SOUTH AFRICAN MATHEMATICS OLYMPIAD

Organised by the
SOUTH AFRICAN MATHEMATICS FOUNDATION

2013 FIRST ROUND
JUNIOR SECTION: GRADE 8

**14 March 2013**   **Time: 60 minutes**   **Number of questions: 20**

Instructions

1. 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.
2. Scoring rules:
   2.1. Each correct answer is worth 5 marks.
   2.2. There is no penalty for an incorrect answer or any unanswered question.
3. You must use an HB pencil. Rough work paper, a ruler and an eraser are permitted. **Calculators and geometry instruments are not permitted.**
4. Figures are not necessarily drawn to scale.
5. Indicate your answers on the sheet provided.
6. The centre page is an information and formula sheet. Please tear out the page for your own use.
7. Start when the invigilator tells you to do so.
8. Answers and solutions will be available at `www.samf.ac.za`

Do not turn the page until you are told to do so.
Draai die boekie om vir die Afrikaanse vraestel.
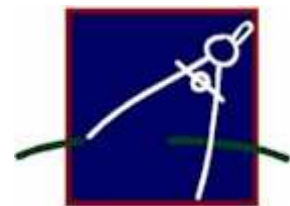
1. If January 1st 1985 was a Tuesday, how many Tuesdays were there in 1985?

(A) 50   (B) 51   (C) 52   (D) 53   (E) 54

2. When 3001^2 is written as a normal number (in the decimal system), the number of times the digit 0 appears is

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

3. The three digit number 7d2 is divisible by 3 and by 11. The digit d must be

(A) 1   (B) 2   (C) 6   (D) 7   (E) 9

4. $(2 + 4 + 6 + ... + 50) - (1 + 3 + 5 + ... + 49) =$

(A) 23   (B) 25   (C) 40   (D) 99   (E) 100

5. As n gets larger and larger the value of $\dfrac{n+2}{2n+1}$ gets closer and closer to

(A) $\dfrac{1}{4}$ (B) $\dfrac{1}{3}$ (C) $\dfrac{1}{2}$ (D) 1   (E) 1,5

6. A bathroom floor is covered by square tiles: the floor is 5 tiles wide and 8 tiles long. If one of the floor tiles is chosen at random, what is the probability that it is at the edge of the floor?

(A) $\dfrac{19}{40}$ (B) $\dfrac{1}{2}$ (C) $\dfrac{21}{40}$ (D) $\dfrac{11}{20}$ (E) $\dfrac{23}{40}$

7. A circle is divided into four sectors. Angle A is $\frac{2}{3}$ the angle C while angle D is twice angle B. Angles B and C are supplementary. The size of angle C is

(A) 100°   (B) 110°   (C) 120°   (D) 135°   (E) 145°
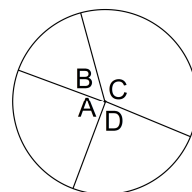
8. ABCD is a rectangle, and BP = 2 units with AD = 7 units.
P$\hat{A}$C = C$\hat{A}$D .The length of AP is
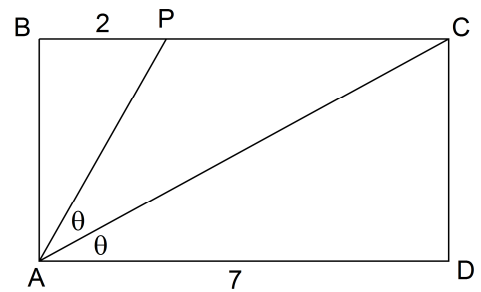
(A) $\sqrt{15}$ (B) 3   (C) 4   (D) $\sqrt{18}$ (E) 5

9. The decimal form of 3÷7 is the recurring decimal 0.428571428571........ The digit in the 2013th decimal place is

(A) 4   (B) 2   (C) 8   (D) 5   (E) 7

10. The diagram shows two concentric circles. If the circumference of one exceeds the circumference of the other by 6 cm, then its radius exceeds the other radius by approximately (in cm)
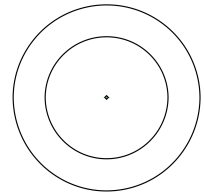
(A) 0,5   (B) 1   (C) 1,5   (D) 2   (E) 2,1

11. $(1-\frac{1}{3})(1-\frac{1}{4})(1-\frac{1}{5})...(1-\frac{1}{100}) =$

(A) $\dfrac{1}{50}$ (B) $\dfrac{1}{100}$ (C) $\dfrac{99}{100}$ (D) $\dfrac{49}{50}$ (E) $\dfrac{1}{25}$

12. A petrol tank weighs 34 kg when empty and 58 kg when full. Its weight in kg when it is two-thirds full is

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

13. A set of 12 numbers has average 18, but the smallest and largest have average 28. What is the average of the others?

(A) 14   (B) 15   (C) 16   (D) 17   (E) 18

14. Four teams play in a knock-out tournament (which means that two pairs compete, and the two winners then play each other). Team A beat Team D, and Team B beat Team A.
Who beat Team C?

(A) B only   (B) A only   (C) D only   (D) B and A   (E) B and D

15. In the sequence 5; 11; 17; ...... how many terms are smaller than 1000?

(A) 163   (B) 166   (C) 169   (D) 172   (E) 175

16. M is the midpoint of AB and is joined to the third vertex of $\triangle$ ABC, with MC = AM = MB. The value of $x + y$ is
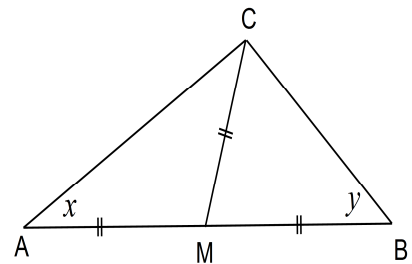
(A) 100°   (B) 90°   (C) 80°   (D) 70°   (E) 60°

17. It has been observed that in a herd of gazelle there is always at least one male for every 5 females. If m is the number of males and f the number of females, which is true?

(A) $m \geq 5f$ (B) $5m \geq f$ (C) $m \leq 5f$ (D) $5m \leq f$ (E) $m + f \geq 5$

18. The positive integers are written in a long sequence 12345678910111213........ When the sequence contains 100 digits, how many of those are 1s?

(A) 14   (B) 16   (C) 18   (D) 19   (E) 20

19. How many factors does the product $11 \times 13 \times 17 \times 19$ have?

(A) 8   (B) 10   (C) 12   (D) 16   (E) 24

20. A certain value increases by a fixed amount each year. If the increase during the first year was 10%, then the percentage increase during the third year was

(A) 7.5   (B) 8   (C) 8.33   (D) 9   (E) 9.5