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 2001
JUNIOR SECTION: GRADES 8 AND 9
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 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 5 marks. 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. $23 + 6 - 4 =$

   (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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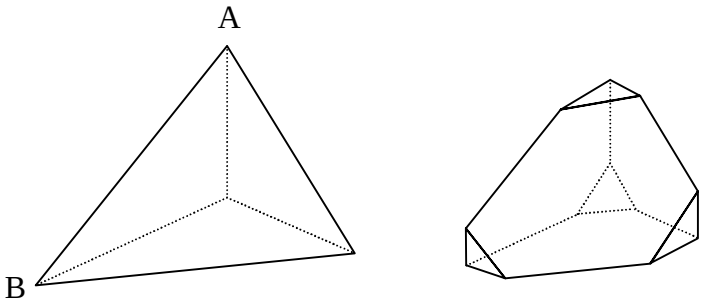
1. When 2001 is divided by 200 the remainder is

(A) 0 (B) 1 (C) 9 (D) 10 (E) 99

2. If $241 \times 39 = 9399$ then
$2{,}41 \times 3{,}9$ is equal to

(A) 0,09399 (B) 0,9399 (C) 9,399 (D) 93,99 (E) 939,9

3. A solid triangular pyramid has six edges such as AB.
Each corner is cut off.
(see new figure)



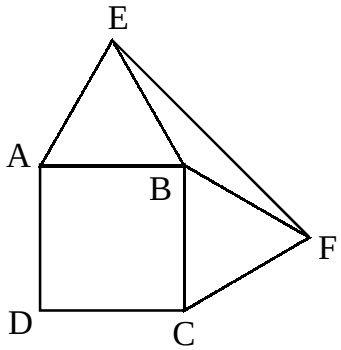
How many edges will
the new figure have?

(A) 24 (B) 9 (C) 12 (D) 15 (E) 18

4. If $a \Delta b = a^2 - b^2$ then $5 \Delta 3$ is equal to

(A) 2 (B) 15 (C) 4 (D) 16 (E) 9

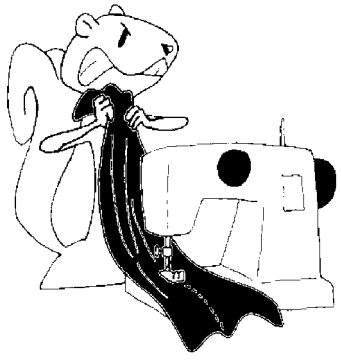
5. ABCD is a square and EAB and CFB
are equilateral triangles.



The size of $B\hat{E}F$ is

(A) $7{,}5^\circ$ (B) 10° (C) $11{,}25^\circ$ (D) $12{,}5^\circ$ (E) 15°

6. A sewing machine stitches 0,6 kilometres of cloth
in one hour.
The rate of stitching of the machine in metres per
minute is



(A) 0,01 (B) 0,1 (C) 1
(D) 10 (E) 100

7. The value of the fraction $\frac{10+20+30+40+...+400}{30+60+90+120+...+1200}$ is

(A) $\frac{1}{30}$ (B) $\frac{1}{2}$ (C) $\frac{1}{6}$ (D) $\frac{2}{3}$ (E) $\frac{1}{3}$

8. If $\frac{1}{x}+\frac{7}{3x}=\frac{5}{6}$ then the value of x is

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

9. Did you know? A palindrome is a number which reads the same forwards as backwards e.g. 35453.

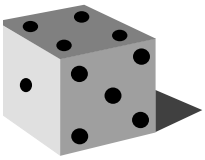
Next year 2002 is an example of a palindromic number. What is the difference between 2002 and the number of the previous palindromic year?

(A) 10 (B) 11 (C) 101 (D) 121 (E) 1001

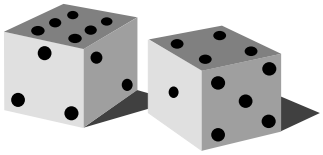
10. 2001 people stand in a queue at a voting station.
There are at least 3 women between any two men.
The largest possible number of men in the queue is

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

11. When a die is rolled the chance of obtaining a 5 is $\frac{1}{6}$

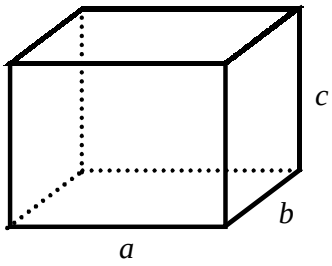


When two dice are rolled the chance of obtaining a sum less than 5 is



(A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{5}{6}$ (D) $\frac{2}{9}$ (E) $\frac{5}{36}$

12. The volume of a rectangular prism with length a cm, width b cm and height c cm is 240 cm^3. $a+b+c=19$. Each side is 3 cm or more in length. a, b and c are whole numbers.
The largest possible area of a face in cm^2 is



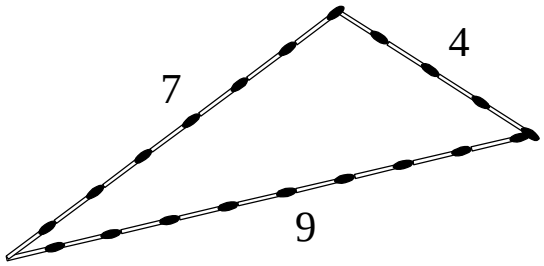
(A) 15 (B) 30 (C) 40 (D) 48 (E) 60

13. The value of $499-497+495-493+...+3-1$ is

(A) 2 (B) 250 (C) 496 (D) 498 (E) 500

14. Did you know? The sum of the lengths of two sides of a triangle is always greater than the third side.

Twenty matchsticks of equal length are placed to form a triangle, as shown. The total number of different triangles that can be made with a perimeter of 20 matchsticks is



(A) 9 (B) 8 (C) 6 (D) 7 (E) 10

15. The sum of two consecutive numbers is S. The square of the larger number minus the square of the smaller number is

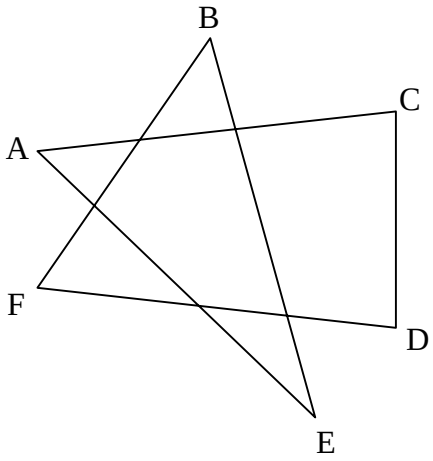
(A) S^2 (B) $2S$ (C) S (D) $S+1$ (E) $S-1$

16. The sum of the digits of the product $999\,999 \times 777\,777$ is

(A) 54 (B) 63 (C) 52 (D) 48 (E) 50

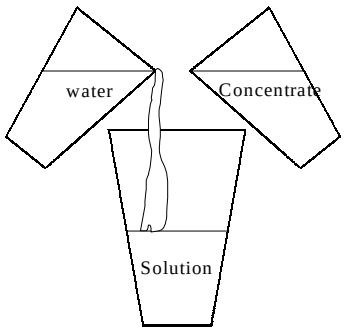
17. In the adjacent figure $\hat{C}+\hat{D}=150^\circ$

The value of $\hat{A}+\hat{B}+\hat{E}+\hat{F}$ is



(A) 210° (B) 300° (C) 360°
(D) 390° (E) 570°

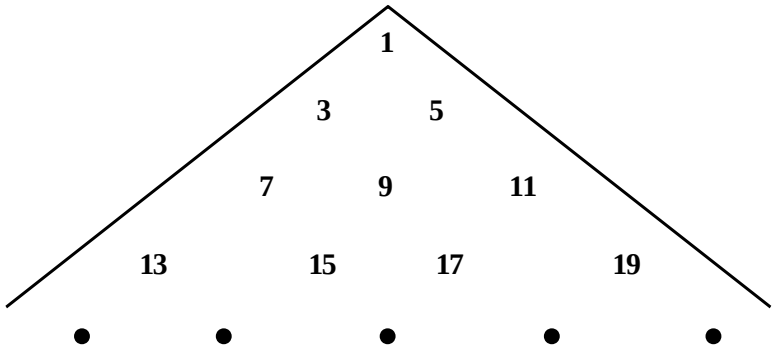
18. A solution containing water and a liquid concentrate has 60% concentrate. By adding 20 litres of water to the solution the concentrate is reduced to 40% of the solution.



How many litres of the original solution is concentrate?

(A) 36 (B) 30 (C) 24
(D) 16 (E) 12

19. The odd integers are arranged in a triangular pattern as shown.



If this pattern continues the first number in the row which has a sum of 1 000 000 is

(A) 99 (B) 990 001 (C) 991 (D) 9 901 (E) 99 001

20. The number of terms of the sequence $4^2; 5^2; 6^2; ... 39^2; 40^2$ that have an even digit in the tens place is

(A) 29 (B) 28 (C) 27 (D) 26 (E) 25

THE END

ANSWER POSITIONS: JUNIOR FIRST ROUND 2001

PRACTICE EXAMPLES	POSITION
1	C
2	D

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

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