INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

IIUM Mathematics Competition (IMC 2011)

Preliminary Stage

MULTIPLE CHOICE QUESTIONS

This Question Paper Consists of 5 Printed Pages with 20 Questions

Department of Computational and Theoretical Sciences
Kulliyyah of Science

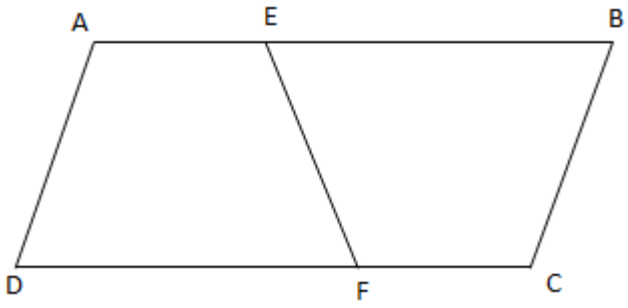
1. For what values of the constant a , does the equation $ax^2 + 2x = 1$ have single real solution?

(A) 1 (B) -1 (C) 0 and 1 (D) -1 and 0 (E) 0

2. For what value of the constant k does the system of equations $2x - y = 4$ and $6x - 3y = 3k$ have an infinite number of solutions?

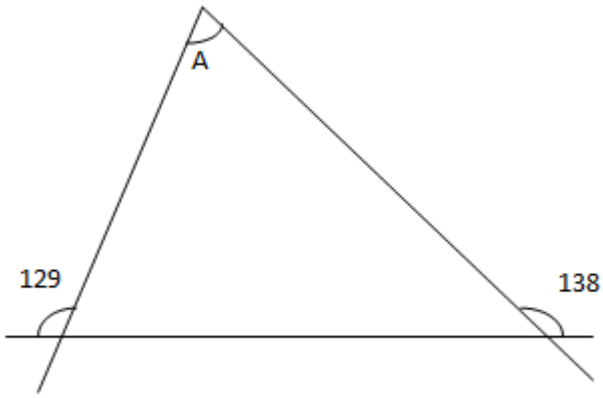
(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

3. ABCD is a parallelogram such that AB is parallel to DC and DA parallel to CB. The length of side AB is 20cm. E is a point between A and B such that the length of AE is 3 cm. F is a point between points D and C. Find the length of DF such that the segment EF divide the parallelogram in two regions with equal areas.



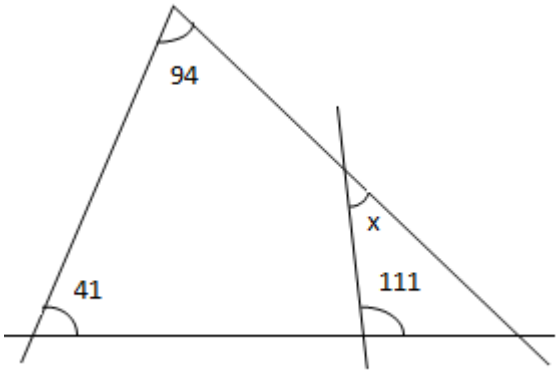
(A) 17 (B) 16 (C) 15 (D) 14 (E) 13

4. Find the measure of angle A in the figure below.



(A) 129 (B) 138 (C) 9 (D) 133.5 (E) 87

5. Find the size of angle x in the figure.



(A) 24 (B) 34 (C) 43 (D) 47 (E) 45

6*. The faces of a cube are labeled with different positive integers such that the numbers of any two adjacent faces differ by at least two. Find the minimum value of the sum of all six numbers.

(A) 25 (B) 26 (C) 27 (D) 28 (E) 29

7*. Each of the numbers 1, 2, 3, …, 25 is written into a square in a 5×5 table, such that the numbers in each row are in increasing order. Find the maximum value of the sum of the numbers in the third column.

(A) 85 (B) 84 (C) 82 (D) 80 (E) 78

8. In how many ways can 2011 be expressed as the sum of one or more consecutive integers?

(A) 5 (B) 4 (C) 3 (D) 2 (E) 1

9*. Δ ABC is an equilateral triangle and P is a variable point on the same plane such that ΔPAB, ΔPBC, and ΔPCA are isosceles triangles. In how many different positions can P lie?

(A) 0 (B) 4 (C) 6 (D) 10 (E) 12

10*. Find the last two digits of the integer $2^{2010}(2^{2011}-1)$ in base 10.

(A) 48 (B) 38 (C) 28 (D) 18 (E) 08

11. Let 28A9B be a five-digit positive integer with pairwise different digits and $A \neq 0$. If the remainder when it is divided by 9 is 7 and the remainder when it is divided by 5 is 1, find A-B.

(A) 6 (B) 5 (C) 4 (D) 3 (E) 2

12. Let on the set of positive integer numbers the operations "*" and "Δ" are defined as follows: $x*y = x^y$ and $x\Delta y = x+y$. If $a*(a\,\Delta 1)=81$, find a.

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

13.If a an integer, which of number given below is an even?

A) a-1 (B) a^2+1 (C) a^2+a (D) a^2-2a+1 (E) a^3

14. If $0 < x < y$ then which of given below inequalities is wrong?

(A) $\frac{x-y}{y} < 0$ (B) $\frac{y-x}{x} > 0$ (C) $\frac{x-y}{y} < 1$ (D) $\frac{x+y}{y} > 1$ (E) $\frac{x+y}{x} < 1$

15. If $\frac{10x-5}{x^2-4x-5} = \frac{A}{x-5} + \frac{B}{x+1}$, then A-B is equal to

(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

16. If $\frac{x^2+ax+b}{x^2+11x+28} \cdot \frac{x^2+4x-21}{x^2-9} = \frac{x+2}{x+3}$, find the sum $a+b$.

(A) 12 (B) 14 (C) 16 (D) 18 (E) 20

17*. In Δ ABC , AB=AC=12, P is a point on BC such that AP=8. Find PB× PC.

(A) 40 (B) 50 (C) 60 (D) 70 (E) 80

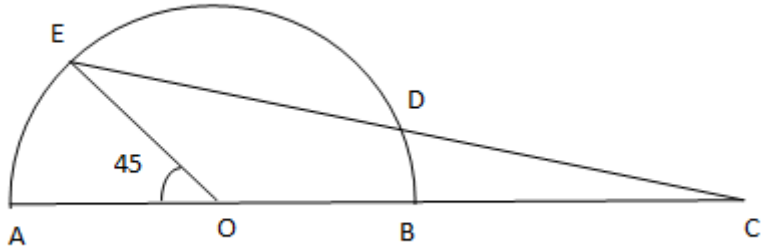
18. If $a+b=1$ and $a^3+b^3=\frac{7}{16}$, find $a\cdot b$

(A) $\frac{1}{32}$ (B) $\frac{3}{16}$ (C) $\frac{1}{8}$ (D) 1 (E) 2

19. If $x<0<y$, then $\frac{3|x-y|}{|y+|x||}$ is equal to

(A) $-3x$ (B) $-3y$ (C) $3(x+y)$ (D) -3 (E) 3

20. Let [AB] be a diameter of a circle centered at point O, E and D are on the circle and C is intersection point of lines AB and ED. If |AO|=|DC| and $\angle$ EOA =45° find $\angle$DCO.



(A) 10 (B) 15 (C) 20 (D) 25 (E) 30

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