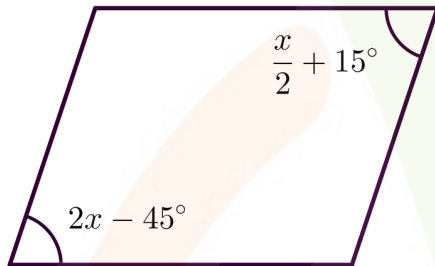# Brainiacs Math Olympiad Preliminary Round Sample Exam Paper 3

Category III – grade 7 and 8

Q1.

In the figure below, two of the internal angles of a parallelogram have been shown. Based on this, find the value of the largest internal angle of this parallelogram.

A)	150°
B)	145°
C)	140°
D)	135°

Q2.

If $x + \dfrac{1}{x} = 5$, what is the value of $x^3 + \dfrac{1}{x^3}$?

A)	110
B)	120
C)	125
D)	140

Q3.

Beatrice's garden produced more fruit than she needed, so she decided to sell some boxes of fruit. In all, 60 oranges and 75 apples were left over. Being an organized girl, Beatrice has decided that the oranges will be distributed equally among the boxes, just like the apples. Since she wants to sell as many boxes as possible, find the total amount of fruit that should be placed in each box.

A)	15
B)	9
C)	5
D)	4

Q4.

Alex, the mascot, is having a party and will give the guests bags of 5 candies each. It is known that Alex has 4 different candy flavors at his disposal (chocolate, strawberry, vanilla, and caramel) and that all candies of the same flavor are identical. Therefore, how many different bags can Alex prepare?

A)	1024

B)   120
C)   75
D)   <mark>56</mark>

Q5.

Robert forgot to pay a bill, and when he remembered, he found that he would have to pay 7% interest on the original amount. Knowing that Robert paid a total of $ 8,025, what was the initial amount of his bill?

a) A.8586.75
b) <mark>B. 7500</mark>
c) C.7463.25
d) D.7200

Q6.

Let a, b, and c be natural numbers that satisfy the equality below. Find $a + b + c$.

$$a + \cfrac{1}{b + \frac{1}{c}} = \frac{47}{21}$$

A)   <mark>11</mark>
B)   12
C)   13
D)   14

Q7.

Andrew needs to climb an 8-step ladder. Since he has large legs, he can do this by climbing 1, 2, or 3 steps at a time. How many ways can Andrew get to the top of the ladder?

A)   8
B)   31
C)   68
D)   <mark>81</mark>

Q8.

In a group of 500 students, 80 are fluent in Spanish, 150 are fluent in English, and 10 are fluent in both languages. If a student is chosen at random, what is the probability that he or she speaks neither Spanish nor English?

A)   <mark>56%</mark>
B)   54%
C)   52%
D)   50%

Q9.

The average grade of boys in a class is 5, and the average grade of girls is 8. If the average grade of all the students in this class is 6.2, what is the percentage of boys in the class?

A)   40%

B)   50%

C)   60%

D)   70%

Q10.

Find the value of x.

$$\frac{8x - 11}{x + 2} = 5$$

A)   7

B)   8

C)   11

D)   12

Q11.

Three men build 5 walls in 2 days. How many men are needed to build 90 walls in 12 days?

A)   9

B)   12

C)   15

D)   24

Q12.

Find the value of the expression below.

$$\sqrt{26 + 15\sqrt{3}} - \sqrt{26 - 15\sqrt{3}}$$

A)   5

B) $5\sqrt{2}$

C) $2\sqrt{5}$

D)   2

Q13.

Daniel is playing the " Primes Challenge". In this game, he must speak aloud the natural numbers, in ascending order, starting with 1. However, this game has a peculiar rule: he cannot speak prime numbers and must clap his hands on their turn. If Daniel just clapped his hands for the 25th time, how many multiples of 7 did he utter out loud?

A)   10

B)   11

C)   12

D)   13

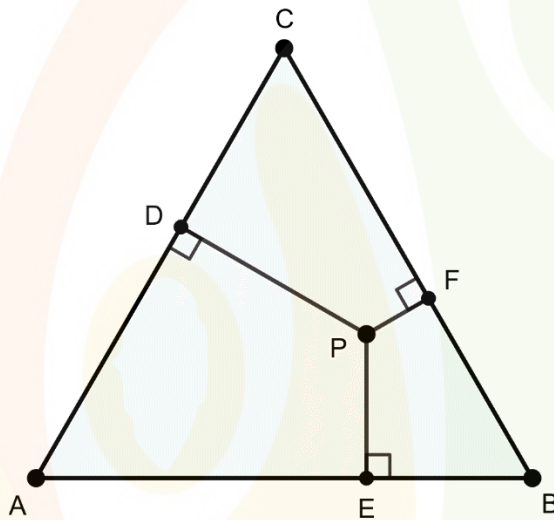**Q14.**

Three vertices of a rectangle are given by the points (2, 4), (7, 1), and (7, 4) on the Cartesian plane. Find the sum of the coordinates of the other vertex of this rectangle.

A) 1
B) 2
C) 3
D) 4

Q15.

In the figure below, triangle ABC is equilateral, $DP = 3, EP = 2, FP = 1$ and the angles marked are right angles. Find the height of the triangle ABC.

A) 4
B) $4\sqrt{3}$
C) 6
D) $6\sqrt{3}$

Q16.

Ann will take a test with 25 multiple-choice questions. The scoring of the test works as follows: all students start with 25 bonus points, get 4 points for a correct answer, lose 1 point for an incorrect answer, and get 0 points for an answer left blank. If Ann had a score of 94, how many questions did she leave blank?
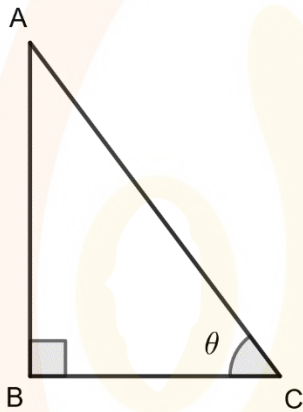
A) 1
B) 2
C) 3
D) 4

Q17.

A horse is tied to the corner of a fence by an 8 meter long rope that can slide freely. The fence is a rectangle, 6 meters by 9 meters, and keeps the horse on the outside. What is the size, in square meters, of the area through which the horse can move? Use $\pi = 3$.

    a) A.51
    b) B.150
    c) C.151
    d) D.154

Q18.

Consider the right triangle ABC below. It is known that the sine of angle θ is equal to $\dfrac{12}{13}$ and the cosine of that same angle equals the irreducible fraction $\dfrac{x}{y}$. Find the value of $y - x$.

A

B   C

    a) 4
    b) 8
    c) 12
    d) 16

Q19.
Louis and Mary have $85 together, Mary and Noah have $103 together, and finally Noah and Louis have $122 together. How much money do they have in total?

    a) 135

    b) 145

    c) 155

    d) 165

Q20.

Knowing that $n! = n \bullet (n - 1) \bullet (n - 2) \bullet \ldots \bullet 2 \bullet 1$, find the number of zeros at the end of $20!$

    a) 4

    b) 6

    c) 7

    d) 9