



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

SOUTHERN AFRICAN SENIOR MATHEMATICS OLYMPIAD

FEMSISA MATHEMATICS OLYMPIAD

(SASMO)  
GRADE TEN  
DATE: 12 OCTOBER 2017  
FINAL ROUND  
TIME: 120 MINUTES

Instructions:

1. This booklet has 20 questions.
2. Use the answer sheet provided. Enter your answer in the block.
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 2017

1. What is the value of  $\sqrt{(0.3)^5 \div (0.3)}$

2. Write down the unit's digit of:-  
 $27^{60} - 17^{60} + 26^{60} + 15^{60} - 2^{60}$

3. If  $a = \frac{-3}{2-b}$  and  $c = \frac{2}{2-3b}$  then write down  $a$  in terms of  $c$ .

4. Write in its simplest form

$$\frac{1}{(c+2)(c-2)} + \frac{1}{c(c+2)} + \frac{2}{c(2-c)}$$

5. Evaluate

An article was discounted at a sale by 10%. It was later increased by 15%.  
If the current price of the article is R207. What was the initial price?

6. The table below shows the relationship between  $x$  and  $y$  which is in the form

$$y = \frac{a}{x-3} + c$$

$x$	-1	0	1
$y$	1	$\frac{2}{3}$	0

Write down the value of  $a - c$ .

7. Evaluate  $27\frac{3}{4} \times 19\frac{6}{7}$

8. If  $ab = 12$ ;  $bc = 28$  and  $ac = 21$  then find  $abc$ .

9. 40 litres of a 50 litre container has 70% water and 30% concentrate. If the concentrate was increased to 40% then how many litres of the mixture will be water?

10. If  $v = \sqrt{2gm \left( \frac{i}{r} - \frac{1}{R} \right)}$  then make  $R$  the subject.

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

$$\frac{6}{x} - \frac{2}{y-2} = 4 \quad \text{and} \quad \frac{3}{x} + \frac{2}{y+2} = 2$$

12. Find p if  $(x-2)(2x^2 + b.x + c) = 2x^3 - 9x^2 + px - 6$

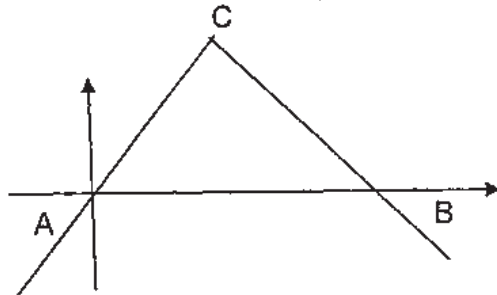
13. If  $3^a \cdot 3^b \cdot 3^c \cdot 3^d \cdot 3^e = 81^t$  then find the average of a; b; c; d and e in terms of t.

14. At a Boxing Tournament tickets were sold for R200; R100 and R60 each. There were 4 times as many R100 tickets as there were R200 tickets. There were half the number of R100 tickets as there were R60 tickets. The total amount realized from the sale of tickets is R108 000. Determine the number of tickets R100 tickets sold.

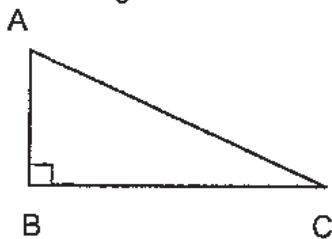
15. In a 1000m race A finished 100m ahead of B who finished 50m ahead of C. If they continued to run at the same average speed then determine how far B finished ahead of C when B completed the 1000m.

16. Find (a + b) in terms of n if  $(2^a + 2^b)^2 - (2^a - 2^b)^2 = 2^a$

17. A and B are the x-intercepts of  $\triangle ABC$ . The equation of BC is  $y = -x + c$  and AC is  $y = 2x$ . The area of  $\triangle ABC$  is equal to 12 sq units.. Determine the value of c.



8. The area of a right angle triangle ABC is 54 square units. Determine the length of AC if the length of AB is 3 units less than the length of BC.



19. At a cinema 5 people in a group sat next to each other. In how many ways can they sit next to each other if 2 couples had to sit next to each other?

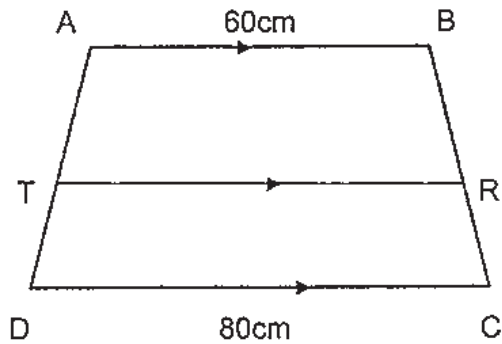
20. Consider:-

Refer to trapezium below.

TR bisects the area of trapezium ABCD.

$AB \parallel TR \parallel DC$ .

Determine the length of TR.



MARKS: 1-15:  $15 \times 1 = 15$

16-20:  $5 \times 2 = 10$

TOTAL: 25