FEMSSISA MATHEMATICS OLYMPIAD: Grade 8 - 12

E-mail : Maths@saolympiads .co.za website: www.saolympiads .co.za

MATHEMATICS OLYMPIAD GRADE NINE

DATE: 5 AUGUST 2024 – 8 AUGUST 2024

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.

Grade Nine Mathematics Olympiad

1. Factorize: $x^2 - 4x - 12$

   (A) (x+6)(x-2) (B) (x+6)(x+2) (C) (x-6)(x-2) (D) (x-6)(x+2)

2. Convert 80 000 metres in 40 minutes to km/h.

   (A) 120 (B) 130 (C) 140 (D) 150

3. The product of $(2x - 3y)(4x^2 + 6xy + 9y^2)$ is …

   (A) $8x^3 + 27y^3$ (B) $8x^3 - 27y^3$ (C) $8x^3 - 12xy - 27y^3$ (D) $8x^3 - y^3$

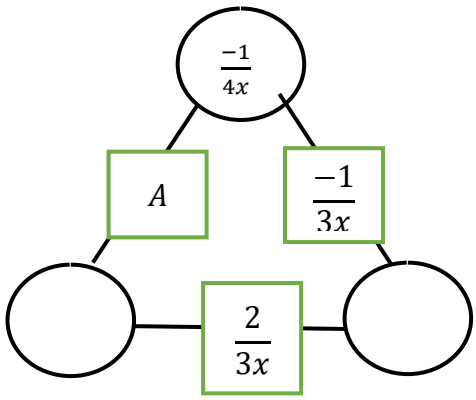
4. The table below shows the relationship between x and y which is in the form: y = mx +c. The equation is …

x	-2	2
y	4	2

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

5. Determine the product: $(5x - 2y)^2$

   (A) $25x^2 - 10xy + 4y^2$ (B) $25x^2 + 20xy + 4y^2$ (C) $25x^2 - 20xy + 4y^2$ (D) $25x^2 - 4y^2$

6. 

   In the above game the sum of the two expressions in the 2 circles gives the expression in the square between them. Determine A in terms of x.

   (A) $\frac{1}{6X}$ (B) $\frac{1}{4X}$ (C) $\frac{1}{3X}$ (D) $\frac{1}{2X}$

7. Give the value of (1-4n)(2-3n)(n+4) if n = -3.

(A) 143 (B) 125 (C) 120 (D) 112

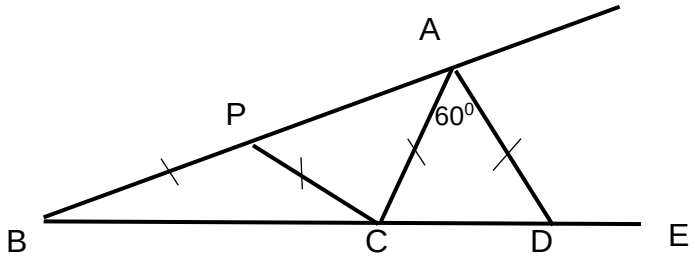
8. The sum of five consecutive even numbers with a common difference of 4 is 5p + 40. The smallest number in terms of 'p' is…

(A) p-4 (B) p+4 (C) p (D) p+8

9. What is the value of: 4026x4026 – 4023 x 4029?

(A) 10 (B) 9 (C) 8 (D) 7

10.



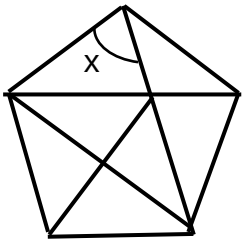
In the above figure PB = PC = AC = AD. $B\hat{C}P$ = x and $C\hat{A}D$ = 60^0
Determine the measurement of x.

(A) 28^0 (B) 24^0 (C) 20^0 (D) 15^0

11. If (x- 3) is the factor of $3x^2 + (4- p)x – 3$ then find the value of p ?

(A) 12 (B) 15 (C) 18 (D) 21

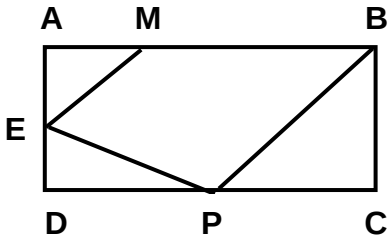
12.



In the above figure which is a regular pentagon the measurement of x is…….

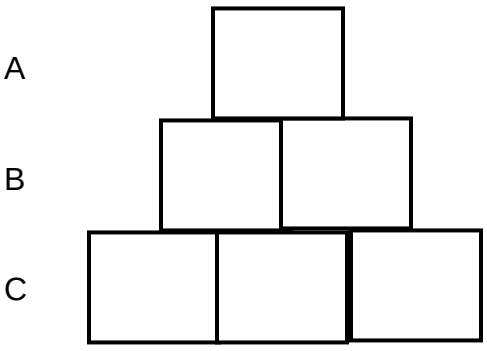
(A) 54^0 (B) 60^0 (C) 72^0 (D) 84^0

13. Rectangle ABCD has M on AB such that MB is five times AM. E is the midpoint of AD and P is the midpoint of DC. If the area of MEPB = 420cm^2 then find the area of ABCD in cm^2.



(A) 720 (B) 660 (C) 640 (D) 600

14. 1; 2; 3; 8; 5; 4 are placed in the boxes to make the numbers A; B and C such that A + B = 43; B + C = 249. What is the value of A + B + C?



(A) 277 (B) 267 (C) 257 (D) 252

15. How many different natural numbers can n have such that M is a natural number?

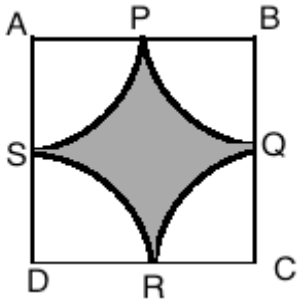
$$M = \frac{12n+84}{3n+1}$$

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

16. Tim used 9 plastic digits 1; 2; 3; 4; 5; 6; 7; 8; 9 to make 2 digit numbers. 3 cannot be used as a ten's digit and 9 cannot be used as a units digit. How many such 2 digit numbers can be constructed?

17. Many numbers from 200 to 400 have two consecutive digits being the same. 111 is not but 110 is.
How many such numbers are there?

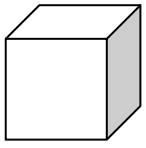
18. Determine the area of the shaded region if one side of the square is 14cm. P;Q;R and S are midpoints of the sides of the squares. Use $\pi = \frac{22}{7}$.



19. Find the sum of the numbers in the 18th bracket for this arithmetic sequence.

(7;9;11); (13 ;15; 17; 19); (21;23; 25; 27; 29); ...

20. A rectangular container has a rectangular base with its height being 2 times the length of the base. The width of the base is 10cm. The surface area of this closed container is 736 cm^2.Calculate the capacity of this container in $ml\ if\ 1cm^3 = 1ml$



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

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