THE SOUTH AFRICAN MATHEMATICS OLYMPIAD

organised by the SOUTH AFRICAN ACADEMY OF SCIENCE AND ARTS
in collaboration with OLD MUTUAL, AMESA and SAMS

SPONSORED BY OLD MUTUAL

FIRST ROUND 1999
JUNIOR SECTION: GRADES 8 AND 9
29 APRIL 1999
TIME: 60 MINUTES
NUMBER OF QUESTIONS: 20

Instructions:

1. Do not open this booklet until told to do so by the invigilator.
2. This is a multiple choice question paper. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct.
3. Scoring rules:
   Each correct answer is worth: 3 marks in Part A,
   5 marks in Part B and
   7 marks in Part C.
   There is no penalty for an incorrect answer or an unanswered question.
4. You must use an HB pencil.
   Rough paper, ruler and rubber are permitted.
   Calculators and geometry instruments are not permitted.
5. Diagrams are not necessarily drawn to scale.
6. Indicate your answers on the sheet provided.
7. When the invigilator gives the signal, start the problems.
   You will have 60 minutes working time for the question paper.

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

KEER DIE BOEKIE OM VIR AFRIKAANS

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PRACTICE EXAMPLES

1. $14 + 8 - 2 =$

(A) 8 (B) 14 (C) 18 (D) 20 (E) 22

2. If $2x - 8 = 0$, then x is equal to

(A) 1 (B) 2 (C) 4 (D) 6 (E) 8

3. Arrange the numbers 0,523; 0,458; 1,003; 0,791 from smallest to largest.

(A) 0,458; 0,523; 0,791; 1,003
(B) 0,523; 0,791; 1,003; 0,458
(C) 0,458; 0,791; 0,523; 1,003
(D) 1,003; 0,791; 0,523; 0,458
(E) 0,523; 0,458; 1,003; 0,791

DO NOT TURN THE PAGE
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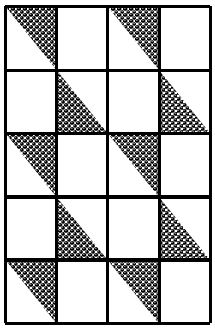
PART A: (Each correct answer is worth 3 marks)

1. $\frac{1+2+3+4}{1\times 2\times 5}$ is equal to

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

2. Noni knits a blanket. She uses 2 colours and follows the pattern as shown. The fraction of the blanket knitted in the darker shade is



(A) $\frac{1}{2}$ (B) $\frac{1}{8}$ (C) $\frac{1}{3}$
(D) $\frac{1}{6}$ (E) $\frac{1}{4}$

3. If two dice are rolled, which total is most likely?

(A) 7 (B) 6 (C) 5 (D) 8 (E) 9

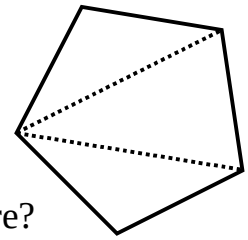
4. For long distance telephone calls, Telkom charges 30,9 cents per metering unit of 13,6 seconds. The cost of a 3 minute long distance call to the nearest rand is

(A) R3,00 (B) R7,00 (C) R5,00 (D) R6,00 (E) R4,00

5. A rectangular carpet has a perimeter of 16 m and area 15 m^2. The lengths of the sides of the carpet in metres are

(A) 10 and 6 (B) 15 and 1 (C) 8 and 2 (D) 7,5 and 2 (E) 5 and 3

PART B: (Each correct answer is worth 5 marks)



6. A five sided regular polygon is drawn with dotted diagonal lines as shown from one vertex to the other vertices. If a regular polygon has 50 sides and diagonals are drawn from one vertex to the other vertices, how many diagonals are there?

(A) 46 (B) 47 (C) 48 (D) 49 (E) 50

7. Suppose there are 20 million learners attending schools in South Africa of which ten percent are in Grades 8 and 9. Each learner in Grade 8 and 9 must receive a Mathematics text book costing R30, a set of language books costing R70, a science text book costing R40 and a history book at R60. What is the total cost for the Department of Education if they have to purchase all these text books?

(A) R40 million (B) R4 million (C) R2 million
(D) R400 million (E) R4 000 million

8. Approximately how far away did the lightning strike if I heard the sound of the thunder 12 seconds after I saw the lightning?
(Let the speed of sound be ±332 m/sec.)

(A) 1 km (B) 12 km (C) 6 km (D) 24 km (E) 4 km

9. Dr Maharaj travels 45 000 km in his car. During that time he changes the tyres, including the spare, regularly so that at the end of the 45 000 km journey each tyre has the same amount of wear. How many kilometres of wear does each tyre have?

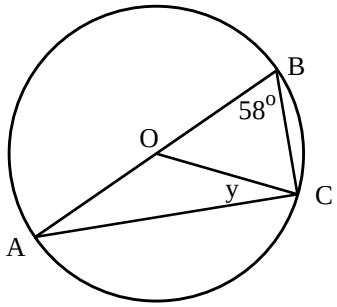
(A) 45 000 (B) 9 000 (C) 36 000 (D) 18 000 (E) 27 000

10. Anusha has 3 questions correct in section A of this paper and 7 correct in section B. She hopes to score 60% to advance to the next round. The least number of questions she must get right in section C is

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

11. Circle, centre O, has triangles AOC and COB drawn inside it. AOB is a straight line.

If $\hat{OBC} = 58^\circ$ then the size of $\hat{OCA}$ is



(A) 58° (B) 60° (C) 64°
(D) 32° (E) 30°

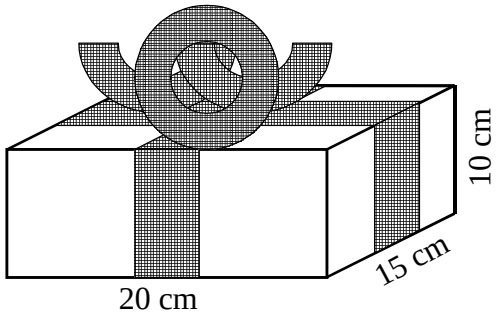
12. The cost of 2 pens and 3 rulers is R1,90. If a pen costs 20 cents more than a ruler, then the cost of 2 rulers and 3 pens in rand is

(A) 2,10 (B) 1,90 (C) 2,50 (D) 1,50 (E) 2,00

13. In the 20^{th} century (1901 – 2000), how many years are divisible by 6?

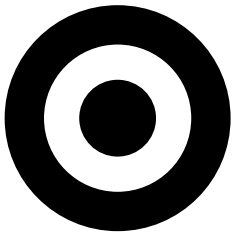
(A) 15 (B) 16 (C) 17 (D) 24 (E) 96

14. A birthday present is tied with ribbon as shown. The bow, knots and ends used 47 cm of ribbon. The total length of the ribbon used, in metres, is



(A) 1,57 (B) 1,67
(C) 1,79 (D) 1,37
(E) 0,92

15. A target consists of rings of width 1 cm. The radius of the inner black circle is 1 cm. Determine how many times the area of the outer black **ring** is bigger than the area of the inner black **circle**.



(A) 9 (B) 3 (C) 7 (D) 4 (E) 5

PART C: (Each correct answer is worth 7 marks)

16. In this addition, different letters stand for different digits, but each letter represents the same digit each time it appears. If the letter **O** stands for **7**, what digit must **U** represent?

```
      T W O
+     T W O
=   F O U R
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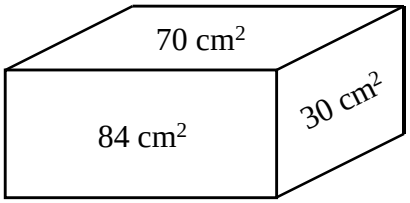
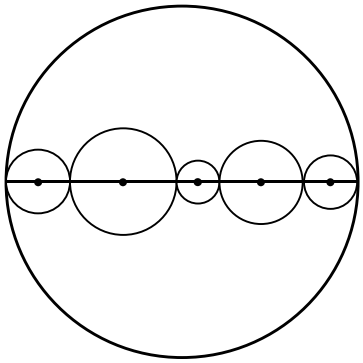
(A) 5 (B) 6 (C) 4 (D) 3 (E) 2

17. The areas of the faces of a rectangular box are 84 cm^2, 70 cm^2 and 30 cm^2. The volume of the box in cm^3 is



(A) 96 (B) 420 (C) 5 880 (D) 88 200 (E) 176 400

18. The diameter of the big circle is divided into 5 parts. These five parts are the diameters of new circles as shown. If the circumference of the big circle is 30 cm, then the sum of the circumferences of the 5 smaller circles is



(A) smaller than 30 cm

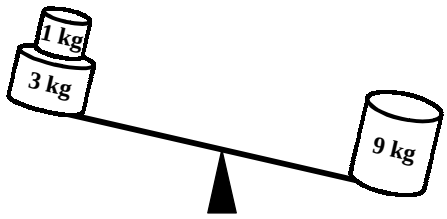
(B) 30 cm

(C) 45 cm

(D) 60 cm

(E) 30π cm

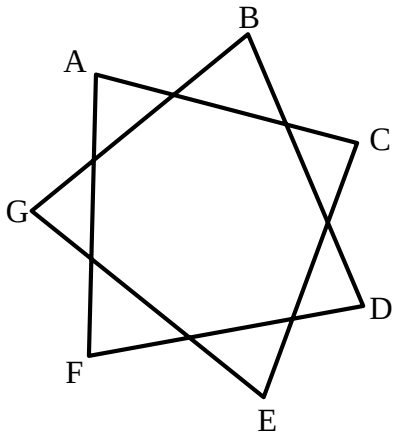
19. You have 3 weights: 1 kg, 3 kg and 9 kg as well as an equal arm balance, as shown. How many different weight objects can you weigh with these three? [Remember the weights may be placed on either side]



(A) 13 (B) 15 (C) 9 (D) 11 (E) 7

20. In the star,

$\hat{A}+\hat{B}+\hat{C}+\hat{D}+\hat{E}+\hat{F}+\hat{G}=$



(A) 720° (B) 540° (C) 360°
(D) 300° (E) 900°

THE END

A man is like a fraction whose numerator is what he is and whose denominator is what he thinks of himself.
The larger the denominator the smaller the fraction.

In H. Eves Return to Mathematical Circles, Boston: Prindle, Weber and Schmidt, 1989.

ANSWER POSITIONS: JUNIOR FIRST ROUND 1999

PRACTICE EXAMPLES	POSITION
1	D
2	C
3	A

NUMBER	POSITION
1	B
2	E
3	A
4	E
5	E
6	B
7	D
8	E
9	C
10	C
11	D
12	A
13	C
14	A
15	E
16	D
17	B
18	B
19	A
20	B

DISTRIBUTION	
A	4
B	5
C	3
D	3
E	5
TOTAL	**20**