X Liceum Ogólnokształcące im. S. Banacha w Toruniu

TEST DIAGNOSTYCZNY Z MATEMATYKI

DODATKOWE ZADANIA W JĘZYKU ANGIELSKIM
POZIOM PODSTAWOWY

DATA: 27.02.2025r.
CZAS PRACY: 80 minut
LICZBA PUNKTÓW DO UZYSKANIA: 30

Instrukcja dla zdającego

1. Sprawdź, czy arkusz zawiera 8 stron (zadania 1 - 15).
   Ewentualny brak zgłoś przewodniczącemu zespołu nadzorującego egzamin.
2. Rozwiązania i odpowiedzi zapisz w miejscu do tego przeznaczonym przy każdym zadaniu.
3. Pisz czytelnie. Używaj długopisu lub pióra tylko z czarnym atramentem.
4. Nie używaj korektora, a błędne zapisy wyraźnie przekreśl.
5. Pamiętaj, że zapisy w brudnopisie nie będą ocenianie.
6. Możesz korzystać z *Wybranych wzorów matematycznych*, cyrkla, linijki oraz kalkulatora prostego. [1]

[1] ®BK & PP

Task 1 (0-1) The opposite of the number

$$4\frac{1}{4} - 5 \cdot \sqrt[3]{\frac{8}{125}}$$

is equal to

A: $2\frac{3}{4}$ **B:** $2\frac{3}{4}$ **C:** $2\frac{1}{4}$ **D**: $-2\frac{1}{4}$

Task 2 (0-4) Write down each sentence as an algebraic expression:

(a) the product of cubes of a and b .....

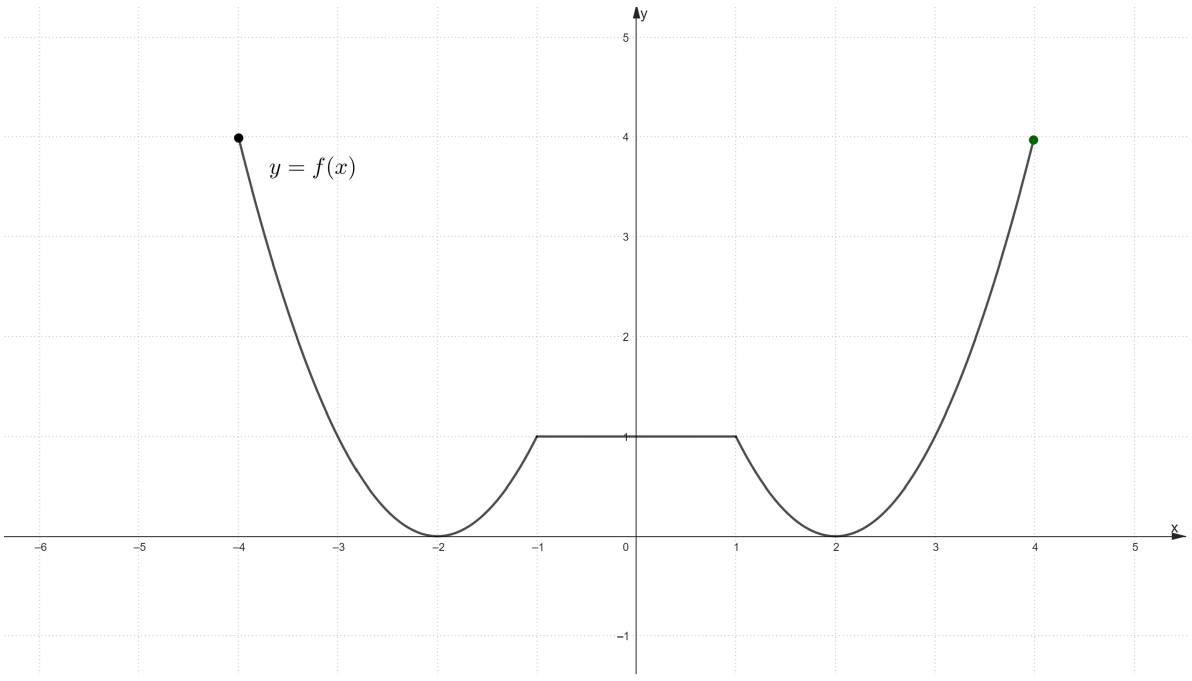
(b) the fifth power of a over b .....

(c) the sum of a and its recirpocal .....

(d) the absolute value of the difference between the square root of a and the cube root of b .....

Information for task 3.

The illustration shows the graph of function f.



Task 3.1 (0-1) The domain of the function f is the interval:

A: $[0; 4]$ **B:** $[-4; 4]$ **C:** $[0; 1]$ **D**: $[-2; 2]$

Task 3.2 (0-1) The range of the function f is the interval:

A: $[0; 4]$ **B:** $[-4; 4]$ **C:** $[0; 1]$ **D**: $[-2; 2]$

Task 3.3 (0-1) The product of all zeros of the function f equals:

A: 0 **B:** 1 **C:** 2 **D**: -4

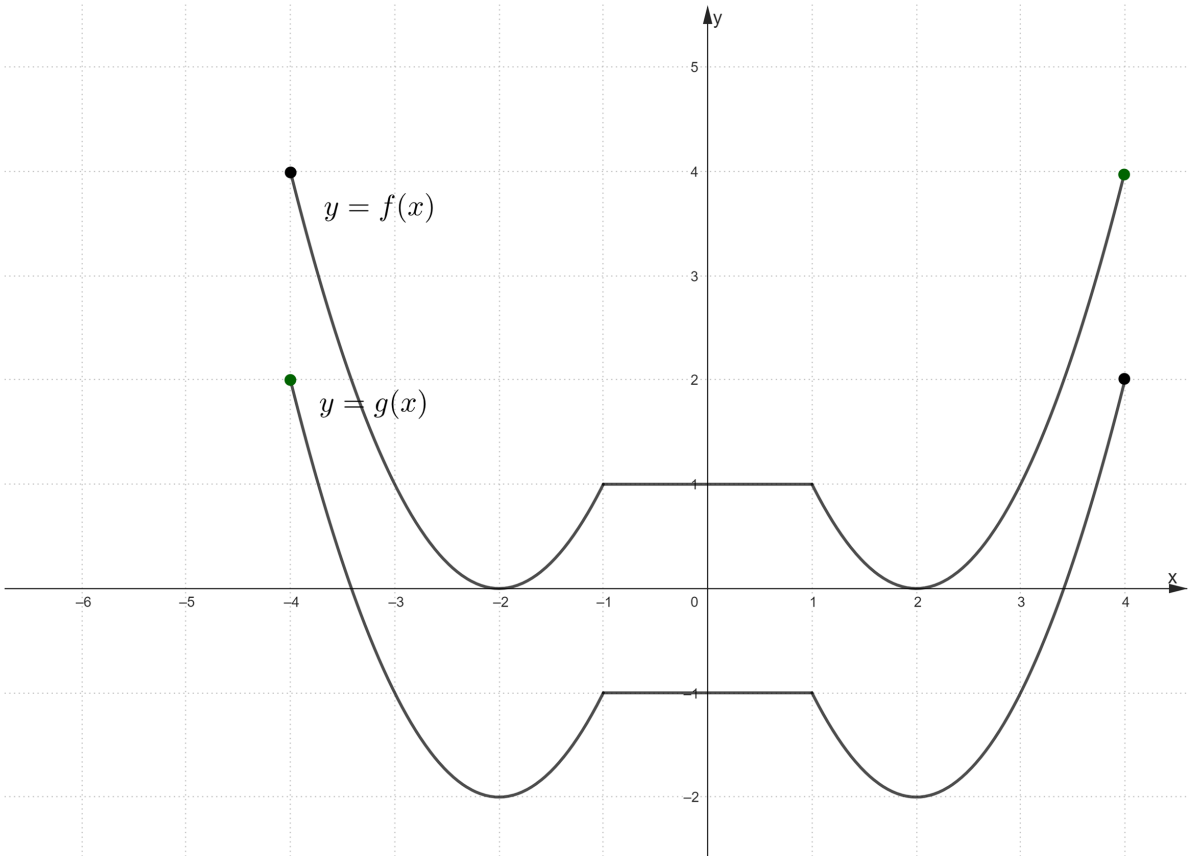
Task 3.4 (0-1) The set of numbers that satisfy the inequality $f(x) \leq 1$ is the interval:

A: $[0; 1]$ **B:** $[-4; 4]$ **C:** $(-3; 3)$ **D**: $[-3; 3]$

Task 3.5 (0-1) The line of symmetry of the graph of the function f is given by equation

A: $y = 0$ **B:** $x = 0$ **C:** $y = x$ **D**: $y = 1$

Task 4 (0-1) Function g was plotted by shifting the graph of the function f along one of the axes of the coordinate system. The function g can be expressed in the following way:



A: $g(x) = f(x - 2)$ **B:** $g(x) = f(x + 2)$

C: $g(x) = f(x) - 2$ **D**: $g(x) = f(x) + 2$

Task 5 (0-1) The line k passes through the point $S(-2,7)$ and is perpendicular to the line l given by equation $y = \frac{2}{3}x + 4$. The line k has the following equation:

A: $y = -3x + 2$ **B:** $y = -\frac{2}{3}x + 4$

C: $y = -\frac{3}{2}x - 2$ **D**: $y = -\frac{3}{2}x + 4$

Task 6 (0-1) Points $P(0,-2)$, $Q(3,0)$, $R(1,3)$, $S(-2,1)$ are vertices of the square $PQRS$. The area of the square is equal to:

A: $4\sqrt{13}$ **B:** $\sqrt{52}$ **C:** 13 **D**: 169

Information for task 7 - 8.

The acute angle of the rhombus is 30° and the area of the rhombus is 50.

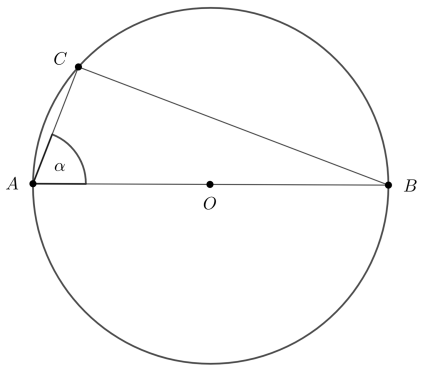
Task 7 (0-1) The height of the rhombus is:

A: $2\sqrt{3}$ **B:** $\frac{5\sqrt{3}}{2}$ **C:** 5 **D**: 10

Task 8 (0-1) The tangent of the obtuse angle of the rhombus is:

A: $\frac{1}{2}$ **B:** $-\frac{\sqrt{3}}{2}$ **C:** $\frac{\sqrt{3}}{3}$ **D**: $-\frac{\sqrt{3}}{3}$

Task 9 (0-1) A circle circumscribed on the triangle ABC has a radius of 10 cm (see ilustration). The centre O of the circle lies on the side AB, and the sine of the angle BAC is equal to $\frac{\sqrt{15}}{4}$.



The length of the segment AC is equal to:

A: $\frac{1}{4}$ **B:** 5 **C:** $\frac{\sqrt{85}}{20}$ **D**: $\frac{\sqrt{15}}{20}$

Task 10 (0-2) In arithmetic sequence (a_n), where $n \in \mathbb{N}_+$, $a_1 = 6$ and $a_{10} = 69$.

Complete the following sentences:

(a) The seventeenth term of the arithmetic sequence is equal to .....
(b) The sum of the first seventeen terms of the sequence (a_n) is equal to .....

Task 11 (0-2) From the set of numbers $\{8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18\}$ two numbers are randomly chosen without replacement. (**order of the chosen numbers does not matter**) Complete the following sentences:

(a) If the product of two randomly chosen numbers is divisible by 21 then one of these numbers must be equal to .....
(b) The probability of the event *A– the product of two randomly chosen numbers is divisible by 21*, equals .....

Task 12 (0-3) Given the function $f(x) = x^2 - 6x - 7$, complete the following sentences:

(a) The minimum of the function f is at the $x =$ .....
(b) The value of the function f at $x = 0$ is the same as for $x =$.....
(c) The function f takes negative values if and only if x belongs to the set .....

Task 13 (0-1) The sum of all real solutions for the equation $x(x^2 - 4)(x^2 + 9)(x - 3) = 0$ is equal to

A: 0 **B:** 1 **C:** 2 **D**: 3

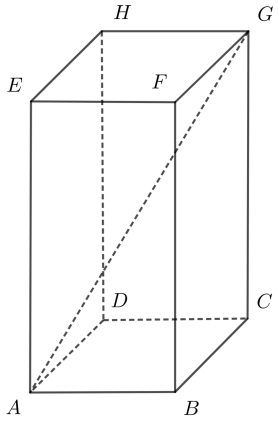
Task 14 Polynomials P and Q are given by the equations $P(x) = 2x^2 + 3x$, $Q(x) = -x^2 - 4x$.

Task 14.1 (0-1) The polynomial $P(x) - 3Q(x)$ written in general form is .....

Task 14.2 (0-1) Decide whether the following statements are true or false. Select **T** if the statement is true or **F** if it is false.

One of the zeros of the polynomial Q is -4	**T**	**F**
The value $P(\sqrt{3})$ is equal to $6 - 3\sqrt{3}$	**T**	**F**

Task 15 (0-4) In a rectangular prism $ABCDEFGH$ (see picture) the base $ABCD$ has sides of the length $|AB| = \sqrt{3}$ and $|BC| = 1$. The angle between the diagonal AG and the edge AB is equal to 60°. Complete the following sentences:



(a) The diagonal of the prism has the length .....

(b) The length of an altitude of the prism equals .....

(c) The total area of the prism is .....

(d) The volume of the prism is .....

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