



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

SOUTHERN AFRICAN JUNIOR MATHEMATICS OLYMPIAD

FEMSISA MATHEMATICS OLYMPIAD

(SAJMO)

GRADE NINE

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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FEMSSISA Grade 9 Final Round 2017

- Write down the remainder when $(7^{145} \div 100)$
- If $x \# y = \left(\frac{1}{x} + \frac{1}{y}\right)^2$ then determine the expression for $\frac{1}{2x} \# \frac{1}{y}$
- How many natural numbers 'n' are there such that M is a natural number.

$$M = \frac{24n}{3n-1}$$
- $P = x^2 - mx + m$. For what value of m is $(x - 2)$ a factor of the expression P

5. Find x

$$\frac{2x+1}{2x} + \frac{x-2}{x} = \frac{1}{4x}$$

- The 2 opposite numbers are linked by a rule. If $y = mx + c$ is this rule then write down the rule with numerical values for m + c.

x	-1	0	2
y	5	2	-4

7. Observe the following pattern

$$\begin{aligned} 4 \times 6 &= 24 \\ 14 \times 16 &= 224 \\ 24 \times 26 &= 624 \\ 34 \times 36 &= 1224 \end{aligned}$$

What is the value of p if $p(p+2) = 990024$ and $p > 0$

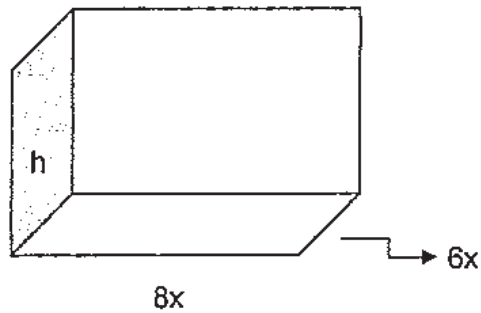
- A committee to represent the Representative Council of Learners comprised 3 females and 2 males. In how many ways could this committee be selected if there were 4 females and 4 males who were eligible to serve on this committee?

9. Evaluate

$$21\,358 \times 21\,354 - 21\,357 \times 21\,355$$

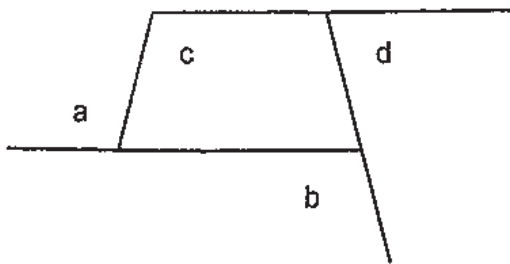
- 4 mangoes and 15g of feta cheese has 690 calories. 3 mangoes and 25g cheese has 930 calories. How many calories does 1 mango have?

11.



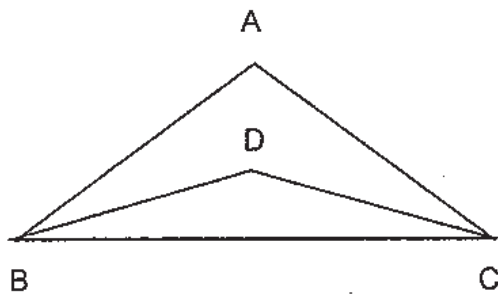
The surface area of a rectangular prism which has dimensions $8x$ units by $6x$ units by h units is $236x^2$ square units. .
Determine the volume in terms of x .

12. The lines of the quadrilateral was extended to form exterior angles. If $a+b+c = 330^\circ$ and $c+d = 198^\circ$ then determine the value of d .



13. If $\frac{4}{21} = 0,19047\dot{6}$ then write down the 100^{th} digit after the decimal point.

14.



$\hat{A}BC$ and $\hat{A}CB$ are such that $2\hat{A}BD = \hat{D}BC$ and $2\hat{A}CD = \hat{D}CB$.

If $\hat{B}DC = 124^\circ$ then determine the measurement of \hat{A} .

15. What is the first time after 1 o' clock when the angle between the minute hand and the hour hand is 80° ?
16. A code consists of a row of ten digits , four of which are 1 and the other 6 are zeros example 0100010110. In how many of these codes is the first digit 0 and last digit 1 ?
17. For what values of m and n will $42m37n$ be divisible by 33?
18. In a motor cycle race from Jersey to Downtown Biker A cycled at a speed of 150km/h whilst Biker B cycled at 120km/h. If the total time taken by both bikers is 4.5 hours. Calculate the distance from Jersey to Downtown.
19. It takes Gordy and Hedley $\frac{18}{5}$ hours to complete a task.. If Gordy works alone she can complete the task in 6 hours. If Hedley works alone how long will it take Hedley to complete the task working at a constant rate.
20. A rectangle with maximum area is enclosed in a semi-circle. If the area of the shaded region is $(100\pi - 200)$ cm² then find the perimeter of the rectangle of the rectangle if the length of the rectangle is twice its width.



$$\text{TOTAL: } 15 \times 1 = 15$$

$$5 \times 2 = 10$$

25
