

REPUBLIKA HRVATSKA
XV. GIMNAZIJA
International Baccalaureate Department
Middle Years Programme



ENTRANCE EXAM 2020

MATHEMATICS

60 minutes

PASSWORD (3 digits and 5 letters)

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digits

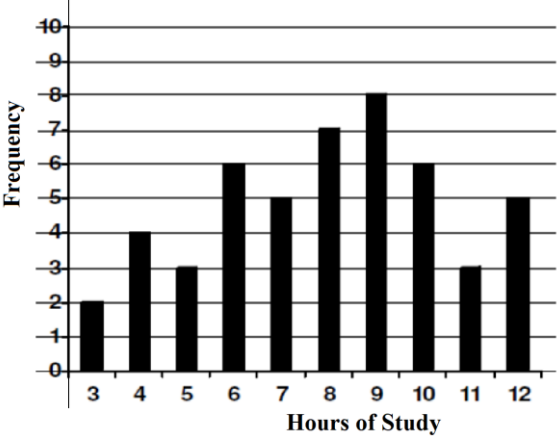
letters

1. The password consists of the combination of 3 digits and 5 letters written together.
2. Only black or blue ink is allowed for the test writing.

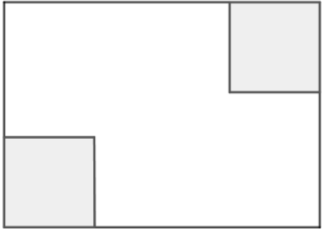
Date _____

Points gained from the test ____ / 24

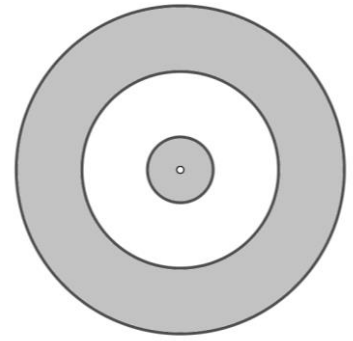
Entrance exam points ____ / 2

<p>1.</p> <p>1 pt</p>	<p>What is the value of $-0.5 + \frac{2}{3} : \left(-\frac{2}{3}\right)^2 - \sqrt{169 - 25}$?</p> <p>A. -11.5 B. -11 C. -8 D. -7.5</p>																						
<p>2.</p> <p>1 pt</p>	<p>Which of the following expressions is the expansion of $(3x - 5)^2$?</p> <p>A. $3x^2 - 30x + 25$ B. $9x^2 + 25$ C. $9x^2 - 25$ D. $9x^2 - 30x + 25$</p>																						
<p>3.</p> <p>1 pt</p>	<p>Number 111672450 is not multiple of one of the following numbers. Which number?</p> <p>A. 10 B. 30 C. 40 D. 50</p>																						
<p>4.</p> <p>1 pt</p>	<p>The lengths of the smallest and the largest side of a right triangle are 13 and 15 and the angle between them is equal to 32°. Which of the following triangles is similar to the given one?</p> <p>A. a triangle with side lengths 13 and 15 and the angle between them equal to 16° B. a triangle with side lengths 6.5 and 7.5 and the angle between them equal to 16° C. a triangle with side lengths 26 and 30 and the angle opposite to one of them equal to 32° D. a triangle with side lengths 19.5 and 22.5 and the angle between equal to 32°</p>																						
<p>5.</p> <p>1 pt</p>	<p>The number of hours a Year 8 group spent doing homework during one week is shown in the graph. How many students studied 8 hours and more than during that week?</p> <p>A. 22 B. 29 C. 42 D. 50</p>  <table border="1" data-bbox="858 1659 1417 2094"> <caption>Hours of Study Data</caption> <thead> <tr> <th>Hours of Study</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>3</td><td>2</td></tr> <tr><td>4</td><td>4</td></tr> <tr><td>5</td><td>3</td></tr> <tr><td>6</td><td>6</td></tr> <tr><td>7</td><td>5</td></tr> <tr><td>8</td><td>7</td></tr> <tr><td>9</td><td>8</td></tr> <tr><td>10</td><td>6</td></tr> <tr><td>11</td><td>3</td></tr> <tr><td>12</td><td>5</td></tr> </tbody> </table>	Hours of Study	Frequency	3	2	4	4	5	3	6	6	7	5	8	7	9	8	10	6	11	3	12	5
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<p>6.</p> <p>1 pt</p>	<p>If snow continues to fall at a rate of 2 mm every 10 minutes, then how many hours will it take for 1 m of snow to fall?</p> <p style="text-align: right;"><i>Answer:</i> _____</p>
<p>7.</p> <p>1 pt</p>	<p>Solve for x: $\frac{3}{2}x + 2(1 - x) = -1 - \frac{x}{3}$.</p> <p style="text-align: right;"><i>Answer:</i> _____</p>
<p>8.</p> <p>1 pt</p>	<p>Point $A(2k - 30, 45)$ is on the line with equation $y = 6x - 15$. What is the value of k?</p> <p style="text-align: right;"><i>Answer:</i> _____</p>
<p>9.</p> <p>1 pt</p>	<p>In a math test 25% of the tasks are from geometry, 20% from algebra, 20% from numbers, 10% from statistics and 5 application tasks. How many tasks in that test are from algebra?</p> <p style="text-align: right;"><i>Answer:</i> _____</p>

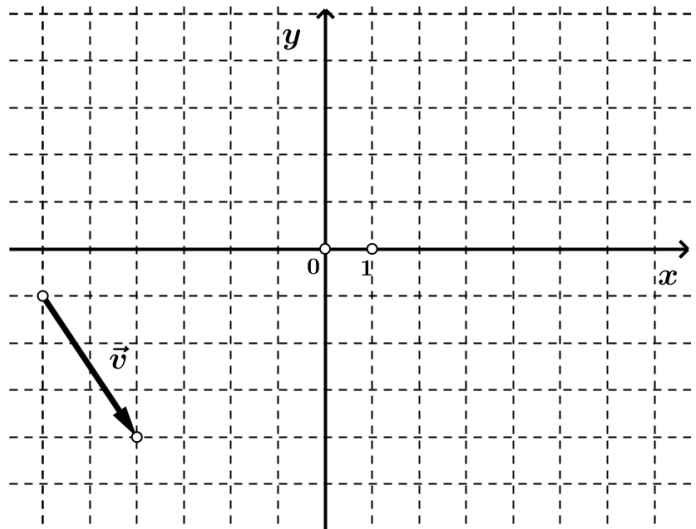
<p>10.</p> <p>2 pts</p>	<p>From a rectangle measuring $9 \text{ cm} \times 8 \text{ cm}$, two congruent squares should be cut as shown in the picture. The area of the figure that remains after cutting is 6 times larger than the area of one square. Determine the length of the side of the cut square.</p>	
<p><i>Answer:</i> _____</p>		
<p>11.</p> <p>2pts</p>	<p>Every 100 g of brown bread contains 6 g of fibre. A loaf of bread weighs 640 g and is cut into 12 equal slices. How much fibre is there in 5 slices?</p>	
<p><i>Answer:</i> _____</p>		
<p>12.</p> <p>2 pts</p>	<p>Solve the system of equations $\begin{cases} 2x = 3y \\ -x = -y + 1 \end{cases}$.</p>	
<p><i>Answer:</i> _____</p>		

13. Three concentric circles divide the target from the picture into three parts, two shaded and one unshaded. The radii of the concentric circles are in the ratio 1: 3: 5. What is the ratio between the areas of these three parts, starting from the smallest?



Answer: _____

14. In the given coordinate system, draw a triangle ABC whose one vertex is at point $A (-4, 0)$, the other at point $C (0, 3)$ and the y -axis is the only axis of symmetry, Determine the coordinates of the vertices of the triangle $A'B'C'$ obtained by translating the triangle ABC for the drawn vector \vec{v} .



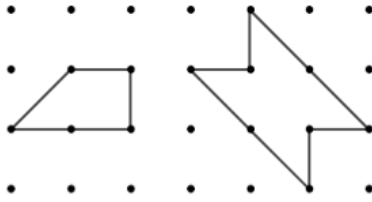
Answer: _____

15.

By connecting points in a square grid with segments without intersections, different polygons can be drawn. The segment is called the edge of the polygon.

The figure shows the polygons within which there are no points of the square grid.

4 pts



The left polygon has 5 points on the edge and the area $1\frac{1}{2}$.

The right polygon has 8 points on the edge and the area 3.

a) Draw different polygons with no points within and fill the table below the grid.



Number of points on the edge (r)	3	4	5	6	7	8
Area of the polygon (P)			$1\frac{1}{2}$			3

b) What is the area of a polygon with 30 points on the edge and no points within?

Answer: _____

c) Write the formula that connects the area of a polygon (P) with the number of points (r) on its edge, if there are no points of a square grid within the polygon.

Answer: _____