HARMONY

THE HARMONY GOLD SOUTH AFRICAN MATHEMATICS OLYMPIAD

organised by the SOUTH AFRICAN ACADEMY OF SCIENCE AND ARTS
in collaboration with HARMONY GOLD MINING, AMESA and SAMS

FIRST ROUND 2002
JUNIOR SECTION: GRADES 8 AND 9
19 MARCH 2002
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, a ruler and a rubber are permitted.
   Calculators and geometry instruments are not permitted.
5. Diagrams are not necessarily drawn to scale.
6. Indicate your answer on the sheet provided.
7. Start when the invigilator tells you to.
   You have 60 minutes to complete the question paper.

DO NOT TURN THE PAGE

UNTIL YOU ARE TOLD TO DO SO.

DRAAI DIE BOEKIE OM VIR DIE AFRIKAANSE VRAESTEL

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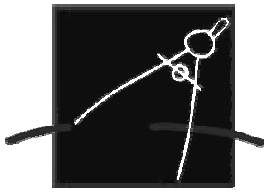

PRACTICE EXAMPLES

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. Find the missing number if $182 \times \Delta = 2002$.

A) 8 B) 9 C) 10 D) 11 E) 12

2. The answer to $5 - 2 + 4 \times 3$ is

A) 12 B) 15 C) 17 D) 19 E) 20

3. If $n = 5$ then the value of $(7n - 5)(n - 5)(3n + 5)$ is

A) 0 B) 50 C) 500 D) 5000 E) 50000

4. An ant covers a distance of 90 metres in 3 hours.
The average speed of the ant in centimetres per minute is

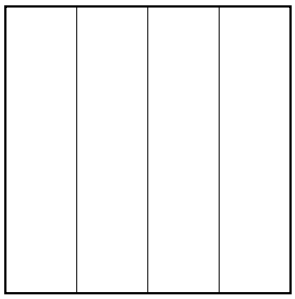
A) 30 B) 40 C) 50 D) 60 E) 70

5. Given that $\frac{9}{25} = 0{,}36$

then $\frac{0{,}9}{0{,}25}$ is equal to

A) 0,036 B) 0,36 C) 3,6 D) 36 E) 360

6. A square is divided into 4 identical rectangles as shown in the diagram. The perimeter of each of the four rectangles is 30 units. What is the perimeter of the square?



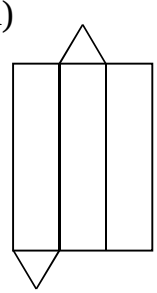
A) 36 B) 40 C) 44 D) 48 E) 52

7. Allison, Nomsa and Jan shared a sum of money in the ratio of 4 : 3 : 1 respectively. Allison received R70 more than Nomsa. The total amount that was shared initially was

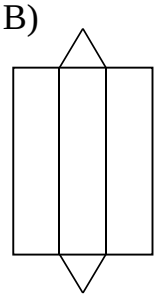
A) R640 B) R560 C) R480 D) R400 E) R320

8. Which of the following nets will **NOT** form a closed triangular prism?

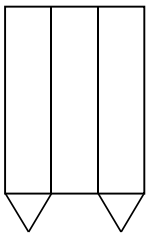
A)



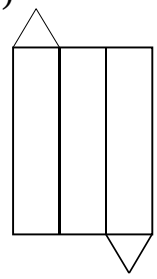
B)



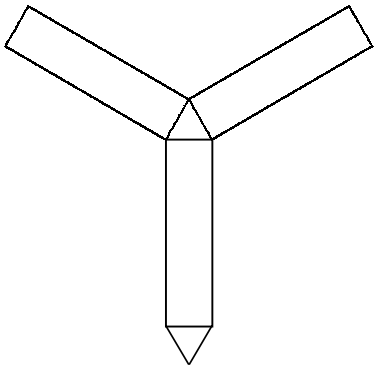
C)



D)



E)



9. The product of two numbers is 504 and each of the numbers is divisible by 6. Neither of the two numbers is 6. What is the larger of the two numbers?

A) 48 B) 84 C) 72 D) 60 E) 42

10. Two windmills pour water into a 1 000 ℓ tank. One windmill pours water into the tank at a rate of 20 ℓ per minute. The other windmill pours water into the tank at 20 ℓ in 3 minutes.

How many minutes will it take to fill the tank?

A) $37\frac{1}{2}$ B) 75 C) $112\frac{1}{2}$ D) 150 E) 175

11. The Ancient Romans used the following different numerals in their number system:

I = 1	C = 100
V = 5	D = 500
X = 10	M = 1 000, etc.
L = 50	

They used these numerals to make up numbers as follows:

I = 1	VI = 6
II = 2	VII = 7
III = 3	VIII = 8
IV = 4	IX = 9
V = 5	X = 10, etc.

So, for example, XCIX is 99.

What is the value of XLVI?

A) 42 B) 44 C) 46 D) 64 E) 66

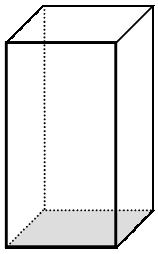
12. Did you know?

- An equilateral triangle is a regular polygon with 3 equal sides, and each interior angle is 60^o.
- A square is a regular polygon with 4 equal sides, and each interior angle is 90^o.

If a regular polygon has n sides, then the formula to find the size of each interior angle is $\frac{(n-2)\times 180^\circ}{n}$. If each interior angle of a regular polygon measures 150°, then the number of sides (n) is

A) 6 B) 9 C) 10 D) 11 E) 12

13. A solid right prism has a square base. The height is twice the length of the side of the base. The surface area of this prism is 160 cm^2.



If 1 cm^3 of the prism has a mass of 250 grams, then the mass of the prism in kilograms is

A) 28 B) 32 C) 36 D) 40 E) 44

14. The diagrams show three scales. On each scale there are different objects on each side which balance each other, as shown.

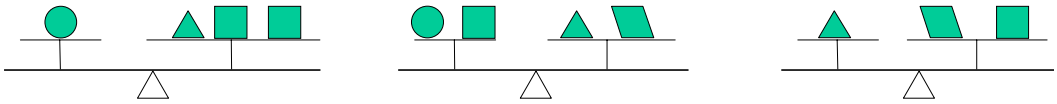


Diagram 1 Diagram 2 Diagram 3

How many ■-shaped objects will balance a ●-object?

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

15. $\frac{1}{3}$; a; b; $\frac{1}{2}$

These numbers are arranged from smallest to largest. The difference between any two adjacent (next to each other) numbers is the same. The value of b is

A) $\frac{5}{12}$ B) $\frac{7}{18}$ C) $\frac{4}{9}$ D) $\frac{5}{6}$ E) $\frac{1}{4}$

16. Given the set of six numbers below:

11; 31; 19; 3; 10; 6

Three numbers are selected from the above set and added together. The remaining three numbers are also added together. These possible two sums are then multiplied to get a product. The maximum product is

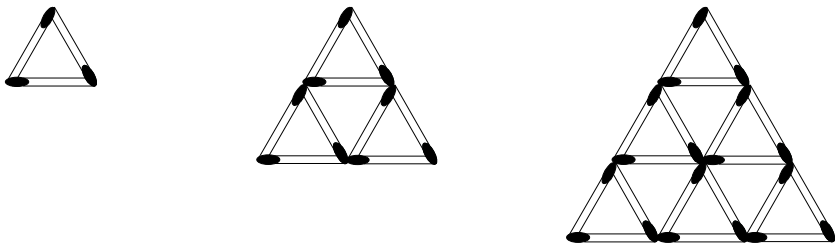
A) 1200 B) 1400 C) 1500 D) 1600 E) 1800

17. The digit 3 is written at the right of a certain 2-digit number forming a 3-digit number. The new number is 372 more than the original 2-digit number. The sum of the digits of the original 2-digit number is

A) 4 B) 5 C) 6 D) 7 E) 8

18. Matchsticks of equal length are used to make the following figures:

i) ii) iii)



3 matchsticks are used for figure i).

9 matchsticks are used for figure ii).

18 matchsticks are used for figure iii).

How many matchsticks are needed for a similar figure which has 10 matchsticks along each side?

A) 84 B) 108 C) 135 D) 165 E) 180

19. In a certain town some people were affected by a 'flu' epidemic. In the first month 20% of the population contracted the flu whilst 80% were healthy.
In the following month 20% of the sick people recovered and 20% of the healthy people contracted the disease.

What fraction of the population is healthy at the end of the second month?

A) 0,68 B) 0,60 C) 0,52 D) 0,44 E) 0,36

20. Mpho, Barry, Sipho, Erica and Fatima are sitting on a park bench. Mpho is not sitting on the far right. Barry is not sitting on the far left. Sipho is not sitting at either end. Erica is sitting to the right of Barry, but not necessarily next to him. Fatima is not sitting next to Sipho. Sipho is not sitting next to Barry.

Who is sitting at the far right?

A) Mpho B) Barry C) Sipho D) Fatima E) Erica

THE END

ANSWER POSITIONS: JUNIOR FIRST ROUND 2002

PRACTICE EXAMPLES	POSITION
1	C
2	D

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

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