

THE SOUTH AFRICAN MATHEMATICS OLYMPIAD

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

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SECOND ROUND 2001
JUNIOR SECTION: GRADES 8 AND 9
29 MAY 2001
TIME: 120 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:

For each correct answer	in Part A:	4 marks
	in Part B:	5 marks
	in Part C:	6 marks
For each wrong answer:		-1 mark
For no answer:		0 marks
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 120 minutes working time for the question paper.

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

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PRACTICE EXAMPLES

1. $23 + 6 - 4 =$

(A) 6

(B) 23

(C) 25

(D) 29

(E) 33

2. $\frac{1}{5} + \frac{2}{3} \times \frac{1}{2}$ equals

(A) $\frac{1}{15}$

(B) $\frac{3}{11}$

(C) $\frac{21}{50}$

(D) $\frac{8}{15}$

(E) $9\frac{4}{5}$

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PART A: (Each correct answer is worth 4 marks)

1. The number 36 is 12% of

(A) 250 (B) 300 (C) 350 (D) 400 (E) 450

2. $3^n + 3^n + 3^n$ equals

(A) 3^{n+1} (B) 3^{3n} (C) 3^{n+3} (D) 3^{3n+3} (E) 3^{3n+1}

3. Ansu works in a bookstore and has to count a number of identical books. She arranges them in a stack 4 wide, 6 deep in 7 layers. The number of books in the stack is

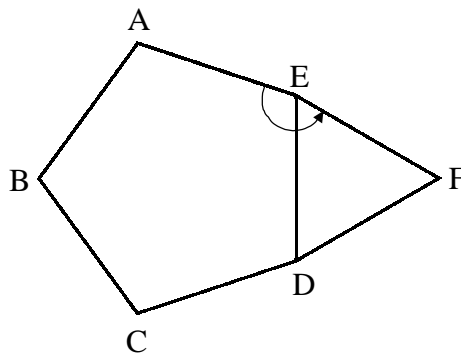
(A) 17 (B) 98 (C) 42 (D) 204 (E) 168

4. The greatest number of Fridays that can occur in a 75 day period is

(A) 15 (B) 13 (C) 12 (D) 11 (E) 9

5. In the diagram, ABCDE is a regular pentagon.
DEF is an equilateral triangle.
The size of angle AEF is

(A) 168° (B) 150° (C) 120°
(D) 132° (E) 170°



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

6. In the weekly Lotto six different numbers are drawn randomly from the numbers 1, 2, 3, 4, ... 48, 49. Mpho's parents bought a ticket with the numbers 2; 17; 26; 29; 30; 43 on it. The first five numbers drawn were 17; 26; 30; 2 and 43. What is the chance that the next number drawn will be 29?

(A) $\frac{1}{2}$ (B) $\frac{1}{6}$ (C) $\frac{1}{30}$ (D) $\frac{1}{44}$ (E) $\frac{1}{49}$

7. The extra time, in minutes, that it would take to cover a distance of 120 km travelling at an average speed of 60 km/h instead of 72 km/h would be

(A) 12 (B) 15 (C) 20 (D) 24 (E) 30

8. Observe: $1,5 \times 1,5 = 2,25$
 $2,5 \times 2,5 = 6,25$
 $3,5 \times 3,5 = 12,25$

The value of if \times = 9900,25 is

(A) 33,5 (B) 66,5 (C) 99,5 (D) 100,5 (E) 300,5

9. The entrance fee at a concert was R5 per child and R16 per adult. A total of R789 was raised. The maximum number of people who could have attended the concert was

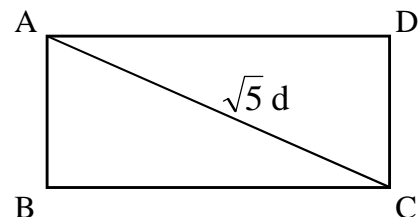
(A) 37 (B) 38 (C) 138 (D) 149 (E) 157

10. Given that $(21)^4 = 194481$ then $(0,21)^4$ equals

(A) 0,000194481 (B) 0,00194481 (C) 0,194481
(D) 19,4481 (E) 1944,81

11. ABCD is a rectangle such that $AD = 2AB$.
If $AC = \sqrt{5}d$, then the perimeter of ABCD is

(A) $4\sqrt{5}d$ (B) $6\sqrt{5}d$ (C) $10d$
(D) $6d$ (E) $8d$



12. How many non-isosceles triangles of perimeter 23 units can be formed with sides of whole number units?

- (A) 6 (B) 8 (C) 13 (D) 23 (E) 66

13. Note: The recurring decimal $3,\dot{4}58\dot{7}$ means 3,458745874587...

If recurring decimals $\frac{1}{7} = 0,\dot{1}4285\dot{7}$ and $\frac{1}{3} = 0,\dot{3}$, what is $\frac{1}{7} + \frac{1}{3}$ as a recurring decimal?

- (A) $0,\dot{4}4285\dot{4}$ (B) $0,\dot{1}4286\dot{0}$ (C) $0,\dot{4}7619\dot{0}$
(D) $0,\dot{4}761\dot{9}$ (E) $0,\dot{4}76\dot{2}$

14. The chicken on Thabo's farm can gain weight at the rate of 20% per week. Thabo wants them to double their weight before he sells them. The minimum number of weeks he needs to keep them is

- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7

15. Two athletes, Johnny and Sarah, are running in opposite directions on a track after they have started at the same point. Every time they meet one another, Sarah gives Johnny R1. Sarah runs three times as fast as Johnny. The number of laps Sarah has to complete to make sure that Johnny collects R120 is

- (A) 30 (B) 40 (C) 50 (D) 60 (E) 90

PART C: (Each correct answer is worth 6 marks)

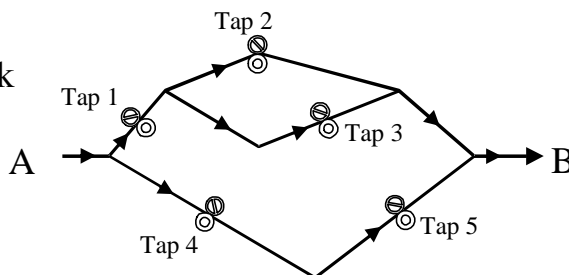
16. By placing a 2 at both ends of a number, the number's value is increased by 2317. The sum of the digits of the original number is

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

17. Six numbers are represented by a ; b ; c ; d ; e and f . The average of a ; b ; c ; and d is 10. The average of b ; c ; d ; e and f is 14. If f is twice the value of a then the average of a and e is

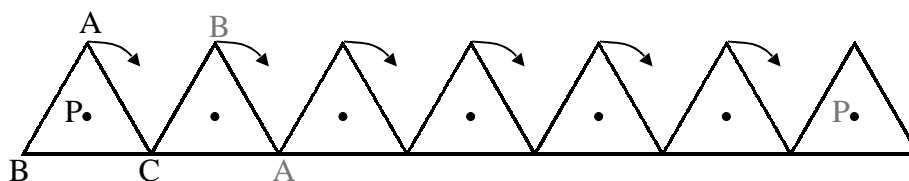
(A) 10 (B) 11 (C) 12 (D) 13 (E) 15

18. Water flows through a network of pipes in the direction shown in the diagram from A to B. Five taps are on the network as shown. Each tap can be opened or closed to let water through or to stop the flow of the water. There are $2^5 = 32$ different ways of setting the taps. How many of these 32 ways will allow water to flow from A to B?



(A) 17 (B) 16 (C) 15 (D) 14 (E) 13

19. ABC is a wooden equilateral triangular block with P as its centre. The block is rolled clockwise on a flat surface such that one side touches the surface each time it is rolled.



If $PC = 2$ units, what is the length of the path of object P in the above diagram?

(A) $12\sqrt{3}$ (B) 2π (C) 8π (D) 6π (E) $14\sqrt{3}$

20. From the numbers 1; 2; 3; 4; ... 500 a sequence is formed by deleting numbers so that no two remaining numbers have a sum which is a multiple of 7. The maximum number of numbers in this sequence is

(A) 216 (B) 217 (C) 213 (D) 287 (E) 284

THE END

