THE SOUTH AFRICAN
MATHEMATICS OLYMPIAD

SPONSORED BY OLD MUTUAL

FIRST ROUND 2001

SENIOR SECTION: GRADES 10, 11 AND 12
(STANDARDS 8, 9 AND 10)

28 MARCH 2001

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 test. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct.
3. Scoring rules:
   3.1 Each correct answer is worth 5 marks.
   3.2 There is no penalty for an incorrect answer or any unanswered questions.
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. Give your answers on the sheet provided.

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

KEER DIE BOEKIE OM VIR AFRIKAANS

PRACTICE EXAMPLES

1. If $3x - 15 = 0$, then x is equal to

   (A) 2   (B) 3   (C) 4   (D) 5   (E) 6.

2. The circumference of a circle with radius 2 is

   (A) π (B) 2π (C) 4π (D) 6π (E) 8π.

3. The sum of the smallest and the largest of the numbers 0,5129; 0,9; 0,89; and 0,289 is

   (A) 1,189
   (B) 0,8019
   (C) 1,428
   (D) 1,179
   (E) 1,4129.

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

1. If 1 tonne = 1 000 kg then Aarnout the fully grown hippo weighs about

   (A) 12 kg   (B) 120 kg   (C) 1,2 tonne   (D) 120 tonne   (E) 1 200 tonne.

2. The value of $(\frac{2001}{5})^2 - (\frac{1999}{5})^2$ is

   (A) $\frac{1}{25}$ (B) $\frac{4}{25}$ (C) 160   (D) 320   (E) 1600.

3. A one-litre bag of milk costs R3,00 and a two-litre bottle costs R6,60. What percentage do you pay extra if you buy one bottle instead of two bags?

   (A) 60   (B) 50   (C) 40   (D) 30   (E) 10.

4. The figure shows a regular pentagon $ABCDE$, and ABG and AEF are equilateral triangles. The size of angle GAF is
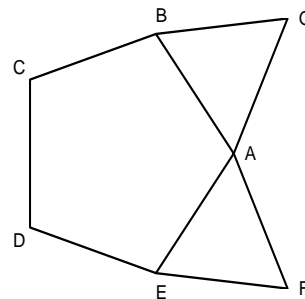

   (A) 124°   (B) 135°   (C) 108°   (D) 120°   (E) 132°.

5. If the following five numbers are arranged in increasing order, which number will be in the middle?

   (A) $2001, 2001$ (B) $2001 + \frac{1}{2001}$ (C) $2001 \div \frac{1}{2001}$ (D) $2001 \times \frac{1}{2001}$

   (E) $2001 - \frac{1}{2001}$.

6. The diameter AB of the circle is 12 cm. The area of the shaded region, in cm^2, is
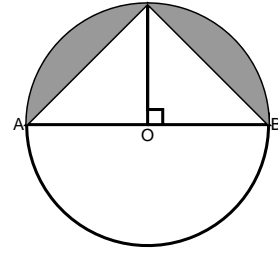
(A) $18\pi - 18$ (B) $36\pi - 18$ (C) $36\pi - 24$ (D) $18\pi - 36$ (E) $36\pi - 36$.

7. The postage rate for parcels is R4,10 for the first 100 g, and R1,40 for each additional 50 g, or part of 50 g. The postage for a parcel weighing 279 g is

(A) R9,70   (B) R12,50   (C) R24,60   (D) R9,10   (E) R8,40.

8. When the repeating decimal $0,45454545\cdots$ is written in simplest fractional form, the sum of the numerator and denominator is

(A) 144   (B) 5   (C) 11   (D) 55   (E) 16.

9. A cube has sides of length 1 metre. The largest number of corners you can choose so that no two of them are one metre apart, is

(A) 5   (B) 4   (C) 3   (D) 2   (E) 6.

10. The length of rectangle $PQRS$ is b and the breadth is a. The rectangle is cut into three congruent rectangles as shown. The ratio of b to a is
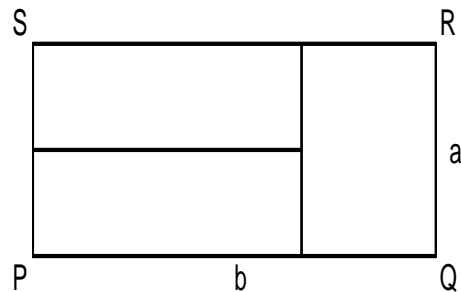
(A) $2 : 1$ (B) $3 : 2$ (C) $4 : 3$ (D) $5 : 4$ (E) $6 : 5$.

11. If the length of a rectangle is 20% greater than the side of a square, and the breadth is 20% less than the side of the square, then

(A) the area of the rectangle is the same as the area of the square
(B) nothing can be compared unless the side of the square is given
(C) the area of the rectangle is greater than the area of the square
(D) the area of the rectangle is less than the area of the square
(E) the perimeter of the rectangle is greater than the perimeter of the square.

12. In the given diagram $AY = AZ$, $BY = BX$ and $CX = CZ$. Two angles are given as shown. The size of angle BCA is

C
Z
40°
75°
X
A
Y
B
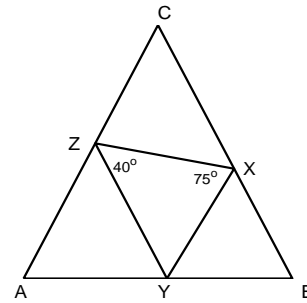
(A) 50°   (B) 60°   (C) 55°   (D) 52,5°   (E) 57,5°.

13. All twenty people in a business each have a direct phone line to every other person in the business. When two new people join the business how many more direct phone lines must be installed?

(A) 20   (B) 10   (C) 40   (D) 41   (E) 60.

14. 2001 people stand in a queue at a voting station. There are at least three women between any two men. The largest possible number of men in the queue is

(A) 500   (B) 501   (C) 502   (D) 667   (E) 668.

15. Given $a = 2^{30}$ and $b = 3^{20}$, which one of the following is true?

(A) $a > b$ (B) $2a = 3b$ (C) $3a = 2b$ (D) $a < b$ (E) $a = b$.

16. Which one of the following statements is not always true for three consecutive natural numbers?

(A) at least one is even
(B) exactly one is divisible by 3
(C) one is divisible by 6
(D) the product is divisible by 6
(E) at least one is odd.

17. Gwen is walking to school at a constant speed. At 07:00 she has walked $\frac{1}{6}$ of the distance and at 07:20 she has walked $\frac{3}{4}$ of the distance. What fraction has she walked at 07:10?

(A) $\frac{7}{12}$ (B) $\frac{5}{6}$ (C) $\frac{7}{24}$ (D) $\frac{11}{24}$ (E) $\frac{13}{24}$.

18. If m and n are positive integers and $m + n + mn + 1 = 91$ then $m + n$ equals

(A) 15   (B) 17   (C) 18   (D) 19   (E) 90.

19. $ABCD$ is a rectangle with $AD = 5$, $DE = 4$ and angle $AED = 90°$. The length of BE is
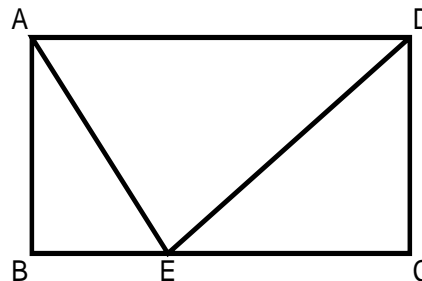
(A) 1,6   (B) 1,8   (C) 2,4   (D) 2,0   (E) 1,5.

20. In how many different ways can 9 oranges be divided among Nic, Sudan and Vishnu in such a way that Nic gets at least 3 oranges, Sudan and Vishnu at least 2 each, and Vishnu at most 3?

(A) 2   (B) 3   (C) 4   (D) 5   (E) 6.