FEMSSISA MATHEMATICS OLYMPIAD: Grade 8 - 12

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MATHEMATICS OLYMPIAD GRADE ELEVEN

DATE: 5 AUGUST 2025

TIME: 90 MINUTES

INSTRUCTIONS:

1. This booklet has 15 multiple choice and 5 open ended questions.
2. Use the answer sheet provided.

   Circle the letter corresponding to your answer.
3. All working details must be done in the space provided.
4. Calculators are not permitted.
5. Diagrams are not necessarily drawn to scale.
6. The first 15 problems carry 1 mark each and the next 5 carry 2 marks each.
7. You have 90 minutes for the paper which works out to an average of 4.5 minutes per question.
8. Read the questions carefully before answering.
9. Visit the website: www.saolympiads.co.za.

ENJOY THE OLYMPIAD

1. For what real value of x is E undefined?

$E = \frac{2x}{x^2-4}$

(A) x = 2 (B) x = -2 (C) x=2 or x =-2 (D) $x \leq -2$

2. Simplify:

$\frac{2x^2-7x+6}{x^2+3x} \times \frac{x^2-9}{2x^2-9x+9}$

(A) $\frac{x+3}{2}$ (B) $\frac{x-2}{x}$ (C) $\frac{x+2}{x}$ (D) $\frac{x-3}{x}$

3. Determine the distance AB if: A(2; -3) and B(7; 9)

(A) 5 (B) 10 (C) 12 (D) 13

4. The number (1050 + n) is divisible by 5; 13 and 17. Find the smallest value of 'n'.

(A) 65 (B) 60 (C) 55 (D) 50

5. Without using a calculator evaluate:

$\frac{sin240^0}{tan120^0 x\, cos300^0}$

(A) 1 (B) $\frac{\sqrt{3}}{2}$ (C) $-\frac{\sqrt{3}}{2}$ (D) -2

6. Solve for x: $(2x^2+1)^2 - 12(2x^2+1) + 27 = 0$

(A) $\pm 1\ only$ (B) $\pm 1;\ \pm 2$ (C) $1;\ 2\ only$ (D) $\pm 2 only$

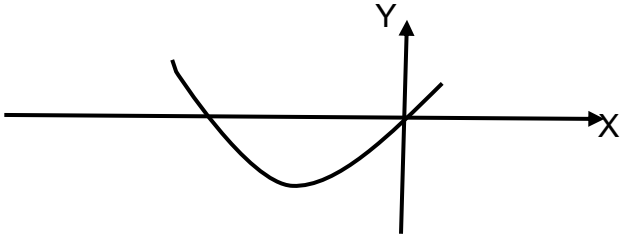
7. 4000 coins was divided equally among a certain number of persons. If 10 more people shared this amount, then each one would receive 20 less. How many people are in the initial group?

(A) 25 (B) 35 (C) 40 (D) 50

8. $\frac{\cos x}{1-\sin x} + \frac{\cos x}{1+\sin x} = \cdots \ldots$

(A) $\frac{2}{\sin x}$ (B) $\frac{2}{\cos x}$ (C) $\frac{-2}{\sin x}$ (D) $\frac{-2}{\cos x}$

9. The graph A below is defined by $y = x^2 + 4x + 4$. The equation of the graph which is reflected about the Y-axis and is translated 2 units vertically downwards is…



(A) $y = x^2 - 4x + 2$ (B) $y = x^2 + -4x$ (C) $y = x^2 - 4x + 4$ (D) $y = x^2 + 4x + 4$

10. What is the value(s) of x where $\sqrt{2x-3} + \sqrt{2x+5} = 4$
(A) 2 or -2 (B) 6 (C) 2 (D) -2

11. What is the 50th term of the series if the n-th term is $\frac{1}{an^2+bn+c}$?
$\frac{1}{6} + \frac{1}{10} + \frac{1}{15} + \frac{1}{21} + \cdots$..
(A) $\frac{1}{1578}$ (B) $\frac{1}{1478}$ (C) $\frac{1}{1400}$ (D) $\frac{1}{1378}$

12. The roots of $ax^2 + bx + c = 0$ are $3+\sqrt{19}$ and $3-\sqrt{19}$. The value of a + b+ c is….
(A) 15 (B) -15 (C) 16 (D) 18

13. The equation of $l_1: (k-1)y = (2-k)x + 4$
For what values of k will l_1 be parallel to the X-axis?
(A) -2 (B) -1 (C) 2 (D) 1

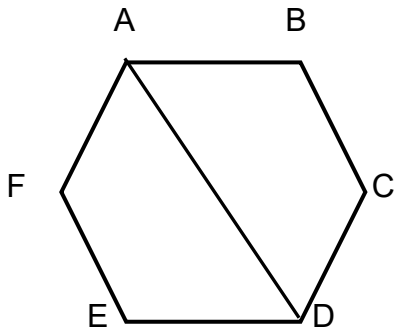
14. Solve for x:

$$\frac{3}{4-x} \geq 2$$

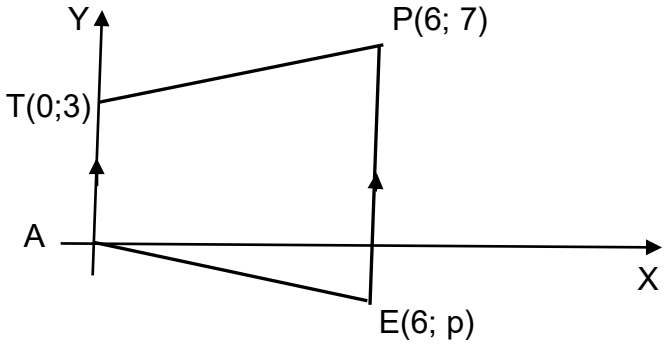
(A) $\frac{5}{2} \leq x < 4$ (B) $\frac{5}{2} \leq x \leq 4$ (C) $x \geq \frac{5}{2}$ (D) $x \leq \frac{5}{2}$ or $x \geq 4$

15. Consider:
10 12 14
16 18 20 22
24 26 28 30 32
……
Determine the middle term of the 25th row.
(A) 676 (B) 698 (C) 702 (D) 732

16. In the following regular hexagon AD = 24cm. Determine the area of ABCDEF in cm^2.



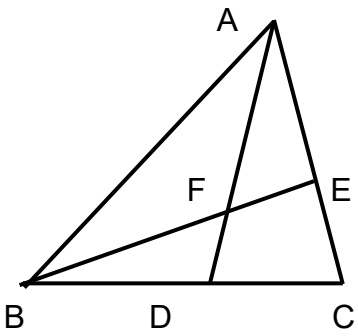
17. In the figure below TAEP is a trapezium with TA | | PE.



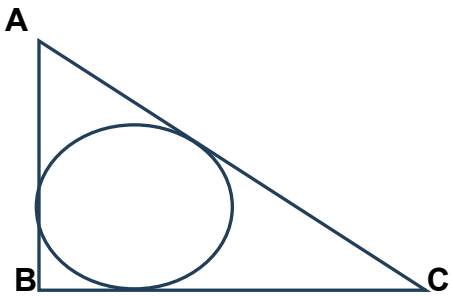
If the area of TAEP is 39 cm^2, then determine the value in cm of 'p'.

18. Five plastic digits 2;4;5;8;9 is used to make 4 digit numbers which are divisible by 4. What is the probability that a randomly selected 4 digit number is divisible by 4?

19. In the adjacent triangle, F divides AD in the ratio 2:1. E divides AC in the ratio 1:1. BE intersects AD at F. Determine the ratio of BD:DC.



20. A circle is inscribed in ΔABC as shown below. If the AB; BC and AC measure 5; 12 and 13 respectively then determine the radius of the circle.



MARKS: 1-15: 15 X 1 = 15
16-20: 5 X 2 = 10
TOTAL = 25