SOUTHERN AFRICAN JUNIOR MATHEMATICS OLYMPIAD

FEMSSISA
(SAJMO)
GRADE EIGHT
FINAL ROUND
DATE: 10 OCTOBER 2019
TIME: 120 MINUTES

Instructions:

1.   **This booklet has 20 questions.**

2.   **Use the answer sheet provided.**

        Write the answer in the block provided

3.   **All working details must be done in the space provided.**

3.   **Calculators are not permitted.**

4.   **Diagrams are not necessarily drawn to scale.**

5.   **The first 15 problems carry one mark each and the next 5 carry 2 marks each.**

 6.   **You have 120 minutes for the paper which works out to an average of 6 minutes per question.**

7.   **Read the questions carefully before answering.**

Visit the website: www.femssisa.org.za

FEMSSISA Grade 8 Final Round

1. **In the following addition problem find A + B + C if each digit is different**

    ```
        A  B  C
        A  B  C
           B  C
      10  3  4
    ```

2. **Write down the expression that 'a' stands for:-**
   $6x^3 + 12x^2 y - 24xy^2 = a(x^2 + 2xy - 4y^2)$

3. If $a + 2b = 20$; $a + 2c = 12$ then find the value of $b - c$.

4. Find the value of $\dfrac{x^2 - 6x + 8}{x - 2}$ when x = 4 ?

5. Find the sum of the digits of

   $(\underbrace{888\ldots888}_{\text{20 digits}} \times \underbrace{666\ldots666}_{\text{21 digits}}) \div (\underbrace{111\ldots111}_{\text{20 digits}} \times \underbrace{222\ldots222}_{\text{7 digits}})$

6. Evaluate

   $24\dfrac{7}{8} \times 15\dfrac{5}{8}$

7. If the sum of half an angle's supplement and half its complement is 105^0 then find the angle.

8. An ant travels alongside a regular hexagon with side measuring 3m and always keeping 1 m from the side of the hexagon. What distance would the ant have travelled when it returns to the original position?

9. Find the value of:-
    149 -145+141-137+..........+ 21 - 17.

10. Given $\dfrac{3}{a} + \dfrac{2}{b} = \dfrac{1}{2}$ such that a:b = 3:4 then find the value of a x b.

11. **When an odd natural number is added to 1 it becomes a perfect square. When this odd natural number is added to 29 it becomes a perfect cube. What is this number which is the smallest?**

12. What is the smaller angle between the hour hand and the minute hand of an analogue clock when the time is 5.15 pm

13. In how many different ways can R10 be obtained from R5; 20c and 50c coins?

14. For what integral value of n will the following expression have the lowest positive integral value?

$$\frac{3n+24}{n+3}$$

15. The area of the rhombus is 96 cm^2. The shorter diagonal is 4cm more than half the longer diagonal. Find the length of one side of the rhombus.
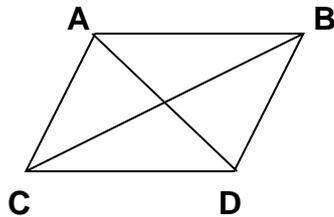
16. What is the maximum number of lines of symmetry does the figure below have if A and B can be attached to create different figures?

17. Two fractions x and y are placed between $\frac{1}{8}$ and $\frac{7}{16}$ such that the difference between x and $\frac{1}{8}$ is twice the difference between y and $\frac{7}{16}$. If $x + y = \frac{5}{8}$ then find x

18. 125 one cm cubes with all red faces are used to form one large cube. Five faces of the large cube are painted white. These cubes were then dismantled. How many cubes have 2 red faces?

19. 8 litres of a 25 litre container has 45% concentrate. How many litres of water must be added so that the mixture has 70% water?

20. Evaluate.
$$\frac{1}{3x5} + \frac{1}{5x7} + \frac{1}{7x9} + \cdots . + \frac{1}{31x33}$$

TOTAL: 15 x 1 = 15
5 x 2 = 10

| 25 |

SOUTHERN AFRICAN JUNIOR MATHEMATICS OLYMPIAD

FEMSSISA
(SAJMO)
GRADE NINE
FINAL ROUND
DATE: 10 OCTOBER 2019
TIME: 120 MINUTES

Instructions:

4.   **This booklet has 20 questions.**

5.   **Use the answer sheet provided.**

        Write the answer in the block provided

6.   **All working details must be done in the space provided.**

6.   **Calculators are not permitted.**

7.   **Diagrams are not necessarily drawn to scale.**

8.   **The first 15 problems carry one mark each and the next 5 carry 2 marks each.**

 6.   **You have 120 minutes for the paper which works out to an average of 6 minutes per question.**

7.   **Read the questions carefully before answering.**

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FEMSSISA Grade 9 Final Round -2019

1. Which one of the following numbers is not divisible by 33?

   3135; 2915; 3333; 3434

2. $P = 8x^2 + tx - 3$. For what value of t is (2x - 3) a factor of the expression P?

3. Find the sum of the digits of the product 1 111 x 4 444

4. Give the largest natural number 'n' such that M is a natural number.

   $M = \dfrac{6n+15}{2n-1}$

5. If $(2x^2 - mx + 2)(x + m) = 2x^3 + 3x^2 - 7x + 6$ then find the value of m.

6. A man is 8 years older than his wife. 10 years ago his wife would have been half his current. In 8 years' time his wife will be the same as the husband is today.

7. Three numbers are such that the difference between any two numbers is 5; 7 and 11. If the sum of these numbers is 47 then find the largest number.

8. If $(t - \frac{1}{2t})^2 = 4$ then find the value of $t^2 + \frac{1}{4t^2}$

9. If $\frac{5}{26} = 0.\dot{1}92307\dot{6},$ then determine the 60th digit after the decimal point.

10. Write down the unit's digit of the following problem.

    $2(6^{16} + 11^{16} + 9^8)$

11. Write down (m + n) if $y = \dfrac{mx-4}{nx+2}$ passes through (1;-1) and (-2; $\frac{-5}{2}$)

12. b is smaller than a but greater than d. d is bigger than c but smaller than e. a is smaller than e. Which is the second largest number?

13. An athletics' team has 3 sprinters and 4 field event athletes. In how many ways this team can be selected if there are 4 sprinters and 5 field event athletes?

14. The population of Peacevale increased by 15% in 2013. After 5 years the population decreased by 10%. The net increase of the population was 7 000. What was the population of Peacevale before 2013.
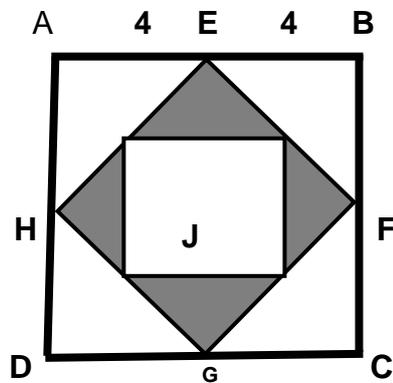   what was the initial number of fish in the tank.

15.

10x
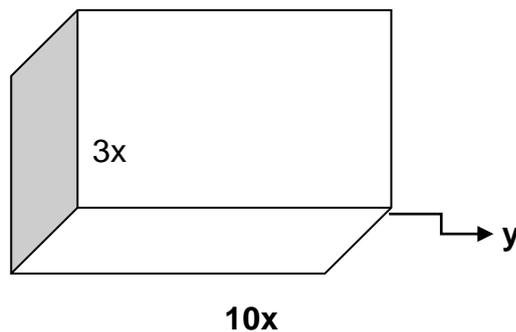
A rectangular prism has dimensions 10x units by y units by 3x units.
The surface area of this prism is 216x² square units.
Find y in terms of x.

16. A 2 digit number can be written as n times the sum of the digits. If the digits are reversed then determine in terms of n the value that the sum of the digits must be multiplied by.

17. What is the first time before 5 o' clock when the angle between the minute hand and the hour hand is 88^0 ?

18. If $x^2 - 16y^2 = 6xy$ then write down the numerical value of
    $x^2 + 2x - 16y + 12 + 16y^2 - 6xy$

19. Find the sum of the numbers in the 15th bracket for this arithmetic sequence.

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

20. Vedic squares ABCD ; EFGH and J are drawn. The side of ABCD is 8cm. The vertices are at the midpoints of each side. Determine the area of the shaded region

A   4   E   4   B

H   J   F

D   G   C

TOTAL: 15 x 1 = 15
5 x 2 = 10

25