Brainiacs Math Olympiad Preliminary Round Sample Exam Paper

Category III – grades 7 and 8

Q1.

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

A. 7/37

B. 6/37

C. 9/35

D. 8/35

Q2.

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

A.14 gram

B.13 gram

C.12 gram

D.10 gram

Q3.

The sum of 10 consecutive natural numbers are 195. Find the value of the first number.

A. 13

B. 14

C. 15

D. 16

Q4.

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

A. 24

B. 18

C.16

D. 12

Q5.

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

A. $\sqrt{3}-2-\sqrt{10}$

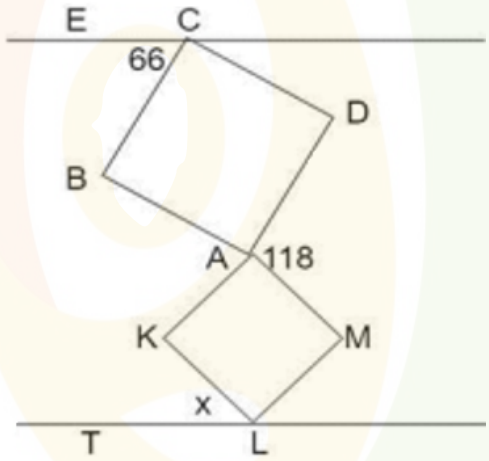
B. $\sqrt{7}-1$

C. $\sqrt{3}-1-\sqrt{10}$

D. $\sqrt{10}-1-\sqrt{3}$

Q6.

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.46

C.52

D.58

Q7.

If $a1 + a2 = 1$, $a2 + a3 = 2$, $a3 + a4 = 3$, …, $a50 + a51 = 50$ and $a51 + a1 = 51$,

then what is the sum of $a1$, $a2$, $a3$, … , $a51$?

A.558

B.663

C.685

D.724

Q8.

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

A. $\frac{7}{4}$

B. 5

C. 3

D. $\frac{3}{2}$

Q9.

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

A. 52

B. 46

C. 44

D. 64

Q10.

In quadrilateral *ABCD*, the ratios of the sides are *AB : BC : CD : DA = 2 : 3 : 4 : 5*. The perimeter of triangle *ABC* is equal to 15 cm, and the perimeter of triangle *ADC* is equal to 27 cm. What is the length of side *CD*?

A. 3

B.6

C.8

D.12

Q11.

Solve equation $(x \nabla 5) - 3(x \nabla 7) + 3x = 3\frac{3}{35}$ if $(a \nabla b) = \frac{2a}{b} + 1$.

A. 6

B. 4

C. 2

D. 1

Q12.

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

A. 4

B. -6

C. -4

D. 2

Q13.

How many divisors does $2^4 \bullet 3^3 \bullet 4^2$ have?

A.18

B. 24

C.36

D.42

Q14.

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

A. 0

B. 2

C. 4

D. 8

Q15.

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. 45^0

B. 120^0

C.135^0

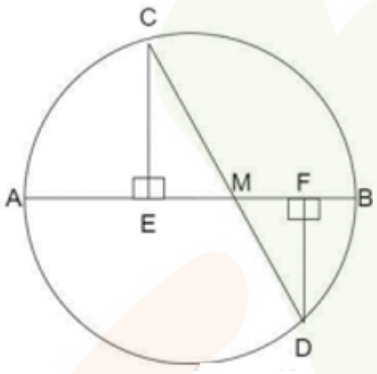
D. 150^0

Q16.

Find the length of CD, if AB is a diameter, O is the center of the circle,

Find the length of CD, given that AB is the diameter of the circle and O is the center.

$C\hat{M}O = 60^0, MF = 12\ and\ ME = 18.$



A.36

B.54

C.60

D.72

Q17.

There are 21 students in a class. Eleven students like to draw, eleven students like to sing, and twelve students like to dance. Five students like to both dance and draw, three students like to sing and dance, and three students like to draw and sing. How many students like to dance, sing, and draw?

A. 1

B. 2

C. 3

D. 4

Q18.

There are 9 liters of 60% orange juice. Alex drinks 3 liters of the orange juice and then pours 3 liters of water into the remaining orange juice. What is the percentage of orange juice in the new mixture?

A) 60%

B) 45%

C) 55%

D) 40%

Q19.

At 3:15, Alex calculates the angle between the hour and minute hands of a clock. What is this angle?

A) 0^0

B) 7.5^0

C) 15^0

D) 22.5^0

Q20.

On Monday, Marry bought 2 bottles of water and 3 bottles of juice, spending a total of $19. On Tuesday, she bought 1 bottle of water and 1 bottle of juice, spending $7. What is the cost of one bottle of water?

A) 0.5 $

B) 1 $

C) 1.5 $

D) 2 $