SOUTHERN AFRICAN SENIOR MATHEMATICS OLYMPIAD

FEMSSISA
(SASMO)
GRADE TEN
FINAL ROUND
DATE: 11 OCTOBER 2018
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.**

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Grade Ten Mathematics Olympiad Final Round 2018

1. What is the value of $(0.3^4 \div (0.03)^2$

2. Write down the unit's digit of:-
   $137^3 + 25^5 \times 4^5 - 27^3$

3. If a = $\dfrac{1}{1-2b}$ and b = $\dfrac{1}{1-2c}$ then write 'a' in terms of 'c'.

4. Write in its simplest form

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

5.Evaluate $1000^2 - 998^2 + 996^2 - 994^2 + \ldots + 4^2 - 2^2$

6. The graph of y = $\dfrac{-x+a}{x+b}$ passes through (-1;0) and (-4;-3).
   Find the numerical value of a + b

7. Evaluate $29\dfrac{1}{6} \times 30\dfrac{1}{10}$

8. Two cyclists, each cycling at a their own constant speeds around an cycling track complete 10 and 20 rounds in 1 hour. If they start together from the same starting point ad cycle in the opposite directions then determine then how many times they pass each other?

9. 80 litres of a mixture was water. How many litres of concentrate must be added so that the mixture has 50% concentrate?

10. If $6^{x+1} = 3$ then write down the value of 36^x

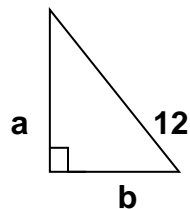**11. Write down the ordered pair (x;y) which is the common solution of both equations:-**

$\dfrac{6}{x-1} + \dfrac{4}{y+1} = 12$ and $\dfrac{2}{x-1} - \dfrac{4}{1-y} = 4$

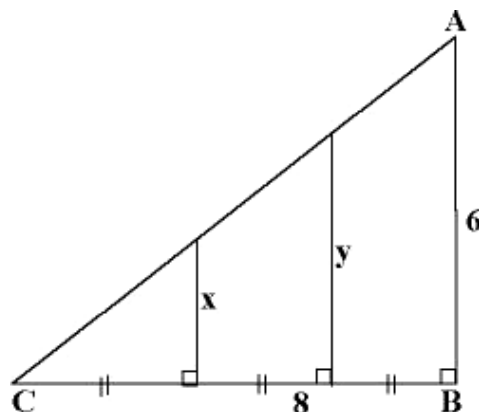**12. What is the units digit of the following ?**

$199^{10} + 16^{10} - 99^{10}$

13. In the triangle below a - b = 6
   Calculate the area of the triangle independent of a and b

a | 12 | b

14. In the figure below AB = 6 and BC = 8. Calculate the value of

(x + y).

15. The difference of the squares of 2 consecutive even numbers is t. What is the larger of the two numbers in terms of t ?

16. Each person in a group of 50 is either blue or brown eyed.

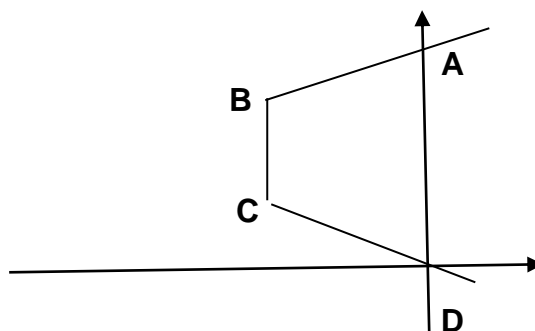   **In addition you are given the following information:**

   14 are blue-eyed females

   31 are males

   23 people have brown eyes

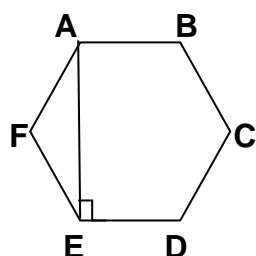   **How many males have blue eyes?**

17. C and B are the y-intercepts and CB ‖ AD. The equation of CB is x = -3 and BA is y = x + 9 and the area of ABCD is $\frac{33}{2}$ square units. Determine the equation of DC.
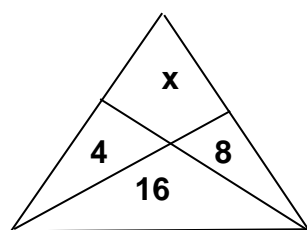

18. A vendor has 4 weights which must be used to weigh items from 1kg to 15kg without balancing with the weights.
    What are the 4 weights?

19. In the following regular hexagon AE = $6\sqrt{3}$ cm. Determine the area of AEDB.

20. In the triangle ABC determine the value of x if the areas of the 3 regions are given.

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