CENTRALNA KOMISJA EGZAMINACYJNA

Arkusz zawiera informacje prawnie chronione do momentu rozpoczęcia egzaminu.

MMA 2016

UZUPEŁNIA ZDAJĄCY

KOD

PESEL

*miejsce na naklejkę*

# EGZAMIN MATURALNY Z MATEMATYKI

## POZIOM PODSTAWOWY

## DODATKOWE ZADANIA W JĘZYKU ANGIELSKIM

DATA: **24 maja 2016 r.**

GODZINA ROZPOCZĘCIA: **09:00**

CZAS PRACY: **80 minut**

LICZBA PUNKTÓW DO UZYSKANIA: **30**

**Instrukcja dla zdającego**

1. Sprawdź, czy arkusz egzaminacyjny zawiera 13 stron (zadania 1–20). 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-162

MMA 2016

**Task 1 (0–1)**

The following table shows the number of votes received by each candidate in a by-election.

| Candidate | I | II |
|---|---|---|
| Number of votes | 13,970 | 17,780 |

The number of votes received by the winner was higher than the number of votes received by the other candidate by:

**A.** 56 percentage points. **B.** 44 percentage points.
**C.** 27 percentage points. **D.** 12 percentage points.

**Task 2 (0–1)**

If $\log a = \frac{1}{2}$ and $\log b = \frac{2}{5}$, where $a > 0$ and $b > 0$, then the value of the expression $\log\left(a^2 b\right)$ equals

**A.** $\frac{7}{5}$ **B.** $\frac{4}{10}$ **C.** $\frac{13}{20}$ **D.** $\frac{1}{10}$

**Task 3 (0–1)**

The number $4\left(4^{18} + 4^{17}\right)$ equals

**A.** $4^{35}$ **B.** $4^{36}$ **C.** $5 \cdot 4^{17}$ **D.** $5 \cdot 4^{18}$

**Task 4 (0–1)**

If $m = \frac{1 - x^2}{x + 1}$, $n = x - 1$, where $x \neq -1$, then the difference between $m$ and $n$ equals

**A.** $0$ **B.** $2 - 2x$ **C.** $-2x$ **D.** $\frac{-x^2 - x + 2}{x + 1}$

**Task 5 (0–1)**

The linear function $y = (3 - m)x + 6$ has no x-intercepts when

**A.** $m = 3$ **B.** $m = 0$ **C.** $m = 6$ **D.** $m = -3$

# NOTES

**Task 6 (0–1)**

The quadratic function $f$ takes negative values for all arguments in the $(-2, 3)$ interval and for no other arguments. The solution set for the inequality $f(x-3) < 0$ is the interval

**A.** $(-5, 0)$ **B.** $(1, 6)$ **C.** $(-2, 3)$ **D.** $(-3, 2)$

**Task 7 (0–1)**

In a right-angled triangle, one of the shorter sides is $\sqrt{3}$ long, and the angle opposite that side is $\alpha$. The length of the hypotenuse of this triangle is $2\sqrt{2}$.

The value of the expression $\frac{1}{\sin\alpha}$ is

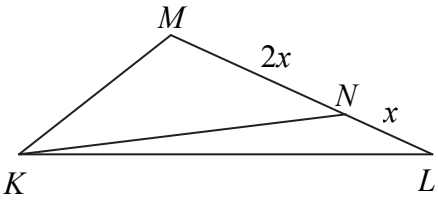
**A.** $\frac{\sqrt{11}}{8}$ **B.** $\frac{2\sqrt{2}}{3}$ **C.** $\frac{2\sqrt{6}}{3}$ **D.** $\frac{\sqrt{22}}{4}$

**Task 8 (0–1)**

The points *K*, *L*, and *M* are colinear, and point *M* is located between points *K* and *L*. It is also known that $|KL| = 11$ and $|LM| = 5|KM|$. In that case, the length of the line segment *LM* is

**A.** $\frac{55}{6}$ **B.** $\frac{11}{6}$ **C.** $\frac{11}{5}$ **D.** $\frac{33}{5}$

**Task 9 (0–1)**



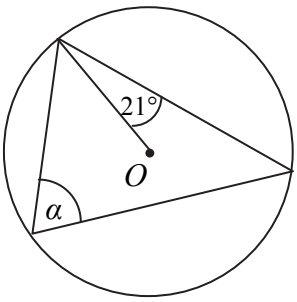

On the side *LM* of the triangle *KLM* the point *N* was selected so that the length of the line segment *MN* is twice the length of the line segment *LN*. The area of the triangle *KLN* equals 7.5. Thus, the area of the triangle *KLM* equals

**A.** 15 **B.** 18.75 **C.** 22.5 **D.** 30

# NOTES

**Task 10 (0–1)**

A triangle was inscribed into a circle with the centre point *O* as shown in the illustration. The angle $\alpha$ of this triangle is




**A.** 28° **B.** 42° **C.** 63° **D.** 69°

**Task 11 (0–1)**

The straight lines $2x+3y-11=0$ and $y=ax$ are perpendicular when

**A.** $a=-\frac{1}{2}$ **B.** $a=\frac{2}{3}$ **C.** $a=\frac{3}{2}$ **D.** $a=2$

**Task 12 (0–1)**

Five different points are located on one plane, and any three of these points are non-colinear. The number of line segments which have their endpoints at any two of these five points is

**A.** 5 **B.** 10 **C.** 20 **D.** 15

**Task 13 (0–1)**

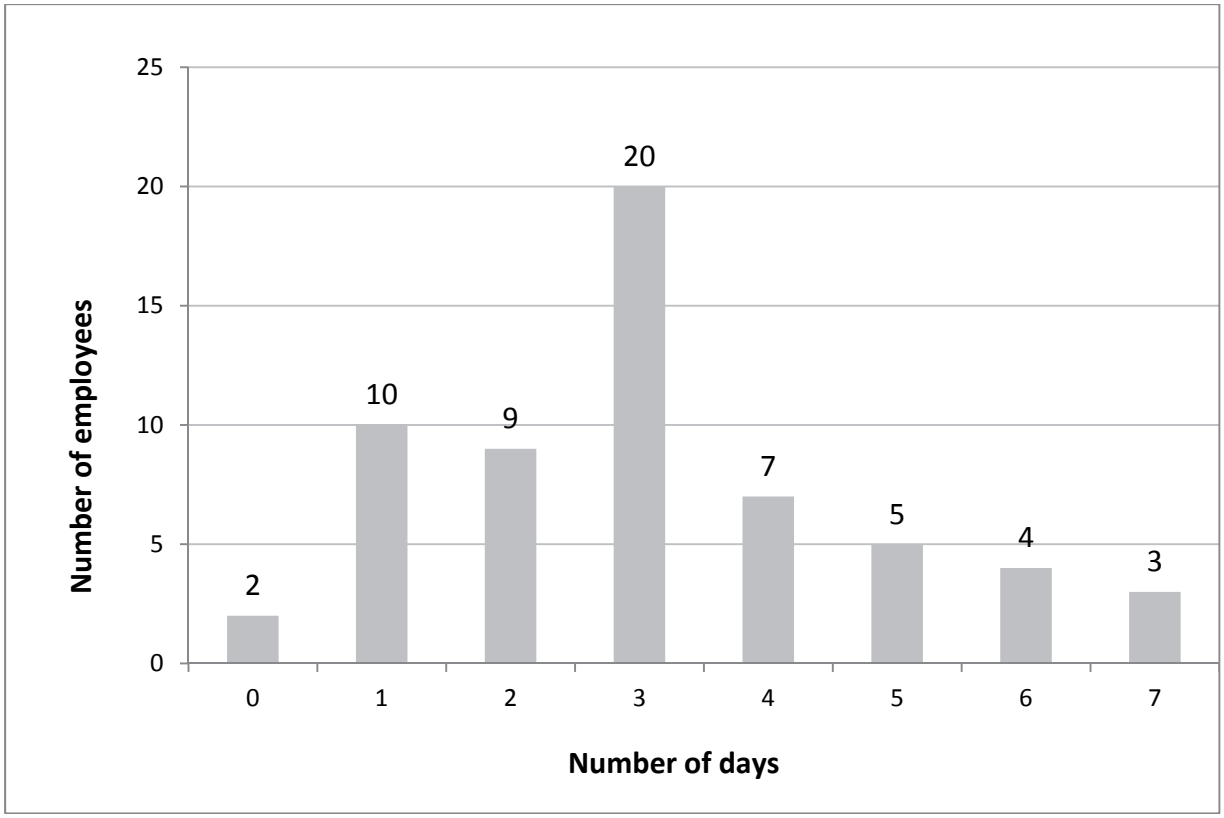
In a right tetragonal prism, the length of the base edge is 8 cm. The length of the diagonal in this prism is 18 cm. The sum of all side edges of this prism equals

**A.** 56 cm **B.** $2\sqrt{65}$ cm **C.** 14 cm **D.** $8\sqrt{65}$ cm

# NOTES

**Task 14 (0–2)**

Each of the 60 employees of a company was asked to give the number of days on which they went grocery shopping in the previous week. The survey results are presented in the chart below.




Complete the following sentences using the chart.

a) The percentage of the employees who shopped for groceries on more than four days in the previous week is ..... .

b) The median number of days when the employees shopped for groceries equals ..... .

**Task 15 (0–2)**

The axial cross-section of a cone is an equilateral triangle with an area of $49\sqrt{3}$. Complete the following sentences.

a) The area of the cone's base equals ..... .

b) The volume of the cone equals ..... .

# NOTES

**Task 16 (0–2)**

The seventeenth term of a geometric sequence equals 10, while its twentieth term equals $-80$. Complete the following sentences.

a) The common ratio of this geometric sequence is …….. .

b) The number of terms in this sequence which are in the interval $(0,1)$ equals …….. .

**Task 17 (0–2)**

In an isosceles trapezium, the internal acute angle is 60°. The side and the shorter base are equal. The perimeter of the trapezium equals 50. Complete the following sentences.

a) The shorter base of the trapezium equals …… .

b) The area of the trapezium equals …… .

**Task 18 (0–2)**

The linear function $f$ has the equation $f(x)=-\frac{1}{2}x+13$. Complete the following sentences.

a) For the argument –4, the value of the function $f$ equals ……. .

b) The x-intercept of the function equals ……. .

**Task 19 (0–2)**

The equation $mx^2+2x-1=0$ is solved for $x$. Complete the following sentences.

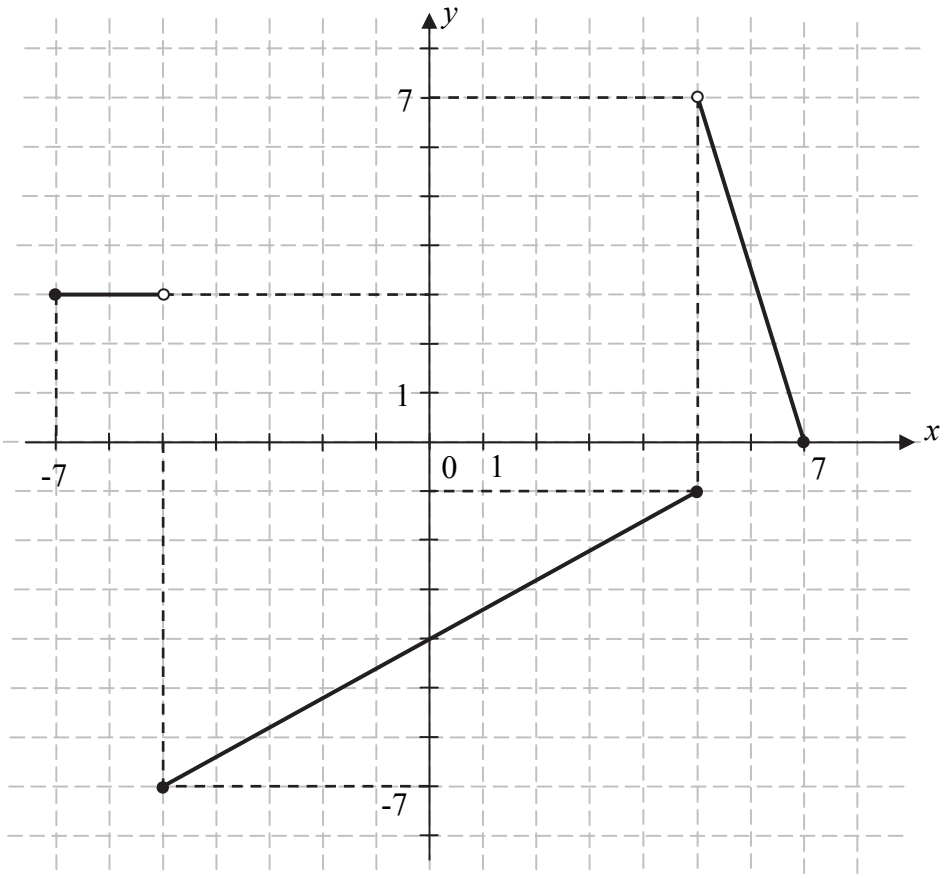
a) If $m=-1$, then the number of solutions to this equation is ……. .

b) If the number $x_0=\frac{1}{2}$ is the solution to this equation, then $m=$ ……. .

# NOTES

**Task 20 (0–5)**

The following illustration shows the graph of the function *f*.




Complete the following sentences based on the illustration.

a) The domain of the function is the set

$D$ = …..…….....……  .

b) The range of the function is

$Z_W$ = ……..……....……  .

c) The longest interval in which the function *f* decreases is

……..…… .

d) The lowest value of the function *f* equals

……..…… .

e) The solution set for the inequality $f(x) < -1$ is

……..…… .

# NOTES