XV. GIMNAZIJA
Zagreb, Croatia

Program međunarodne mature
International Baccalaureate
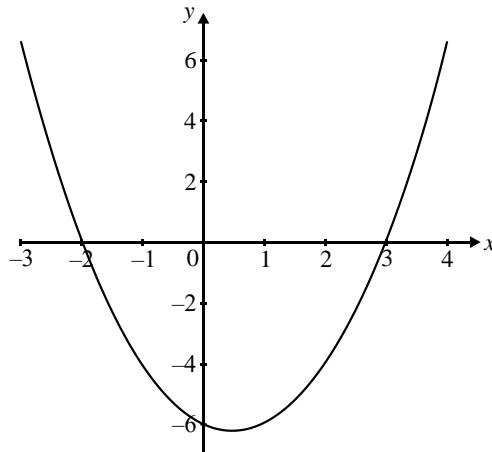*Diploma Programme*

ENTRANCE EXAM IN MATHEMATICS, School year 2022/2023

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

1.	Solve for x: a) $2x^2 + 16x = -32$ b) $12 \cdot 3^{x+4} = 4$	2 pt
2.	Simplify: a) $\left(\dfrac{2x^{-2}y^2}{xy^{-4}}\right)^3 =$ b) $\dfrac{a}{b-a} + \dfrac{2ab}{a^2 - b^2} =$ Answer:_____	2 pt

3.	The diagram shows part of the graph with equation $y = x^2 + px + q$. The graph cuts the x-axis at -2 and 3.	2 pt

Find the value of

(a) p;

(b) q.

Answers:_____

4.	Solve the inequality $2x(x - 1) \leq 0$	1 pt
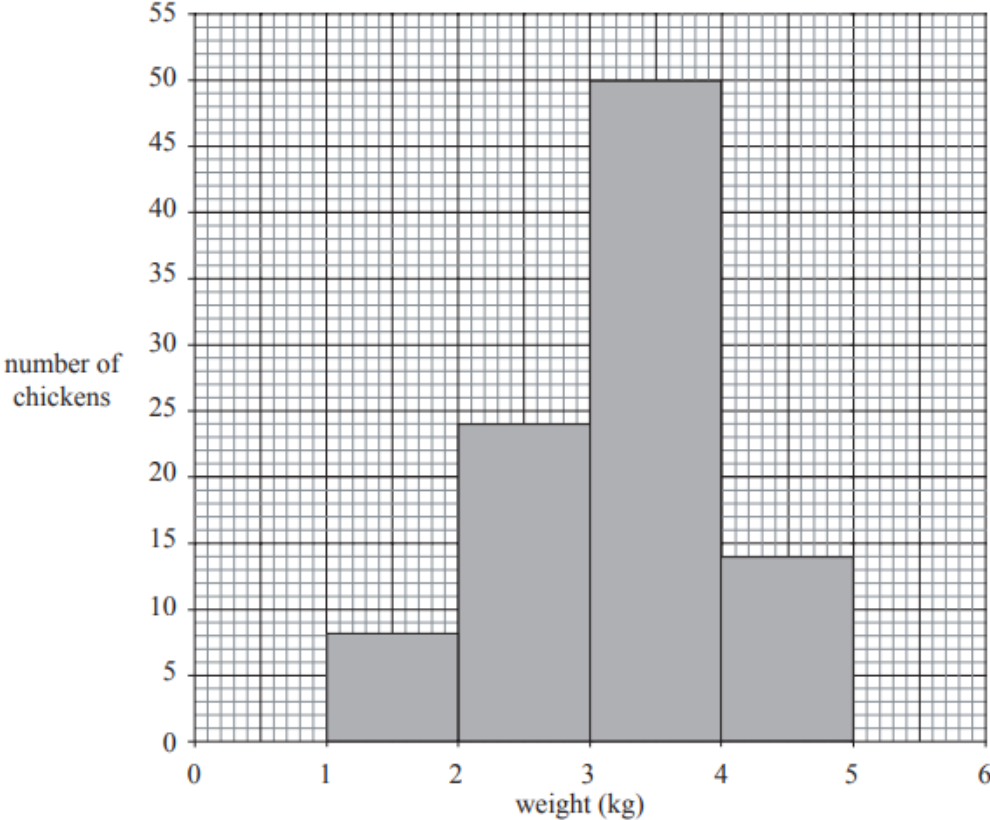
Answer:_____

5.	Express y in terms of x:	2 pt

$$x = \frac{\dfrac{3y + 2}{5}}{2y - 1}$$

6.	The rectangular terrace is 12 m long by 6m wide. It is surrounded by a pavement of uniform with, the area of the pavement being $\frac{7}{8}$ of the area of the pool. How wide is the pavement? Answer: _____	2 pt
7.	The following histogram shows the weights of a number of frozen chickens in a supermarket. The weights are grouped such that $1 \le \text{weight} < 2, 2 \le \text{weight} < 3$ and so on. a) Write down the modal class. b) If it is known that a chicken weights under 4kg, what is the probability that a chicken weights under 3kg?	2 pt

8.		3 pt
	The figure shows two adjacent triangular fields ABC and ACD where $AD = 30$ m, $CD = 80$ m, $BC = 50$ m. $A\hat{D}C = 60°$ and $B\hat{A}C = 30°$.	
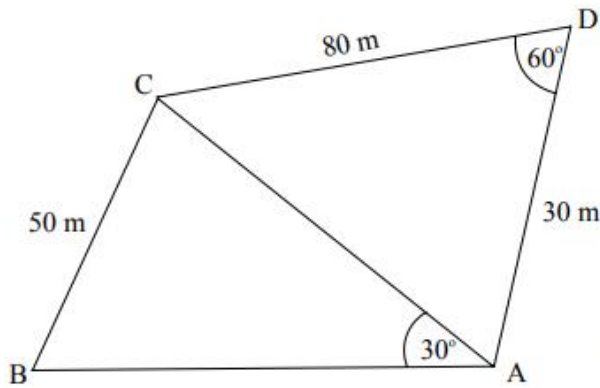
(a) Using triangle ACD calculate the length AC.

|	(b) Find the area of the triangle ABC	
11.	Two athletes are competing in the national finals and (approximately) always running at a constant rate.	4 pt

These are their performances (time needed to complete the running distance in seconds) depending on the running distance which is given in meters.

Athlete 1		Athlete 2	
50 m	5 s	120 m	15 s
300 m	30 s	200 m	25 s
500 m	50 s	320 m	40 s
600 m	60 s	800 m	100 s

Sketch the graph representing distance run depending on time per each Athlete. Draw a sketch for the given values using suitable coordinate system and units.
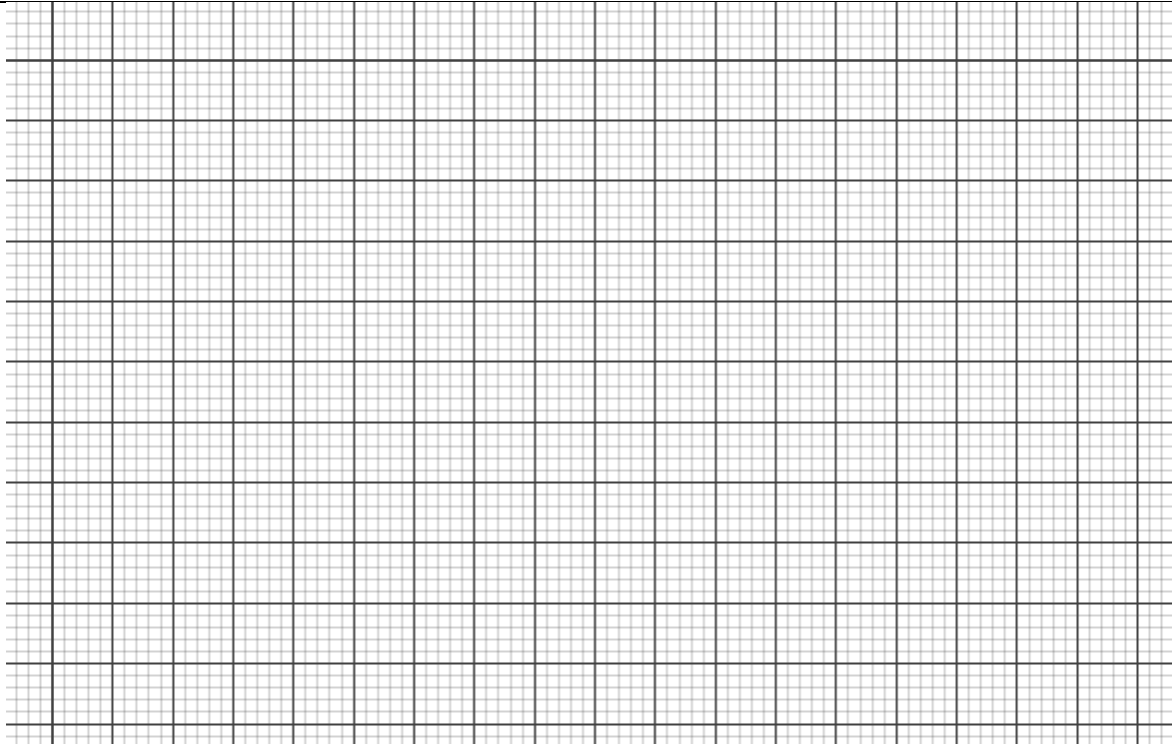
a) Write the equation for each of the Athletes that determines time (*T*) needed to complete the race depending on the running distance (*d*).

b) Athlete 1 had an accident immediately after the start and started running after the Athlete 2 was already 20 m away from the starting line.
What the equation which describes the new situation.

c) What should be the length of the race track so that the result of the race is a draw?