

**UZUPEŁNIA ZDAJĄCY**

KOD			PESEL											
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*miejsce  
na naklejkę*

**EGZAMIN MATURALNY  
Z MATEMATYKI  
POZIOM PODSTAWOWY  
DODATKOWE ZADANIA W JĘZYKU ANGIELSKIM**

DATA: **23 maja 2019 r.**

GODZINA ROZPOCZĘCIA: **9:00**

CZAS PRACY: **80 minut**

LICZBA PUNKTÓW DO UZYSKANIA: **30**

**Instrukcja dla zdającego**

1. Sprawdź, czy arkusz egzaminacyjny zawiera 12 stron (zadania 1–18). Ewentualny brak zgłoś przewodniczącemu zespołu nadzorującego egzamin.
2. Rozwiązania i odpowiedzi zapisz w miejscu na to przeznaczonym przy każdym zadaniu.
3. Pisz czytelnie. Używaj długopisu/pióra tylko z czarnym tuszem/atramentem.
4. Nie używaj korektora, a błędne zapisy wyraźnie przekreśl.
5. Pamiętaj, że zapisy w brudnopisie nie będą oceniane.
6. Możesz korzystać z *Wybranych wzorów matematycznych*, cyrkla, linijki oraz kalkulatora prostego.
7. Na tej stronie oraz na karcie odpowiedzi wpisz swój numer PESEL i przyklej naklejkę z kodem.
8. Nie wpisuj żadnych znaków w części przeznaczonej dla egzaminatora.



MMA-R2\_1A-192

**NOWA FORMUŁA**

**Task 1. (0–1)**

If we assume that  $\frac{8}{9}$  is approximately equal to 0.9, the percentage error of this approximation is equal to:

- A. 1%                      B. 1.25%                      C. 0.0125%                      D. 0.01%

**Task 2. (0–1)**

For each real number  $x$  and for each real number  $y$  the square of the difference  $(x^2 - 5y)^2$  equals:

- A.  $x^4 - 10x^2y + 25y^2$     B.  $-x^4 + 10x^2y - 25y^2$     C.  $x^4 + 25y^2$     D.  $x^4 - 25y^2$

**Task 3. (0–1)**

The set of simultaneous equations  $\begin{cases} 3x + 5y = -1 \\ x - 11y = 6 \end{cases}$  in a set of coordinate axes:

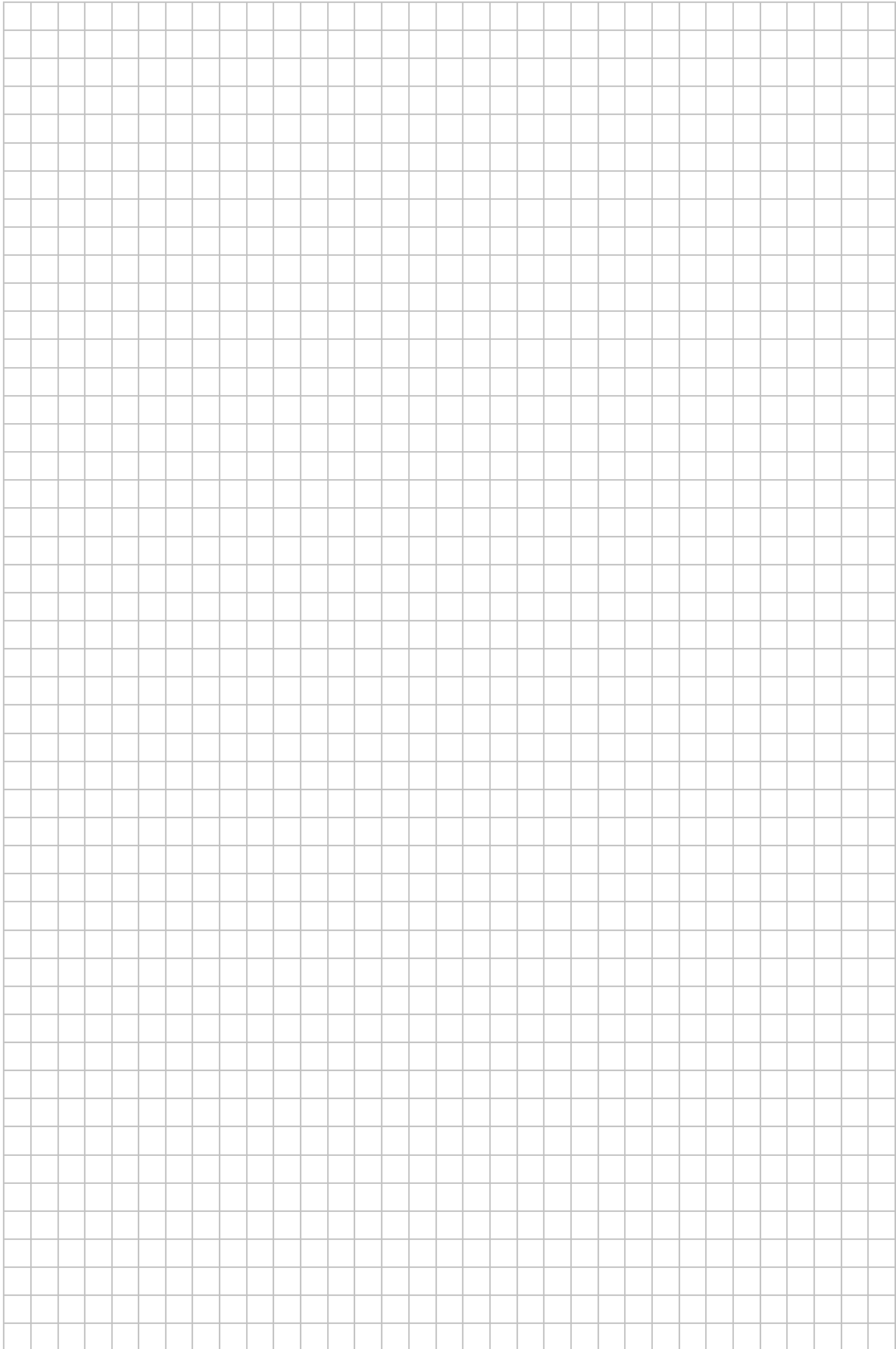
- A. describes an infinite set.  
B. describes an empty set.  
C. describes exactly two distinct points.  
D. describes exactly one point.

**Task 4. (0–1)**

The quadratic function  $f$  takes positive values for all  $x$ s within the interval  $(-8, 16)$  and for no other  $x$ s. The solution set for the inequality  $f(x+4) > 0$  is the interval:

- A.  $(-12, 20)$                       B.  $(-4, 20)$                       C.  $(-4, 12)$                       D.  $(-12, 12)$

# NOTES



**Task 5. (0–1)**

The four functions:  $f_1, f_2, f_3, f_4$  are defined for all real numbers by the following formulas:

$$f_1 = x^2 - x + 2019$$

$$f_2 = (x^2 + 2019)(x^2 + 1)$$

$$f_3 = -(x - 2019)(x^2 + 1)$$

$$f_4 = -x^2 + 11x - 2019$$

One of these functions has a zero. This function is:

- A.  $f_1$                       B.  $f_2$                       C.  $f_3$                       D.  $f_4$

**Task 6. (0–1)**

In a decreasing geometric sequence  $(a_n)$  defined for each natural number  $n \geq 1$ , the ninth term equals 9, and the seventh term equals 81. Therefore the common ratio  $q$  of this sequence equals

- A.  $-\frac{1}{3}$                       B.  $\frac{1}{3}$                       C. 3                      D. -3

**Task 7. (0–1)**

The line  $m$  passes through the point  $K = (-2, 19)$  and is perpendicular to the line  $l$  given by the equation  $y = \frac{1}{8}x + 2019$ . The equation of the line  $m$  is:

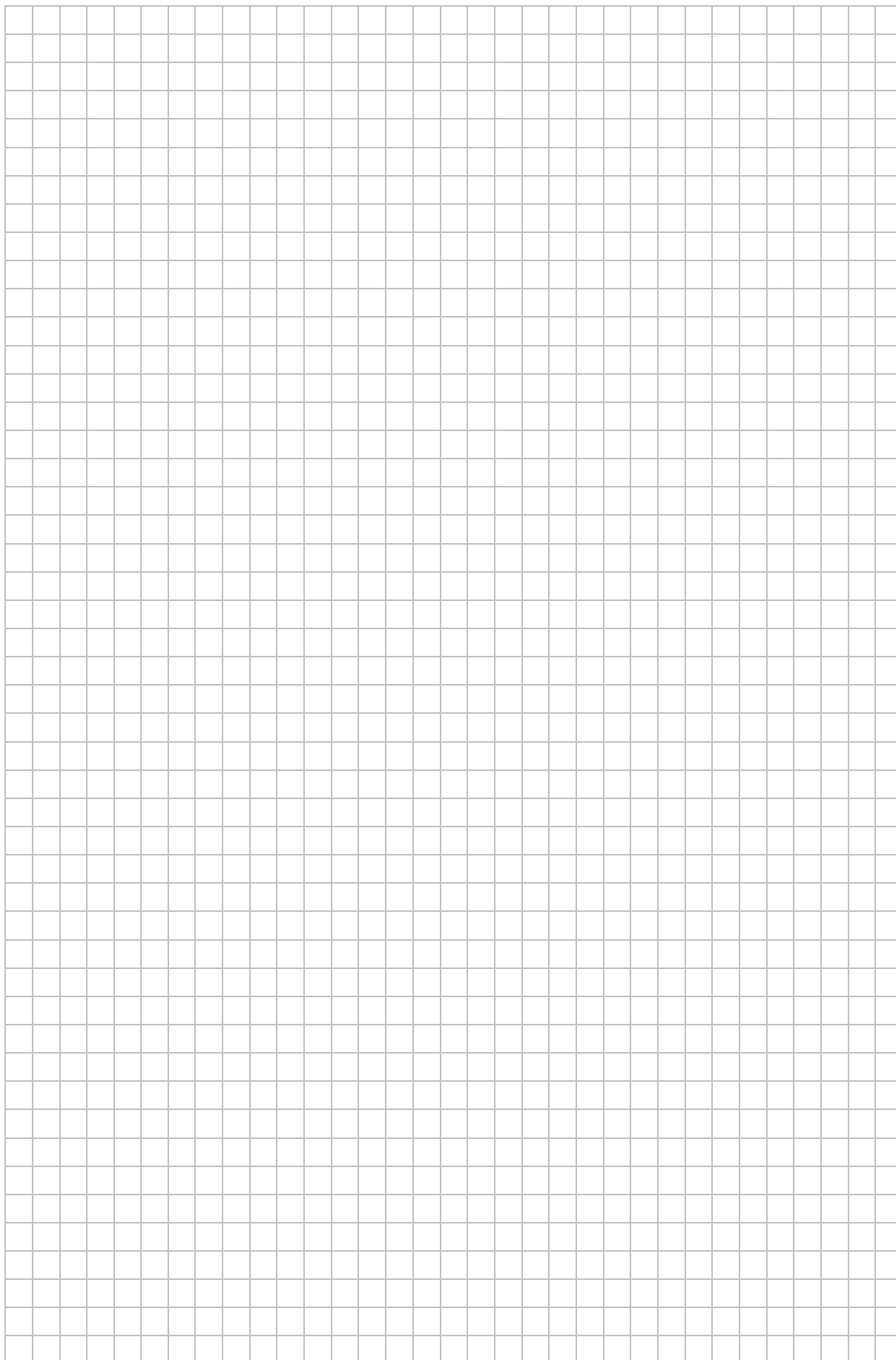
- A.  $y = -8x + 3$                       B.  $y = -8x + 150$   
C.  $y = -\frac{1}{8}x + \frac{75}{4}$                       D.  $y = -\frac{1}{8}x + \frac{3}{8}$

**Task 8. (0–1)**

The acute angle of a rhombus is  $30^\circ$ , and the area of the rhombus is  $\frac{361}{2}$ . The side length of this rhombus is

- A. 76                      B.  $76\sqrt{2}$                       C. 19                      D.  $19\sqrt{2}$

# NOTES



**Task 9. (0–1)**

The sine of an obtuse angle  $\alpha$  is:  $\sin \alpha = \frac{2\sqrt{2}}{3}$ . Therefore the cosine of this angle equals

- A.  $\cos \alpha = \frac{1}{9}$       B.  $\cos \alpha = \frac{1}{3}$       C.  $\cos \alpha = -\frac{1}{3}$       D.  $\cos \alpha = -\frac{1}{9}$

**Task 10. (0–1)**

The angle at the vertex of a cone is a right angle, and the height of the cone equals 10. The lateral surface area of the cone is:

- A.  $100\pi\sqrt{3}$       B.  $100\pi(\sqrt{2}+1)$       C.  $100\pi$       D.  $100\pi\sqrt{2}$

**Task 11. (0–1)**

One person is randomly selected from a class of 32 students, 18 of whom are girls. The probability that none of the girls will be selected equals:

- A.  $\frac{7}{9}$       B.  $\frac{1}{32}$       C.  $\frac{1}{14}$       D.  $\frac{7}{16}$

**Task 12. (0–1)**

The  $n$ -th term of the sequence  $(a_n)$  is given by:  $a_n = \frac{7-2n}{3}$  for each natural number  $n \geq 1$ .

Therefore this sequence is:

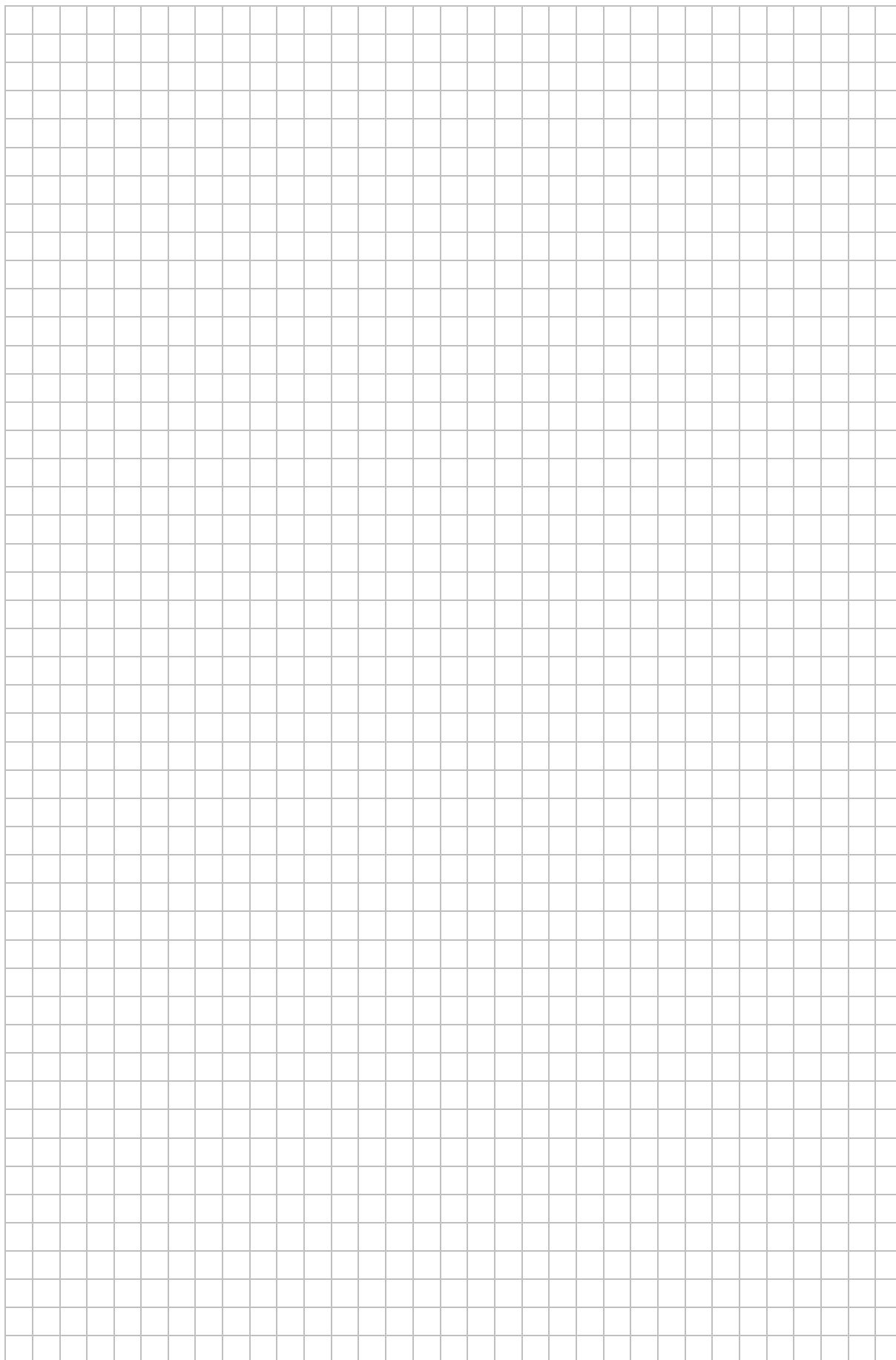
- A. an arithmetic sequence, and its common difference equals  $r = -\frac{2}{3}$ .
- B. an arithmetic sequence, and its common difference equals  $r = \frac{7}{3}$ .
- C. a geometric sequence, and its common ratio equals  $q = -\frac{2}{3}$ .
- D. a geometric sequence, and its common ratio equals  $q = \frac{7}{3}$ .

**Task 13. (0–1)**

Triangles  $KLM$  and  $PQR$  are similar. The area of the triangle  $KLM$  is 6, and the area of the triangle  $PQR$  is 90 units greater than the area of the  $KLM$  triangle. The perimeter of the triangle  $KLM$  equals 12. Hence, the perimeter of the triangle  $PQR$  equals:

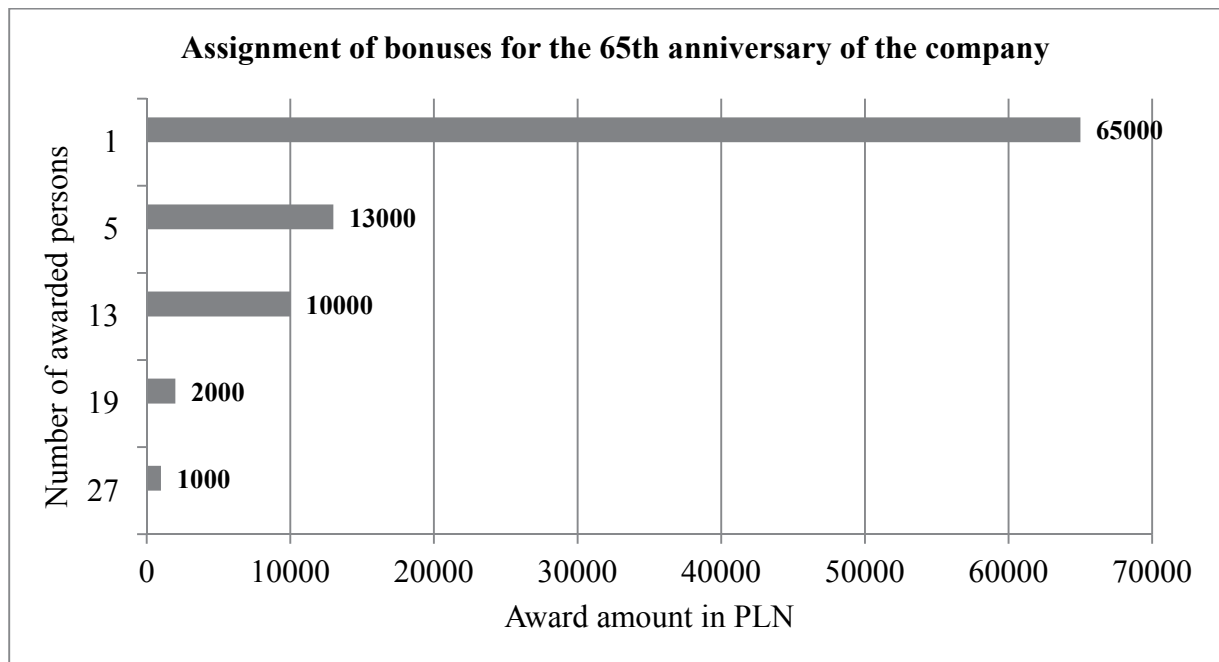
- A. 102      B. 48      C. 768      D. 192

# NOTES



**Task 14. (0–4)**

To celebrate its 65th anniversary, a company decided to award bonuses to 65 of its employees. The assignment of bonuses is illustrated in the diagram below.



Complete the following sentences with the correct numbers.

- The greatest number of employees were awarded the bonus worth PLN .....
- The mean of the bonuses is PLN .....
- The median of the awarded bonuses equals PLN .....
- The person who was awarded the highest bonus received .....% of the total amount allocated for all bonuses to celebrate the 65th anniversary of the company.

**Task 15. (0–3)**

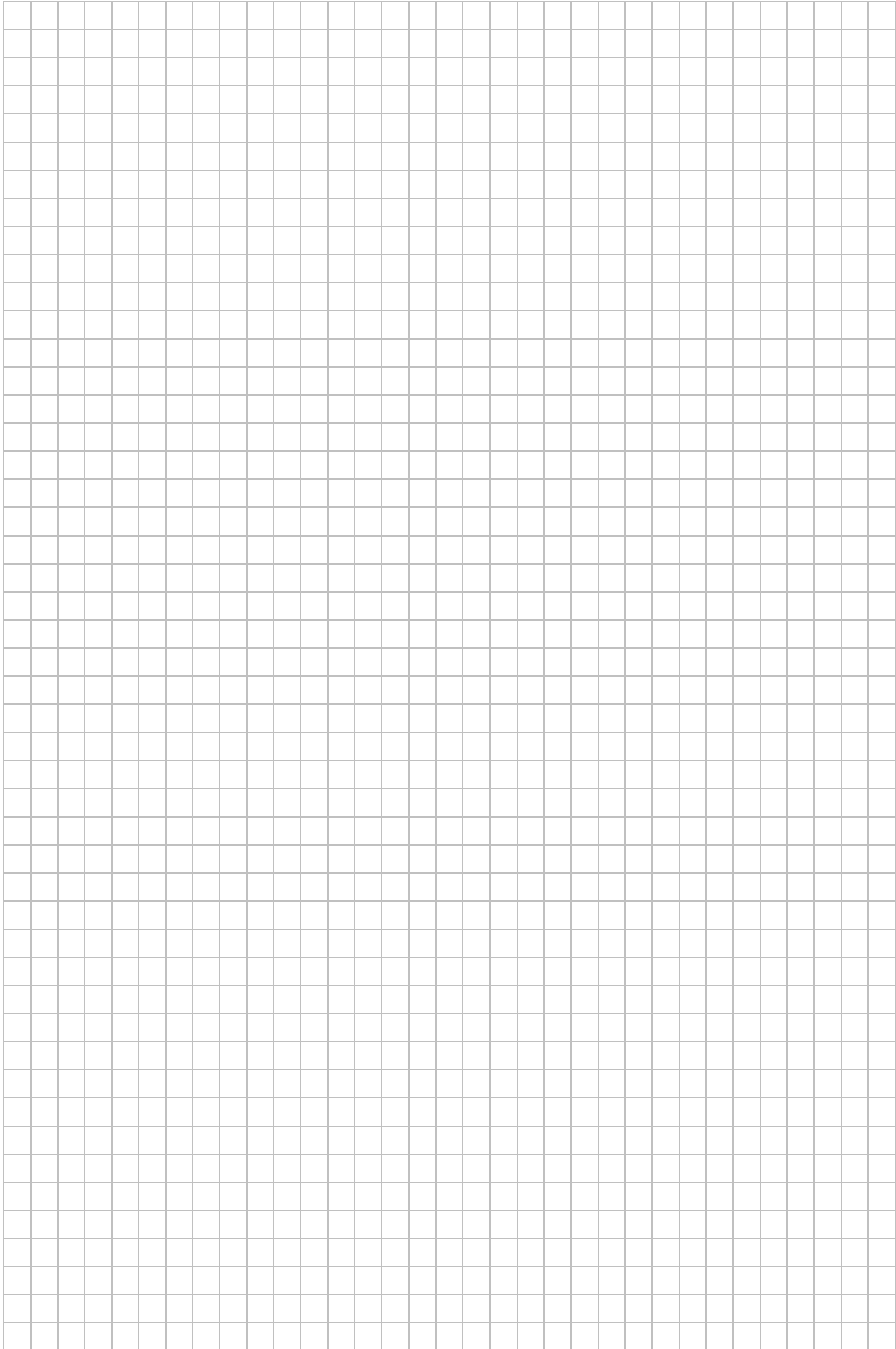
A rectangle with sides measuring 3 and 4 is the base of a pyramid  $ABCD$ . One of the side edges of the pyramid is perpendicular to the base, while its length is the same as the length of the diagonal of the base.

Complete the following sentences with the correct numbers.

- The volume of the pyramid equals .....
- The angle between the longest side edge and the base of the pyramid measures .....
- The pyramid has five faces, and the number of faces which are right-angled triangles equals .....



# NOTES



**Task 16. (0–3)**

The fortieth term of an arithmetic sequence is 40. The sum of the first forty terms of this sequence also equals 40.

Complete the following sentences with the correct numbers.

- a) The first term of the sequence is .....
- b) The common difference of this arithmetic sequence is .....
- c) The number of negative terms in the sequence is .....

**Task 17. (0–3)**

From the set of numbers  $\{11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$  two numbers are randomly drawn without replacement.

Complete the following sentences with the correct numbers.

- a) The probability of drawing two numbers whose product is an odd number equals .....
- b) The probability of drawing two even numbers equals .....
- c) The probability of drawing two numbers whose difference is an odd number equals .....

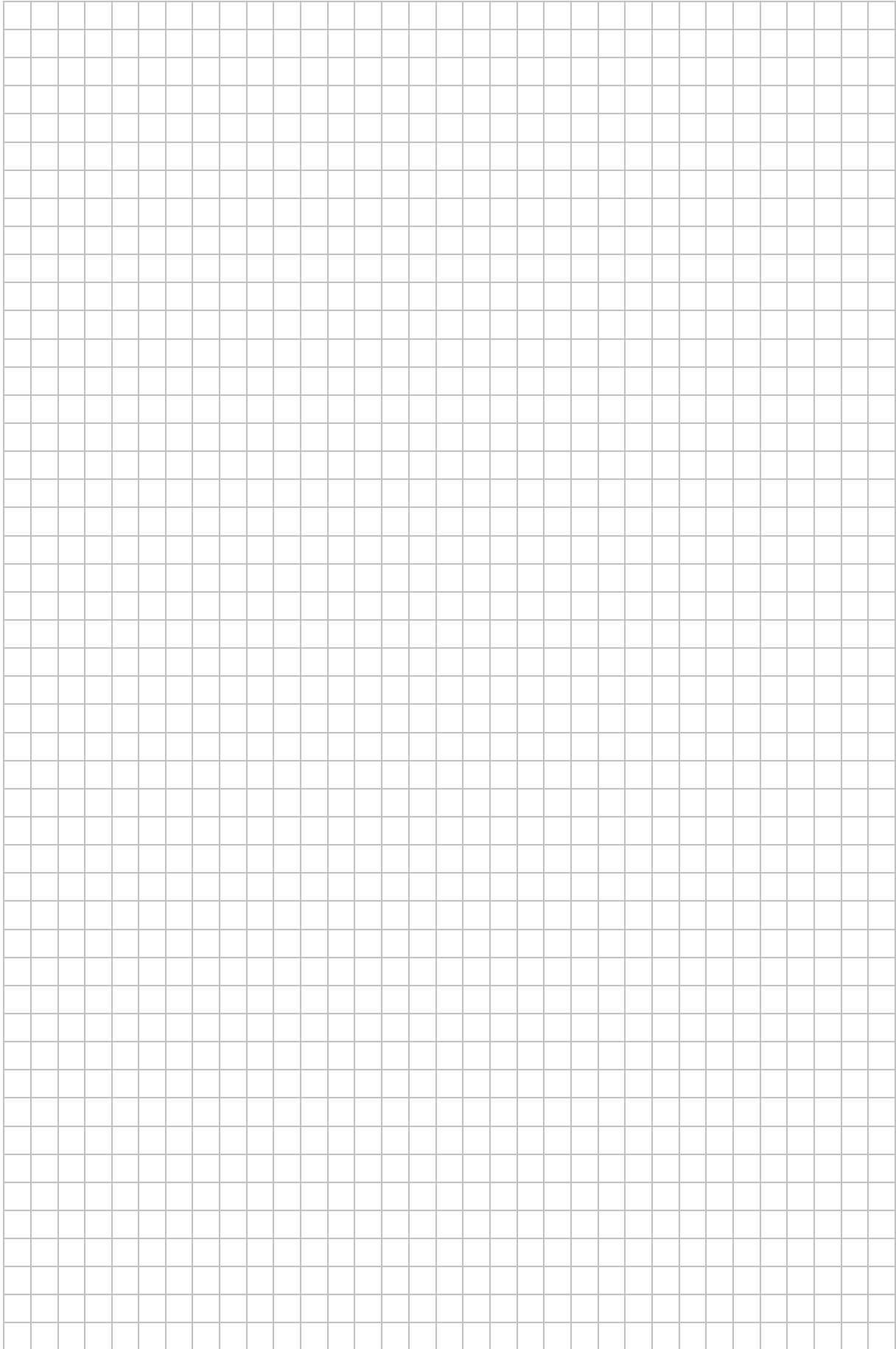
**Task 18. (0–4)**

Points  $A = (8, -1)$ ,  $B = (-4, -23)$ , and  $K = (1, 9)$  are located on a Cartesian plane. The point  $S$  is the midpoint of the line segment  $AB$ . The line  $m$  is parallel to the line  $AB$  and passes through the point  $K$ .

Complete the following sentences. Enter the correct numbers in sentences a) and b), and write the equation of the line in sentences c) and d).

- a) The first coordinate of the point  $S$  equals ....., and the second coordinate of this point is .....
- b) The distance between points  $A$  and  $B$  equals .....
- c) The line  $AB$  has the equation .....
- d) The line  $m$  has the equation .....

# NOTES



## **NOTES** (*will not be assessed*)