CENTRALNA KOMISJA EGZAMINACYJNA

WYPEŁNIA ZDAJĄCY

KOD   PESEL

Miejsce na naklejkę.
Sprawdź, czy kod na naklejce to
E-100.
Jeżeli tak – przyklej naklejkę.
Jeżeli nie – zgłoś to nauczycielowi.

EGZAMIN MATURALNY Z MATEMATYKI
POZIOM PODSTAWOWY
DODATKOWE ZADANIA W JĘZYKU ANGIELSKIM

WYPEŁNIA ZESPÓŁ NADZORUJĄCY

Uprawnienia zdającego do:

☐ dostosowania zasad oceniania

☐ dostosowania w zw. z dyskalkulią

☐ nieprzenoszenia zaznaczeń na kartę.

DATA: **20 maja 2021 r.**
GODZINA ROZPOCZĘCIA: **9:00**
CZAS PRACY: **80 minut**
LICZBA PUNKTÓW DO UZYSKANIA: **30**

EMAA-Z0-**100**-2105

Instrukcja dla zdającego

1. Sprawdź, czy arkusz egzaminacyjny zawiera 12 stron (zadania 1–19). Ewentualny brak zgłoś przewodniczącemu zespołu nadzorującego egzamin.
2. Na tej stronie oraz na karcie odpowiedzi wpisz swój numer PESEL i przyklej naklejkę z kodem.
3. Nie wpisuj żadnych znaków w części przeznaczonej dla egzaminatora.
4. Rozwiązania i odpowiedzi zapisz w miejscu na to przeznaczonym.
5. Odpowiedzi do zadań zamkniętych (1–15) zaznacz na karcie odpowiedzi w części karty przeznaczonej dla zdającego. Zamaluj ▊ pola do tego przeznaczone. Błędne zaznaczenie otocz kółkiem ⊘ i zaznacz właściwe.
6. Pisz czytelnie i używaj tylko długopisu lub pióra z czarnym tuszem lub atramentem.
7. Nie używaj korektora, a błędne zapisy wyraźnie przekreśl.
8. Pamiętaj, że zapisy w brudnopisie nie będą oceniane.
9. Możesz korzystać z zestawu wzorów matematycznych, cyrkla i linijki oraz kalkulatora prostego.

Task 1. (0–1)

The square of the difference of $3x$ and y, minus the square of the sum of x and $3y$ is

A. $8x^2 + 8y^2 - 12xy$

B. $8x^2 - 8y^2$

C. $8x^2 - 8y^2 - 12xy$

D. $8x^2 + 8y^2$

Task 2. (0–1)

The Seine is shorter than the Vistula by 25%, and the Rhine is longer than the Vistula by 17%. Thus the Rhine is longer than the Seine by

A. 64%

B. 56%

C. 42%

D. 21%

Task 3. (0–1)

The solution for the inequality

$$\frac{x-2}{2} - \frac{9-x}{3} > \frac{1}{6}x - 10$$

is

A. $(-9, +\infty)$

B. $\left(-\frac{36}{11}, +\infty\right)$

C. $\left(\frac{7}{2}, +\infty\right)$

D. R

Task 4. (0–1)

The greatest real root of the equation $x(x^2 + 1)(3x + 4) = 0$ is

A. 1

B. 0

C. 2

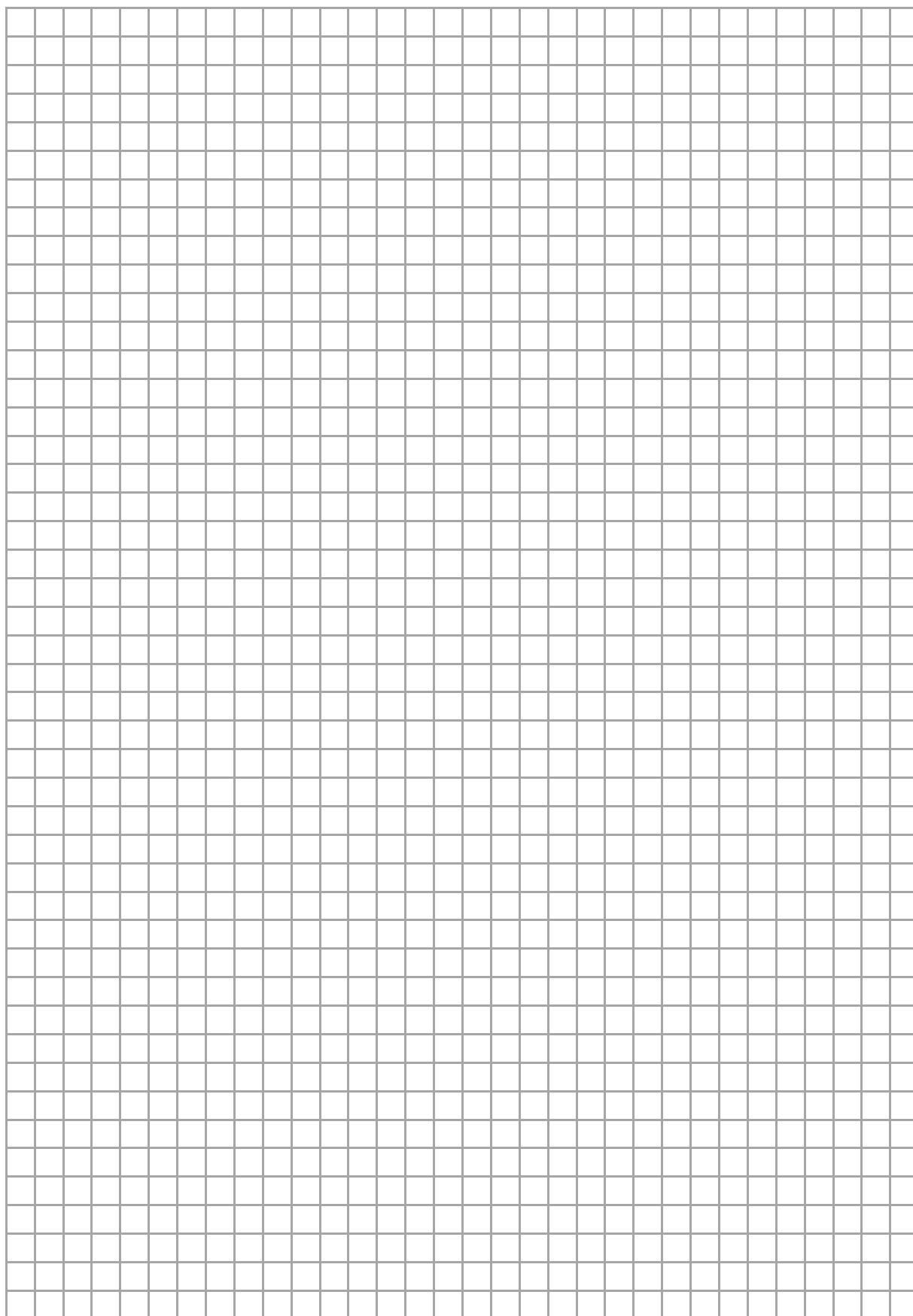**D.** $-\frac{4}{3}$

Task 5. (0–1)

The graph of the function $f(x) = (x + 6)(2x - 4)$ is a parabola whose vertex is a point with coordinates

A. $(-6, 4)$

B. $(6, -4)$

C. $(-6, 2)$

D. $(-2, -32)$

NOTES (not subject to evaluation)

Information for Tasks 6–7

A function f assigns to each two-digit number x the remainder of the division of x by 7.

Task 6. (0–1)

The set of values of the function f consists of

A. 10 elements. **B.** 90 elements. **C.** 7 elements. **D.** 13 elements.

Task 7. (0–1)

The number of zeros of the function f is equal to

A. 10 elements. **B.** 90 elements. **C.** 7 elements. **D.** 13 elements.

Task 8. (0–1)

The number of positive integers which belong to the set of values of the function
$g(x) = -x^2 - 4x + 21$ is

A. 10 **B.** 3 **C.** 25 **D.** 2

Task 9. (0–1)

The fourth term of an arithmetic sequence is 7, and the seventh term is 4. The common difference of this arithmetic sequence is equal to

A. -3 **B.** -1 **C.** 1 **D.** 3

Task 10. (0–1)

The area of the parallelogram $ABCD$ is equal to P. Points E and F are the midpoints of the sides BC and CD respectively. The area of the triangle AEF is equal to
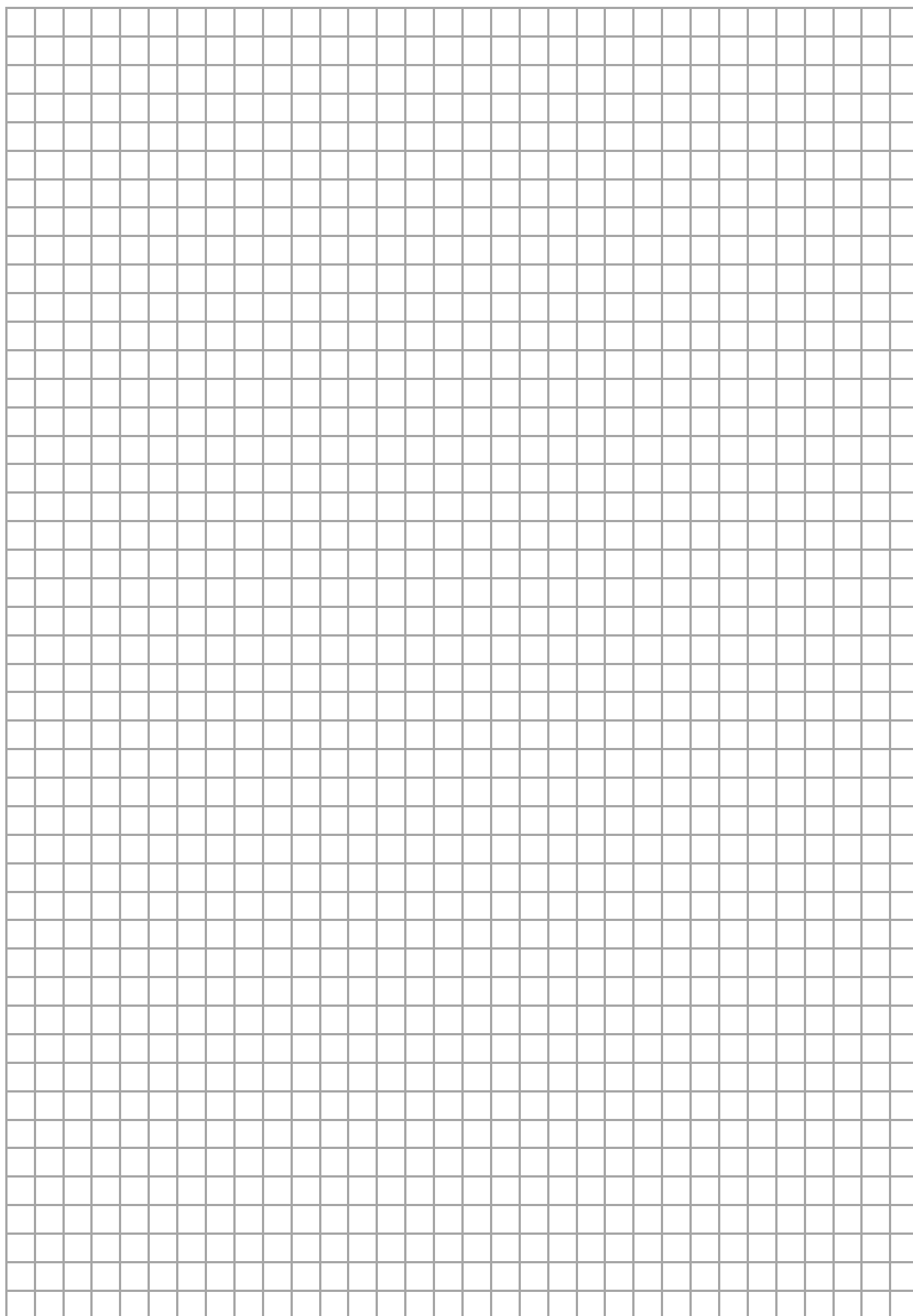
A. $\frac{1}{8}P$ **B.** $\frac{1}{4}P$ **C.** $\frac{3}{8}P$ **D.** $\frac{1}{2}P$

Task 11. (0–1)

We are given a circle $\mathcal{O}$ and a point P outside the circle. Lines k and l pass through the point P. The line k crosses the circle $\mathcal{O}$ at points A and B (where $|PA| < |PB|$) and passes through its centre. The line l is a tangent to the circle $\mathcal{O}$ at point C. The angle between the lines k and l is 60°. The angle CBA is equal to

A. 15° **B.** 30° **C.** 45° **D.** 60°

NOTES (not subject to evaluation)

Task 12. (0–1)

The arithmetic mean of the lengths of the bases of an isosceles trapezium is equal to 9, and the area of the trapezium is equal to 36. The tangent of the angle between the diagonal of the trapezium and the base of the trapezium is equal to

A. $\dfrac{9}{4}$ **B.** $\dfrac{4}{9}$ **C.** $\dfrac{1}{4}$ **D.** $\dfrac{1}{9}$

Task 13. (0–1)

A prism has 8 faces. The total number of body diagonals of this prism is equal to

A. 20 **B.** 16 **C.** 18 **D.** 40

Task 14. (0–1)

In a regular square pyramid, the ratio of the total surface area to the lateral surface area equals $9 : 5$. Then the ratio of the length of the base edge of this pyramid to the slant height of the pyramid is equal to

A. $2 : 5$ **B.** $4 : 5$ **C.** $3 : \sqrt{5}$ **D.** $8 : 5$

Task 15. (0–1)

The number of all natural divisors of the second power of the number 2020 is equal to

A. 4 **B.** 8 **C.** 44 **D.** 45

Task 16. (0–4)

A sequence (a_n) is given by the formula $a_n = 3n - 5$ for $n \geq 1$. Let T be a set of all two-digit numbers which are terms of the sequence (a_n).

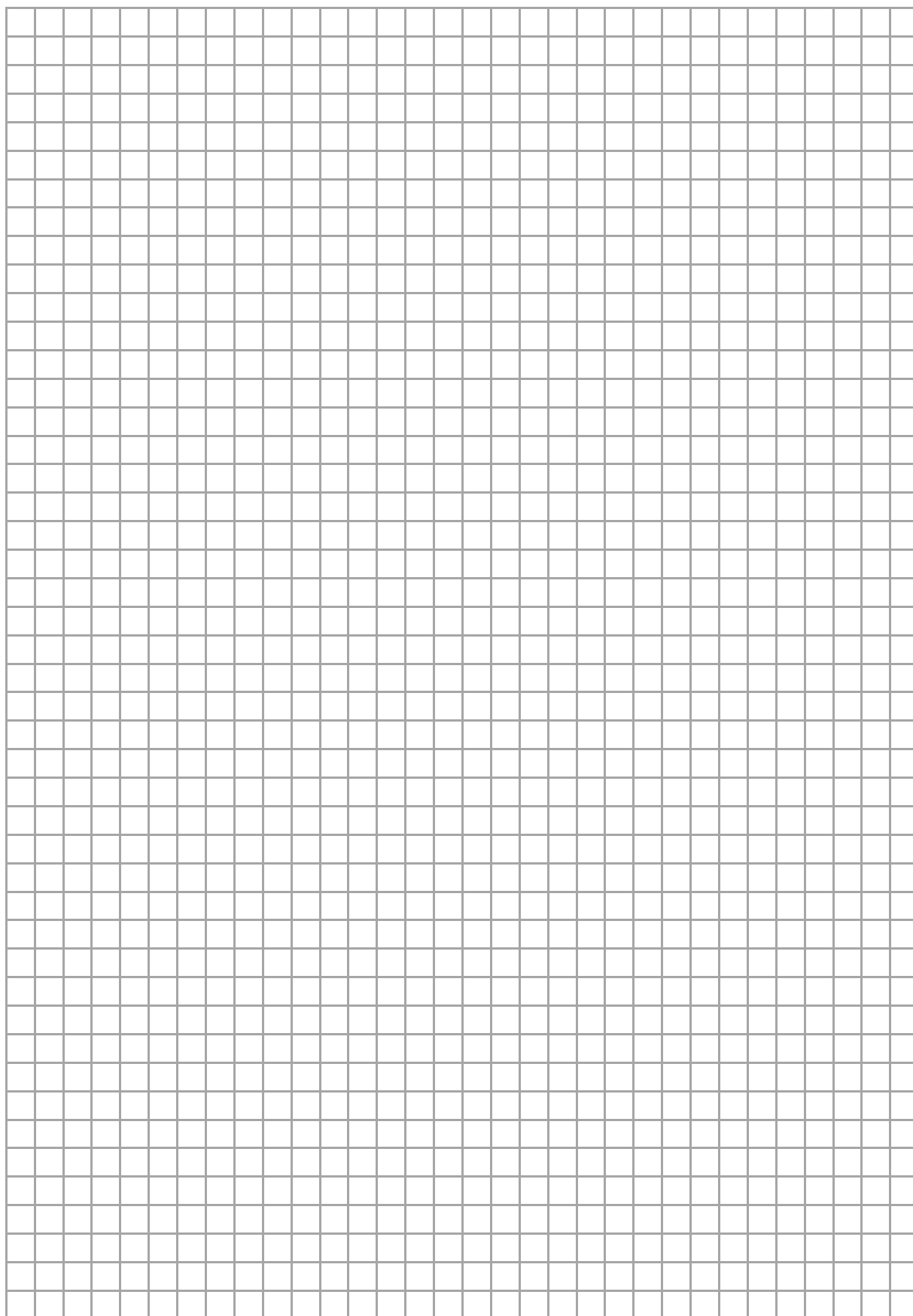**Complete the sentences a – d below by writing the correct numeric values in the blanks.**

a) The set T has .... elements.

b) The arithmetic mean of the elements of the set T is equal to ....

c) The median of the elements of the set T is equal to ....

d) The set T contains .... numbers which are squares of integers.

NOTES (not subject to evaluation)

The triangle ABC is a right-angled triangle. The length of the hypotenuse AC is equal to 65. The vertex A has coordinates $(-15, 20)$, the vertex B is at the origin of the coordinate system, and the vertex C has both coordinates positive.

Complete the sentences a–c below by writing the correct numeric values in the blanks.

a) The length of the shortest side of the triangle ABC is equal to ....

b) The area of the triangle ABC is equal to ....

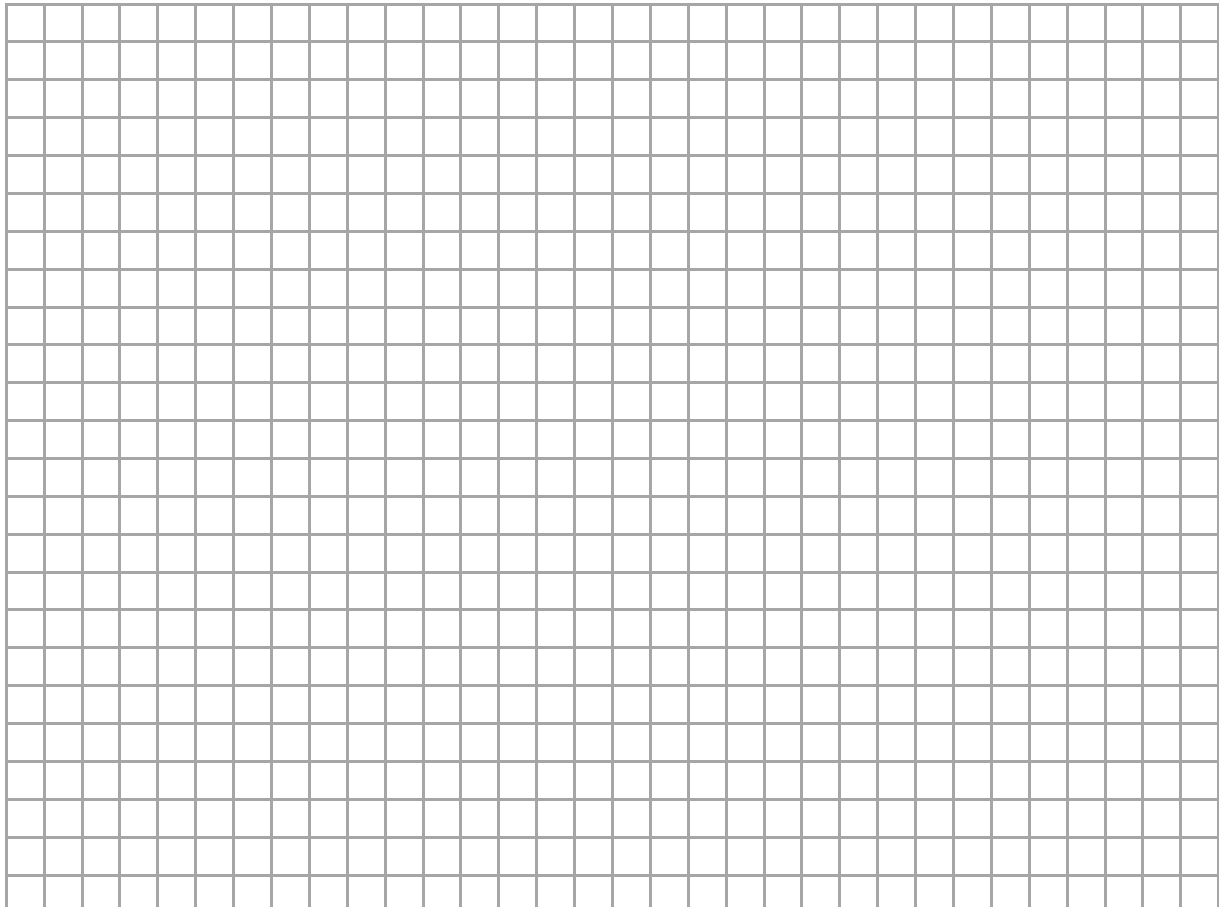c) The radius of the circle circumscribed on the triangle ABC is equal to ....

Write the equation of the straight line BC.

d) The straight line BC has the equation ....

Write the coordinates of the centre of the circle circumscribed on the triangle ABC.
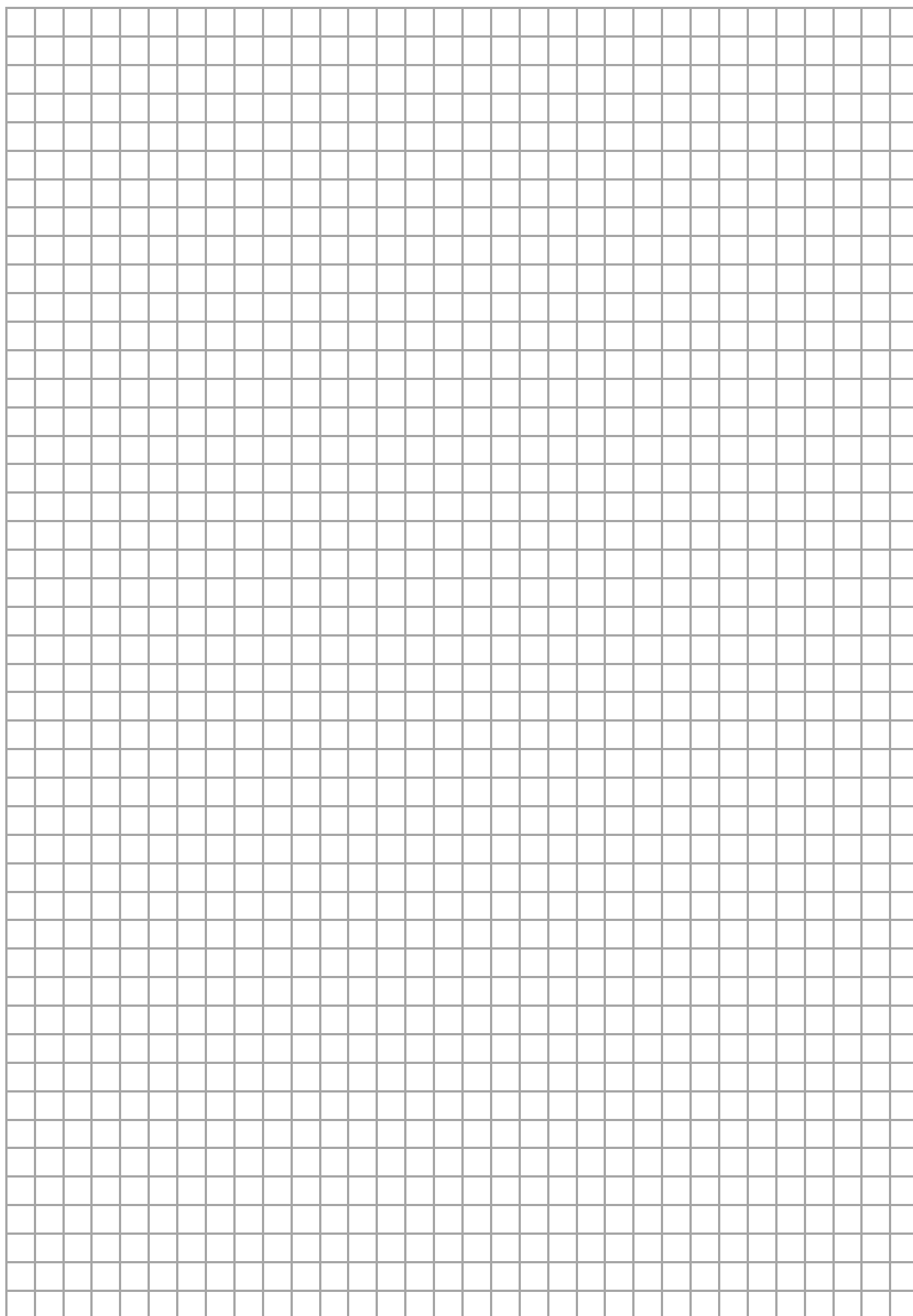
e) The centre of the circle circumscribed on the triangle ABC has coordinates ....

NOTES (not subject to evaluation)

NOTES (not subject to evaluation)

Task 18. (0–4)

Write down each of the sentences a–d below as an algebraic expression.

a) The difference of a squared and b.

....

b) The absolute value of the sum of b and tripled a.

....

c) The quotient of a squared and the third power of b.

....

d) The product of a increased by 5 and the square root of b.

....

NOTES (not subject to evaluation)
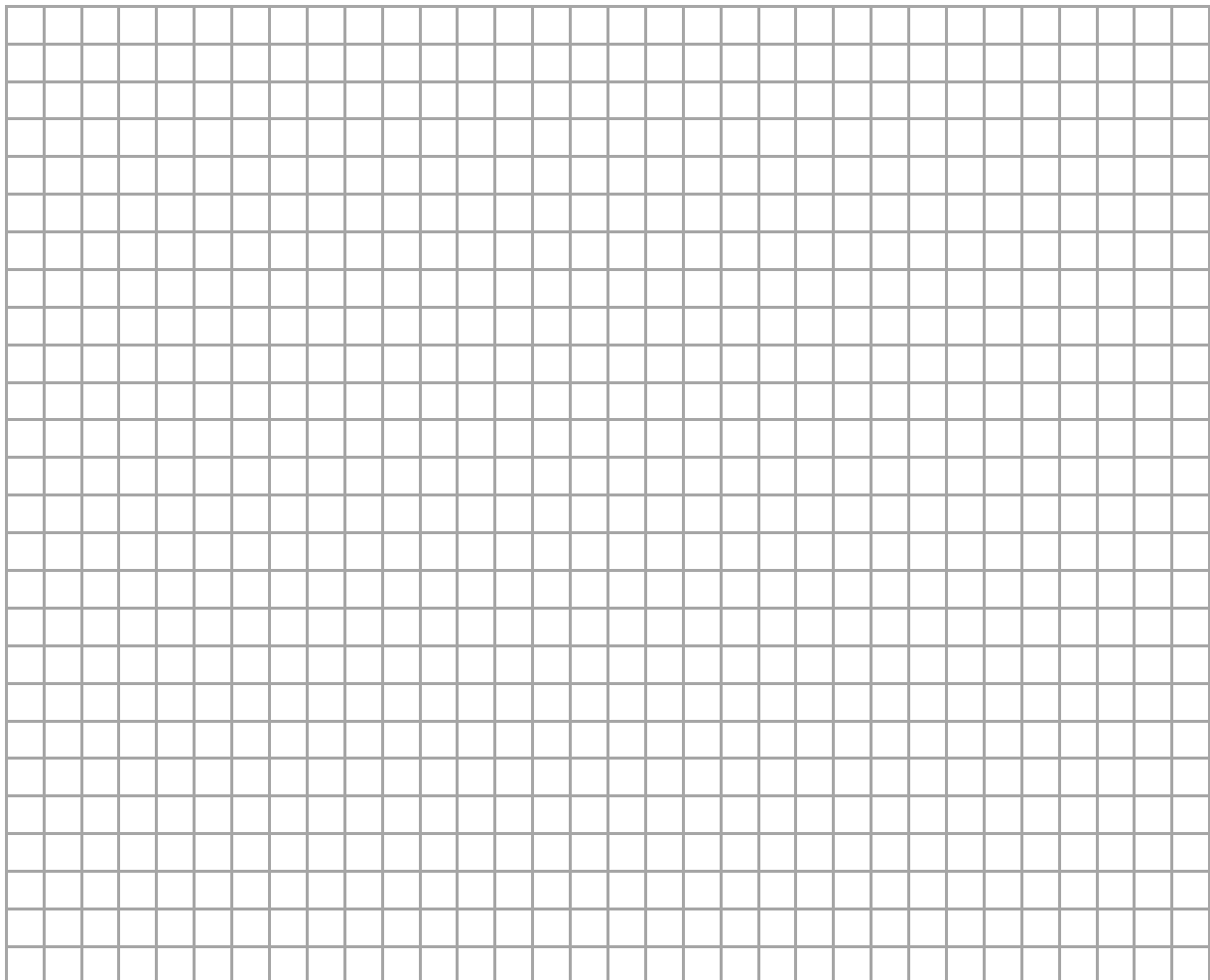
Task 19. (0–2)

In a random experiment, two fair, distinguishable cubic dice are thrown. Let A denote an event in which the product of the values obtained is an odd number.

Complete the sentences a–b below by writing the correct numeric values in the blanks.

a) The sample space for the experiment has ....
outcomes.

b) The probability of the event A is equal to ....

NOTES (not subject to evaluation)