SOUTHERN AFRICAN SENIOR MATHEMATICS OLYMPIAD

FEMSSISA
(SASMO)
GRADE TEN
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.**

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1. What is the value of $(0.6)^6 \div (0.06)^3$

2. Write down the unit's digit of:-
   $19^3 + 2^{10} \times 3^{10} - 109^3$

3. If $b = \dfrac{2}{2-3c}$ and a = $\dfrac{3}{3-4b}$ then write 'c' in terms of 'a'.

4. Write in its simplest form

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

5. Evaluate $199^2 - 197^2 + 195^2 - 193^2 + ... + 39^2 - 37^2$

6. The graph of $y = \dfrac{-2x+a}{x-b}$ passes through (-3;-2) and (1;2).
   Find the numerical value of a - b

7. Evaluate $30\dfrac{1}{6} \times 23\dfrac{1}{5}$

8. Two cyclists, each cycling at a their own constant speeds around an cycling track complete 15 and 20 rounds in 1 hour. If they start together from the same starting point ad cycle in the same direction then determine then how many times faster cyclist will pass the other cyclist in 90 minutes.

9. 60 litres of a mixture was water and 18 litres was concentrate. How many litres of concentrate must be added so that the mixture has 40% concentrate?
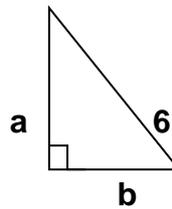
10. If $8^{x-1} = 3$ then write down the value of 32^x

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

$\dfrac{5}{x+2} + \dfrac{2}{y-1} = 1$ and $\dfrac{2}{x+2} + \dfrac{1}{1-y} = 2$

12. Find the value of
66 666 x 66 673 – 66 670 x 66 669

13. In the triangle below a + b = 10
Calculate the area of the triangle independent of a and b

14. At 6am the hour hand and the minute hand are opposite each other. At what next time will both hands be together?

15. In the formula $\frac{1}{f} - \frac{1}{h} = \frac{2}{r}$ write down h in terms of f and r

16. Each bird in a group of 60 is either females or males. In this group they are yellow feathered or red feathered.
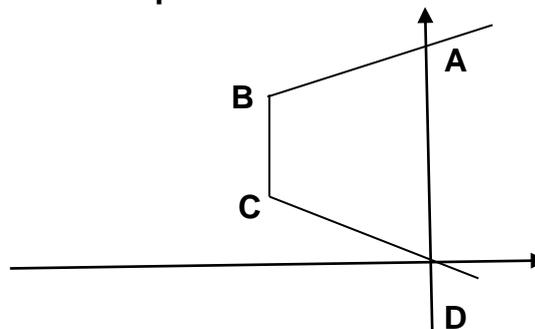
In addition you are given the following information:

16 are red feathered males

36 are females

28 are yellow feathered

How many females have red feathers?

17. C and B are the y-intercepts and CB ∥ AD. The equation of CB is x = - 4 and
CD is y = - x + 1; the y intercept of BA is (0;10) and the area of ABCD is 28 square units. Determine the equation of AB.
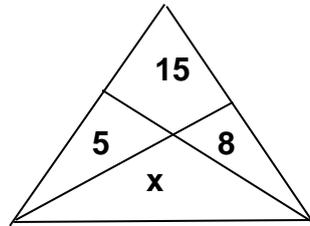
18. A vendor has 5 weights which must be used to weigh items from 1kg to 31kg without balancing with the weights.
What are the 5 weights?

19. In the following regular hexagon has area = $96\sqrt{3}$. Determine the length of AB.
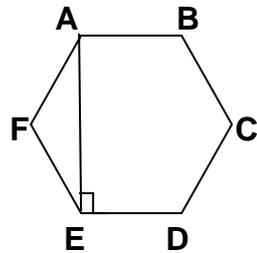
20. In the triangle ABC determine the value of x if the areas of the 3 regions are given.

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