YOUNG MASTER CHALLENGE

SAMPLE QUESTIONS FOR MATHS COMPETITION

AGE CATEGORY: BUMBLE BEE (16-18 Years old)

Question 1 *(2 marks)*

Three different containers contain 496 litres, 403 litres and 713 litres of mixtures of milk and water respectively. What is the biggest measure that can measure all the different quantities exactly?

 a) 1 litre

 b) 7 litres

 c) 31 litres

 d) 41 litres

Question 2 *(2 marks)*

Which one of the following is not a factor of $x^3 + 16x^2 + 69x + 54$?

 a) $x + 1$

 b) $x + 3$

 c) $x + 6$

 d) $x + 9$

Question 3 *(3 marks)*

How many positive integers satisfy the following inequality?

$$1 + \sqrt{n^2 - 9n + 20} \ > \ \sqrt{n^2 - 7n + 12}$$

 a) 1

 b) 2

 c) 3

 d) 4

Question 4 (3 marks)

How many prime numbers, p satisfies that $|p^4 - 86|$ is also a prime number?

     a) 0

     b) 1

     c) 2

     d) 3

Question 5 (3 marks)

How many coefficients of the polynomial $(x + 1)^{65}$ cannot be divided by 65?

     a) 20

     b) 18

     c) 16

     d) 3

Question 6 (3 marks)

A plane takes off from Airport A, flies 200km due north, then turns on a bearing of 150° and flies a further 300km due south-west before landing at Airport B. Given that Cos 30°= 0.87 and Sin 30° = 0.5, how far is airport A from airport B in a straight line?
Give your answer correct to the nearest kilometre.

     a) 500km

     b) 180km

     c) 160km

     d) 120km

Question 7 *(3 marks)*

14 students are put in line randomly regardless of their height.
By changing the place of two students standing next to each other at every step,
how many steps does it take to put all students in order of height?

    a) 52

    b) 45

    c) 42

    d) None of them

Question 8 *(3 marks)*

Solve the following: $xy = 64$

    $\log_x y = 2$

    a) x=4 , y=16

    b) x=2 , y=32

    c) x=1 , y=64

    d) x=1 , y=2

Question 9 *(3 marks)*

Each of the 100 students in a school have sent text messages to the 50 students they have chosen.
What is the minimum number of student pairs who have mutually exchanged text messages?

    a) 100

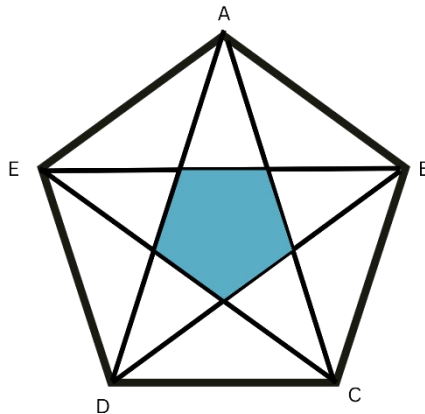   b) 75

    c) 50

    d) 25

Question 10 (5 marks)

What is the ratio of the ABCDE regular pentagon to the area of the pentagon which sits on the sides AC, CE, EB, BD, DA?

a) $\dfrac{41}{6}$

b) $\dfrac{3+5\sqrt{5}}{2}$

c) $4+\sqrt{5}$

d) $\dfrac{7+3\sqrt{5}}{2}$

Question 11 (5 marks)

If A,D,B is collinears,
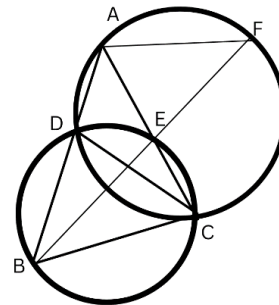
A,E,C is collinears and F,E,B is collinears,

where |AD|=4 and |BD|=8, what is |AF|=?

a) $\sqrt{3}$

b) $2\sqrt{6}$

c) $\sqrt{6}$

c) None

Question 12 (5 marks)

For which value of m, there is no integer pair of (x,y) satisfying the equation
$3x^2 - 10xy - 8y^2 = m^2$

a) 7

b) 6

c) 5

d) 4