COPERNICUS

A TRADITION OF EXCELLENCE

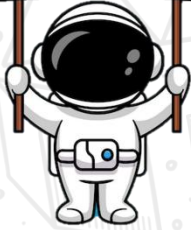**WELCOME TO COPERNICUS**

INSTRUCTIONS

You are about to take Copernicus Exam.

Please read the followings carefully.

1. The exam has 25 multiple choice-questions. Each question weighs 4 points. The maximum score a student can get is 100. There is a penalty of one point for each incorrect answer. So only answer the questions you are sure of.

2. Start with the easier questions, you can always come back to the questions you leave.

3. The time allocated for the exam is 60 minutes. You will start when the invigilator tells you to start.

4. You are required to comply with the directions given by the head invigilator before the examination.

5. Those who are taking the exam with a mobile phone MUST make sure that during the examination no one calls.

6. If anything in the examination is unclear, you can contact the invigilator.

7. Where permitted you may use a translation dictionary.

8. Students must not give or receive assistance of any kind during the exam. Any cheating, any attempt to cheat, assisting others to cheat, participating therein, or engaging in such improper conduct is a serious violation and will generally result in disqualifying.

Remember that "Hard work beats talent when talent doesn't work hard"
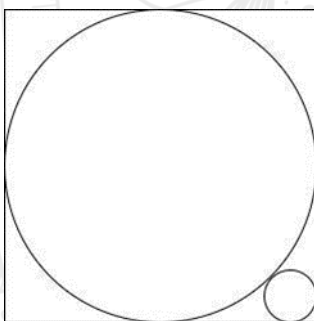**We wish you the very best luck on the exam.**

1. Seven-digit number $62AB427$ is divisible by 99. Find the value of $A + B$.

A) 7

B) 5

C) 6

D) 4

2. There are 37 numbers on a roulette wheel: 0 and the whole numbers from 1 to 36. What is the chance of getting a perfect square number?

A) $\dfrac{1}{6}$

B) $\dfrac{7}{37}$

C) $\dfrac{6}{37}$

D) $\dfrac{5}{37}$

3. The square in the figure has side length equal to 2. What is the radius of the small circle? (Circles are touching)

A) $\sqrt{2} - 1$

B) $\dfrac{2}{\sqrt{2}+1}$

C) $\sqrt{2}$

D) $3 - 2\sqrt{2}$

4. The average of five weights is 13 grams. If a 7-gram weight is added, what is the average of the six weights?

A) 11

B) 12

C) 13

D) 14

5. The sum of 10 consecutive natural numbers are 195. Find the value of the first one.
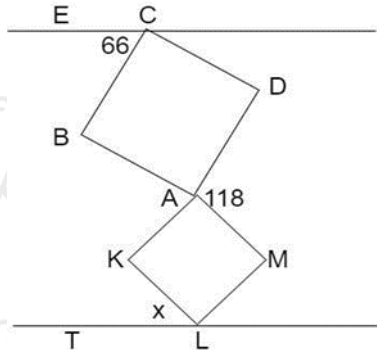
A) 13

B) 14

C) 15

D) 16

6. Every day at school, Alex climbs a flight of 6 stairs. Alex can climb using 1, 2 or 3 steps or a combination of any of them. How many ways can Alex climb the flight of 6 stairs?

A) 18

B) 20

C) 22

D) 24

7. Find the simplest form of $\dfrac{\left(\sqrt{10}-1\right)^2-3}{\sqrt{10}+\sqrt{3}-1}$.

A) $\sqrt{10} - \sqrt{3} - 1$

B) $\sqrt{10} + \sqrt{3} - 1$

C) $\sqrt{7} - 1$

D) $\sqrt{3} + 1$

8. Inside two parallel lines there are two squares $ABCD$ and $AKLM$. Find the angle $\angle TLK$ if $\angle BCE = 66°$ and $\angle DAM = 118°$.
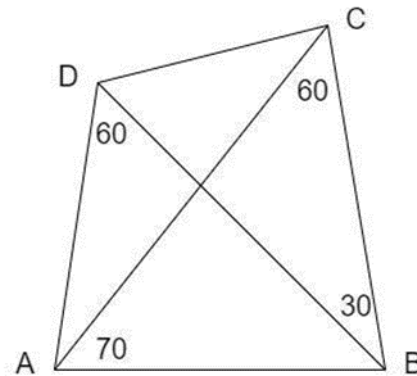

A) 42°

B) 48°

C) 52°

D) 58°

9. If $a_1 + a_2 = 1$, $a_2 + a_3 = 2$, $a_3 + a_4 = 3$, …, $a_{50} + a_{51} = 50$ and $a_{51} + a_1 = 51$, then what is the sum of $a_1, a_2, a_3, …, a_{51}$?

A) 538

B) 1075

C) 663

D) 754

10. If $a^2 + b^2 = 117$ and $ab = 54$, then find the value of $\dfrac{a+b}{a-b}$.

A) $\dfrac{3}{5}$

B) 3

C) 5

D) $\dfrac{5}{3}$

11. In the given figure, $ABCD$ is a quadrilateral. $\angle ADB = 60°$, $\angle BAC = 70°$, $\angle DBC = 30°$ and $\angle ACB = 60°$. Find $\angle DAC$.

A) 20°

B) 30°

C) 40°

D) 50°

12. If $x + \dfrac{1}{x} = 4$, find the value of $x^3 + \dfrac{1}{x^3}$.

A) 8

B) 16

C) 8.5

D) 52

13. In $ABCD$ quadrilateral, $AB : BC : CD : DA = 2 : 3 : 4 : 5$. The perimeter of ABC is equal to $15\ cm$ and the perimeter of ACD is equal to $27\ cm$. What is the length of CD?

A) 10

B) $\dfrac{27}{5}$

C) 15

D) 12

14. Solve equation $(x\nabla 5) - 3(x\nabla 7) + 3x = 3\dfrac{3}{35}$

if $(a\nabla b) = \dfrac{2a}{b} + 1$.

A) $x = \dfrac{12}{5}$

B) $x = 3$

C) $x = 2$

D) $x = 2.5$

15. If $f(x) = -x^2$ and $g(x) = -4x - 5$, for what positive value of x will be $f(x + 2)$ equal to $g(x + 2)$?

A) 4.5

B) 2

C) 3

D) 4

16. If a and b are positive natural numbers such that $2022 - ab = 2a(1 + b) + a + 3b + 3$, find the value of $a + b$.

A) 2022

B) 341

C) 337

D) 2021

17. Calculate:

$$\dfrac{4.5 : \left(47.375 - \left(26\frac{1}{3} - 18 \times 0.75\right) \times 2.4 : 0.88\right)}{17.81 : 1.37 - 23\frac{2}{3} : 1\frac{5}{6}}$$
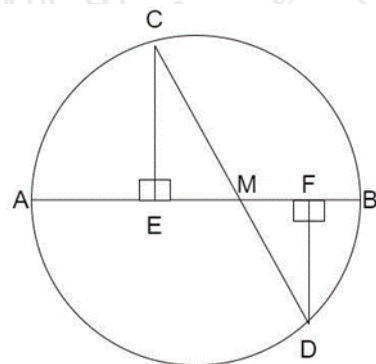
A) 3

B) 4

C) 3.5

D) 3.6

18. If $f(t) = 3 - |2t + 1|$, find the value of $f(-2) + f(-1) + f(0) + f(1) + f(2)$.

A) 2

B) 3

C) 1

D) 0

19. How many divisors does $2^4 \cdot 3^3 \cdot 4^2$ have?

A) 12

B) 24

C) 24

D) 36

20. Find the length of CD, if AB is a diameter, $\angle CMO = 60°$, $MF = 12$ and $ME = 18$.
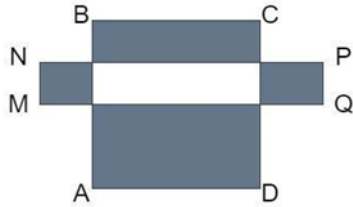

A) 30

B) 60

C) 6

D) 40

21. What is the last digit of 2022^{2022}?

A) 2

B) 4

C) 6

D) 8

22. $ABCD$ is a square, and $MNPQ$ is a rectangle. Find the sum of the perimeters of the colored rectangles, if $AB = 8$, $MN = 2$, and $NP = 14$.

- **A)** 48
- **B)** 52
- **C)** 60
- **D)** 64

23. Which one of the following numbers is equal to $\dfrac{2022^4 - 2021^4}{2022^2 + 2021^2}$?

- **A)** 2043
- **B)** 4043
- **C)** 2021.5
- **D)** $2 \cdot (2022^2 - 2021^2)$

24. Three points A, B, and C have coordinates $(0, 4)$, $(6, 2)$, and $(10, 4)$, respectively. What is the measure of angle $\angle ABC$?

- **A)** 105°
- **B)** 120°
- **C)** 135°
- **D)** 145°

25. Find the simplest form of $\sqrt{5 - 2\sqrt{6}}$.

- **A)** 0.5
- **B)** $\sqrt{3} - \sqrt{2}$
- **C)** $\sqrt{5} - \sqrt{3}$
- **D)** $\sqrt{5} - \sqrt{2}$