FEMSSISA MATHEMATICS OLYMPIAD: Grade 8 - 12

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MATHEMATICS OLYMPIAD GRADE TEN

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.

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1. Simplify:

   $(-2xy)^3 \times \sqrt{25x^4y^2}$

   (A) $-40x^5y^4$ (B) $24x^3y^4$ (C) $12x^3y^4$ (D) $-36x^3y^4$

2. Simplify:

   $$\frac{15x^2 - 4x - 3}{9x^2 - 1}$$

   (A) $\frac{x-2}{3x+1}$ (B) $\frac{5x+3}{3x-1}$ (C) $\frac{5x-3}{3x-1}$ (D) $\frac{5x-3}{3x+1}$

3. Solve for x and y:

   $2x + 3y = -3; -4x - 5y = 7$

   (A) (6;-3) (B) (-3;1) (C) (5;3) (D) (5;-3)

4. The equation of the line perpendicular to x -2y + 4 = 0 and passing through P(2; -3) is…

   (A) y = 2x +1 (B) y = -2x - 1 (C) y = -2x + 1 (D) y = -3x + 1.

5. The graph of $y = \frac{x-a}{x-b}$; passes through (1;-1). Determine a + b.

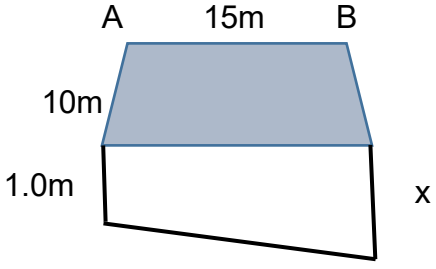
   (A) 2 (B) 3 (C) -3 (D) -2

6. Solve for x:

   $$\frac{3x+2}{x+2} = \frac{4x-2}{x+1}$$

   (A) $2\ only$ (B) $3\ or -2$ (C) $-3\ only$ (D) $-3\ or\ 2$

7. A rectangular swimming pool has dimensions measuring 15m by 10m. The shallow end is 1.0 m and **x** m in the deep end. The cross section is a trapezium. If the capacity of the pool is 210 kl then determine the value of '**x**' in metres.



   (A) 1.5 (B) 1.6 (C) 1.8 (D) 1.9

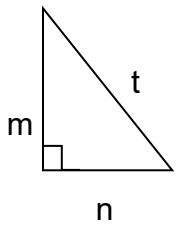
8. 80000 tickets for a soccer match were sold at R300 and R600 each.
The revenue realized was R33 million. How many R300 tickets were sold?

(A) 50000 (B) 55000 (C) 60000 (D) 65000

9. If T = $2\pi\sqrt{\frac{M}{K}}$ then K =.....

(A) $\frac{\pi^2.M}{T^2}$ (B) $\frac{4\pi^2.M}{T^2}$ (C) $\frac{4\pi^2.M}{T}$ (D) $\frac{4\pi^2.}{T^2}$

10. In the right-angle triangle alongside, m - n = 7 and t = 13. Calculate the area of the triangle in square units independent of m and n.



(A) 45 (B) 40 (C) 36 (D) 30

11. Write in its simplest form:

$$\frac{3}{(2x+1)(2x-1)} - \frac{3}{x(1-2x)} + \frac{3}{x(2x+1)}$$

(A) $\frac{3}{(2x+1)(2x-1)}$ (B) $\frac{15}{(2x+1)(2x-1)}$ (C) $\frac{15}{x(2x+1)}$ (D) $\frac{3x}{(2x-1)}$

12. Evaluate: $73^2 - 71^2 + 69^2 - 67^2 + 65^2 - 63^2 + \ldots + 5^2 - 3^2$

(A) 2736 (B) 1368 (C) 2700 (D) 2780

13. Evaluate: $36\frac{3}{4} \times 19\frac{1}{9}$

(A) 702 (B) $702\frac{2}{3}$ (C) $702\frac{1}{3}$ (D) $700\frac{1}{3}$

14. Write down the ordered pair (x;y) which is the common solution of both equations:

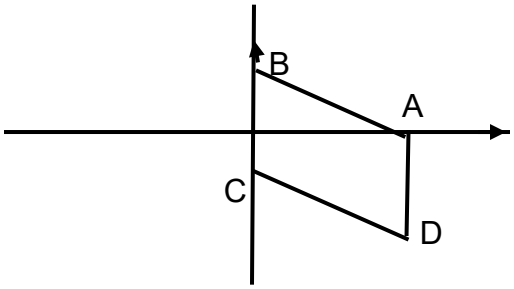
$$\frac{-4}{2x-1} + \frac{2}{5y+1} = 2 \text{ and } \frac{2}{2x-1} + \frac{-3}{1+5y} = 1$$

(A) $(-1; \frac{-2}{5})$ (B) $(0; \frac{-2}{5})$ (C) $(\frac{1}{5}; \frac{-2}{5})$ (D) $(0; \frac{2}{5})$

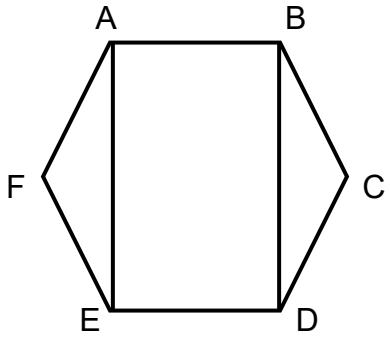
15. A bag has 10 white discs and x red discs. Disc one was chosen at random and not replaced. Disc two was chosen at random. If the probability of choosing 2 red discs is $\frac{2}{21}$ then determine the value of x.

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

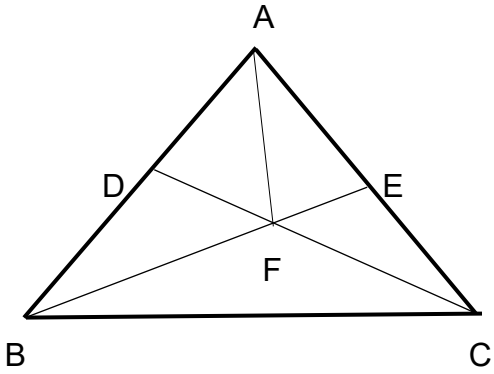
16. B and C are the y-intercepts and A is the x-intercept of rhombus ABCD. The equation of AB is y = $\frac{-3}{4}$x + 3 and the coordinates of C(0; -2). Determine area of ABCD.



17. In the following regular hexagon ABCDEF, the AD = 12cm, Determine the area of ABCDEF in cm^2.



18. In Δ ABC , D and E are points on AB and AC respectively. CD and BE meet at F such that BF:FE = 5:3 and AE:EC = 3:2 . If the area of $\Delta AFB = 65cm^2$ then determine the area of ΔEFC in cm^2



19. Two cyclists, each cycling at their own constant speeds around a cycling track complete one lap in 15 minutes and 10 minutes respectively travelling in opposite directions. If they start together from the same starting point and in the opposite directions then how many times will they pass each other in 2 hours?

20. Two candles of equal lengths start burning at the same time. One of the candles burns down in 8 hours whilst the other burns in 6 hours. How long must both candles burn such that one candle is twice the length of the other candle?

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