SOUTHERN AFRICAN JUNIOR MATHEMATICS OLYMPIAD FEMSSISA

GRADE9

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DATE: 15 – 19 AUGUST 2022

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 one 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 websites: www.saolympiads.co.za.

Grade Nine Mathematics Olympiad 2022

1. If 60% of the items is 1800 then what is 20% of the items?

   (A) 560 (B) 600 (C) 640 (D) 680

2. If $(2x^2 - px - 1)(x - 3) = 2x^3 - 3px^2 + 5x + 12$ then find the value of p?

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

3. Three friends Amy; Beatrice and Candy decided to donate a property to a children's foundation. Amy owned 360 hectares; Beatrice owned 168 hectares and Candy owned 216 hectares of land from their inheritance. Each one's number is a product of 2 numbers, and one was common. Determine the highest common number of all 3?

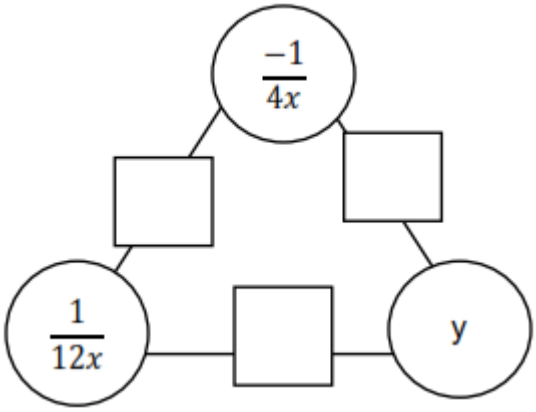
   (A) 24 (B) 27 (C) 30 (D) 33

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

x	-6	3
y	0	6

(A) $y = \frac{1}{6}x + 1$ (B) $y = \frac{2}{3}x + 2$ C) $y = \frac{1}{3}x + 5$ (D) $y = \frac{2}{3}x + 4$

5.



In the above game the sum of the two expressions in the 2 circles gives the expression in the square between them. The sum of the expressions in the 3 squares is $\frac{-1}{3x}$. Determine y in terms of x.

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

6. The product of $(5x + y)(25x^2 - 5xy + y^2)$ is …

(A) $125x^3-y^3$ (B) $125x^3+y^3$ (C) $25x^3+y^3$ (D) $125x^3-10x^2y+10xy^2+y^2$

7. The sum of three consecutive even numbers with a common difference of 2 is $\frac{p+1}{2}$. The smallest number in terms of 'p' is…

(A) $\frac{p-11}{6}$ (B) $\frac{p+11}{6}$ (C) $\frac{p-6}{6}$ (D) p – 11

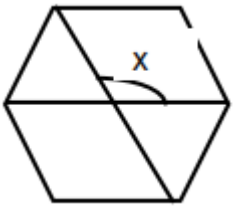
8. What is the value of: 5407 x 5403 – 5402 x 5408 ?

(A) 7 (B) 6 (C) 5 (D) 4

9. If a – b = 6; b – c = 10 and a + c = 16 then find a+b+c.

(A) 30 (B) 28 (C) 26 (D) 24

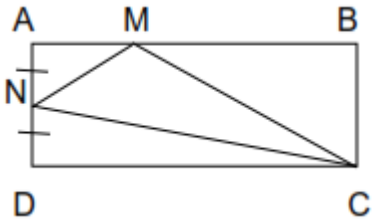
10.



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

(A) 105^0 (B) 108^0 (C) 120^0 (D) 135

11. Rectangle ABCD has M on AB such that MB is thrice AM. N is the midpoint of AD. If the area of $rectangle\ ABCD = 120cm^2$ then find the area of ΔMNC in cm^2.



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

12. 4 different digits x;4; 6;y are used to make 2 digit numbers with different digits. If the sum of all such 2 digit numbers is 627 then find $2x + y$.

(A) 12 (B) 10 (C) 8 (D) 6

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

$$\mathbf{M} = \frac{6n+18}{2n+1}$$

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

14. In a group of 4 learners each one has trumpet. In how many different ways can 2 learners take the wrong trumpet home?

(A) 4 (B) 5 (C) 6 (D) 9

15. Four plastic digits 2;4; 6; 8 are used to construct 3 digit numbers such that 4 cannot be the 3rd digit. How many different combinations are there?

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

16. The production of a company decreased by 15% in 2020. After 2 years the production increased by 20%. The net increase of production was 400 units. What was the production in units before 2020?

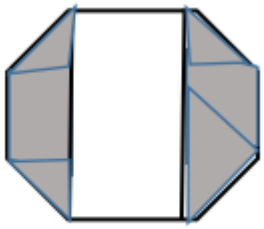
17. A group of 20 learners scored a mean mark of 60% for a test. Another group of 25 learners scored a mean mark of n%. The mean mark of all 45 learners was 70%. What was the mean mark of the 25 learners?

18. What is the first time after 6 o' clock when the angle between the minute hand and the hour hand is 40^0?

19. Find the sum of the numbers in the 10th bracket for this arithmetic sequence.

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

20. If the area of the non-shaded region of a regular octagon is $(36 + 36\sqrt{2})$ cm^2 then determine the perimeter of the octagon in cm^2.



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