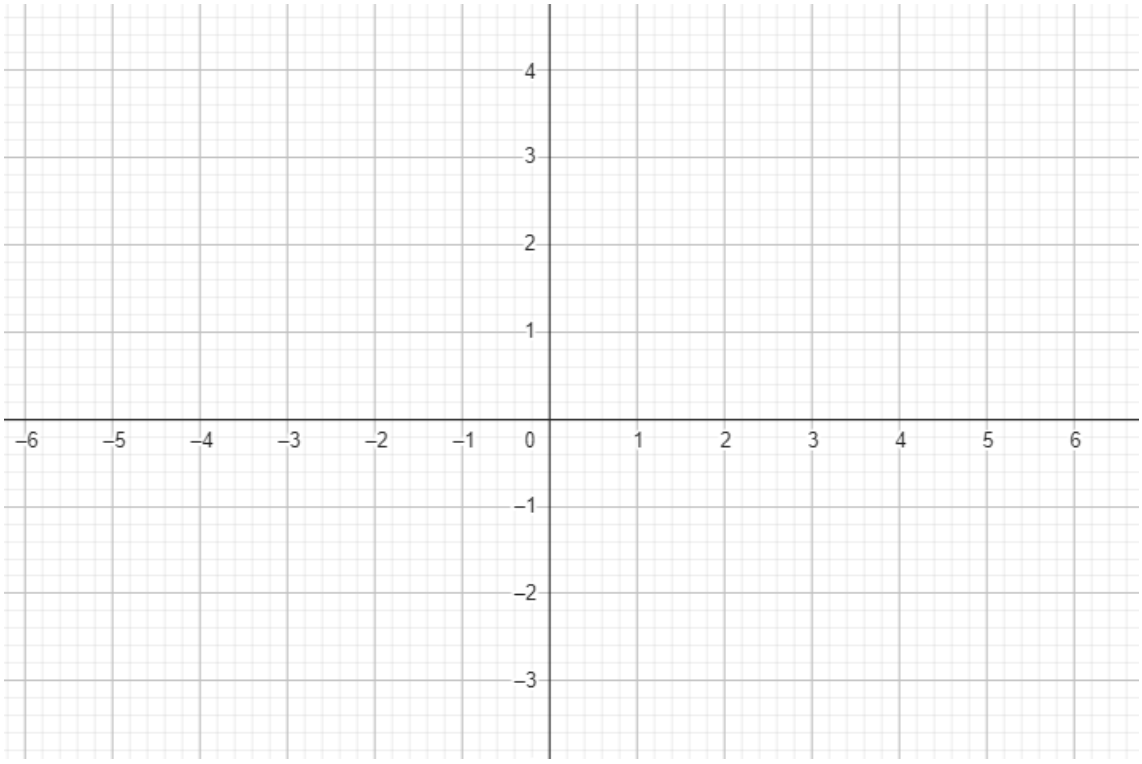
Program međunarodne mature
International Baccalaureate
Diploma Programme

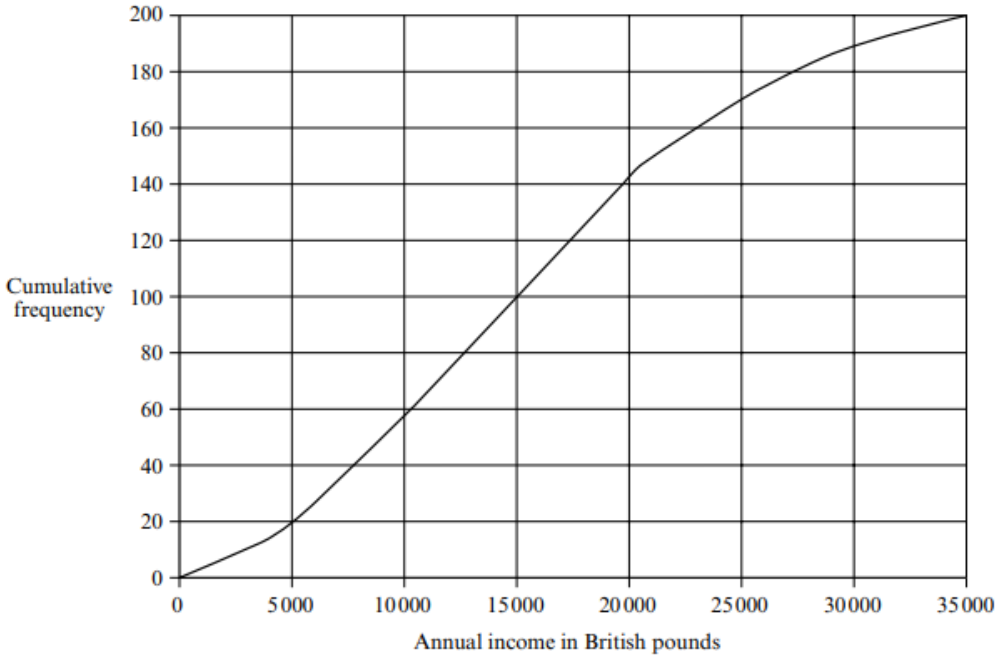
ENTRANCE EXAM IN MATHEMATICS, School year 2023/2024

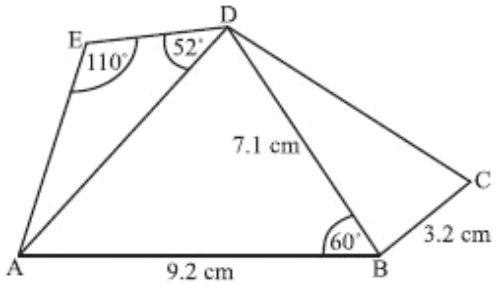
NAME:_____POINTS:_____ /20 PERC:_____ P:_____

1.	Solve for x: a) $1 + \frac{x+3}{3} = \frac{4-x}{2}$ b) $x^2 - 3x - 4 = 0$ c) $4^x = \sqrt{8}$	3 pt
2.	Factorize the following expression: $(x + y)^2 - 2xy - 5y^2 =$ Answer:_____	1 pt

3.	The width of the asteroid belt is 2.8×10^8 kilometers. The speed of Pioneer 10, a U.S. space vehicle, in passing through this belt was 1.14×10^5 kilometers per hour. How many hours took the Pioneer to pass the belt? Round to the nearest whole number. Answer:_____	1 pt
4.	The diagram shows part of the graph of the quadratic function $f(x) = a(x - h)^2 + k$, where a, h, $k \in \mathbb{Z}$.  (a) The vertex is at the point (3, 1). The point P (5, 9) is on the graph. Find a. (b) Write the equation of the quadratic function in form $f(x) = ax^2 + bx + c$	2 pt
5.	Solve the inequality $4x^2 - 25 \leq 0$ Answer:_____	2 pt

6.	a) Draw graph for the function $f(x) = \left(\frac{1}{2}\right)^x$  b) The graph from part a) has been vertically translated 1 unit down and horizontally 1 unit to the right. Write down the equation of the function whose graph has been obtained by these transformations. Answer:_____	2 pt

7.	The graph below shows the cumulative frequency for the yearly incomes of 200 people  Use the graph to estimate: a) The median salary of the group of 200 people Answer:_____ b) The probability that a randomly chosen person from this group earns less than x dollars is 0.9. Find x. Answer:_____	2 pt

8.	The following diagram shows a pentagon ABCDE, with AB = 9.2 cm, BC = 3.2 cm, BD = 7.1 cm, $A\hat{E}D$ =110°, $A\hat{D}E$ = 52° and $A\hat{B}D$ = 60°.  a) Find AD. b) Find DE. c) The area of triangle BCD is 5.68 cm^2. Find the angle $D\hat{B}C$.	3 pt
9.	a) Which of the following sequences of numbers (A and B) represents linear growth and which represent exponential growth? <u>Explain your reasoning</u>. A: 4, 8, 12, 16, … B: 1, 4, 16, 64, … b) Find a linear function *f* and an exponential *g* that represent the two sequences? c) Give an example of the sequence of the numbers that represent quadratic relation.	4 pt