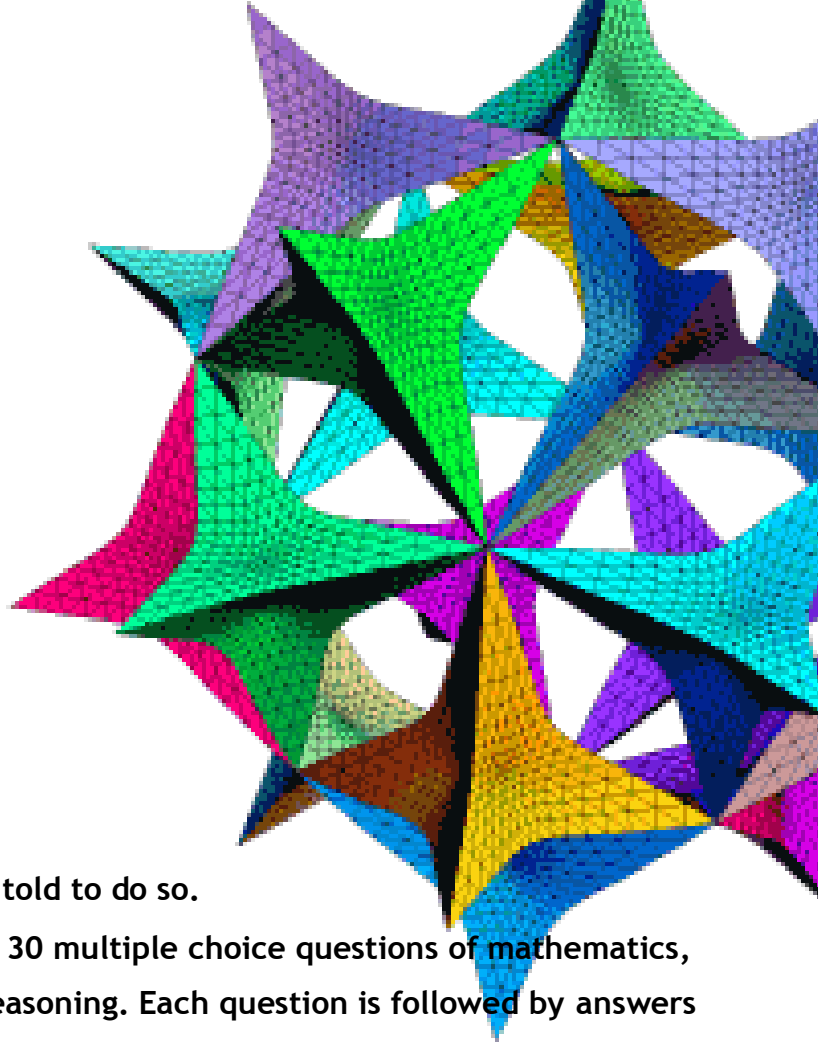


HMC

2009

2nd Round



INSTRUCTIONS

- Do not turn over this booklet until told to do so.
- This examination paper consists of 30 multiple choice questions of mathematics, logical deduction, and analytical reasoning. Each question is followed by answers marked a, b, c, d and e. Only one of these is correct.
- The final answers must be entered in the correct circle on the ANSWER SHEET which is supplied separately.
- The correct answers will be counted; there is no penalty for the incorrect answers.
- Exam duration is 75 minutes and no extra time will be given.
- Calculators or any other computing devices are NOT allowed.
- Rough paper, pen, pencil, and rubber are permitted.
- Start when the invigilator tells you to do so. Good luck!

**”DEDICATED TO THE ADVANCEMENT OF
MATHEMATICS”**

SECTION A

1. $200920092009 \div 2009 = ?$

- a) 1001001 b) 100010001 c) 111 d) 10001001 e) 1111

2. 28 children took part in math league competition. The number of children who finished behind Thabo was twice as large as the number of children who were more successful than him. In which place did Thabo finish?

- a) Sixteenth b) Seventeenth c) Eighth d) Ninth e) Tenth

3. In the figure $WY=10$, $XZ=15$, $WZ=22$ Find XY



- a) 1m b) 2m c) 3m d) 4m e) 5m

4. Which statement is not true?

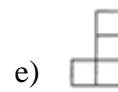
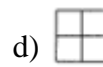
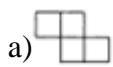
- a) All squares have four sides.
 b) A polygon must have at least four sides.
 c) All polygons have four sides.
 d) Some rectangles are squares.
 e) All rectangles are quadrilaterals.



5. If $n+11$ is an even number, which one of the followings is an odd number.

- a) $n+2$ b) $3n+3$ c) n^2+1 d) $2n+4$ e) $16n+7$

6. All the figures below consist of the same squares of equal size. Which figure has the smallest perimeter?



7. Here is one addition example: each shape replaces a digit, different shapes replace different digits and same shapes replace the same digit. What is the sum of the “square” and the “circle”?

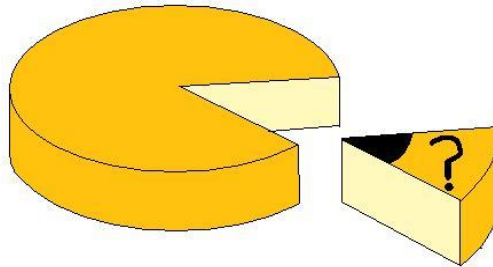
$$\square + \oplus + \bigcirc = ?$$

$$\begin{array}{r}
 \oplus \square \square \square \\
 \oplus \square \square \bigcirc \\
 \hline
 \square \triangle \triangle \\
 \hline
 2003
 \end{array}$$

- a) 6 b) 7 c) 8 d) 9 e) 13

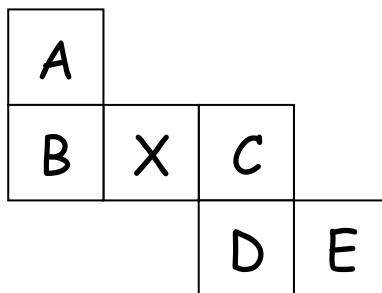
8. 15 % of a circular cheese is cut as shown in the figure. How many degree is the angle denoted by the question mark?

- a) 30° b) 45° c) 20° d) 15° e) 54°



9. The net shown at the figure on the right is cut and folded to form a cube. Which face is then opposite the face marked X?

- a) A b) B c) C d) D e) E



10. In a triangle ABC, the angle C is three times bigger than the angle A, the angle B is two times bigger than the angle A. Then, the triangle ABC

- a) is equilateral
- b) is isosceles
- c) has an obtuse angle
- d) has a right angle
- e) has only acute angles

11. Tariq was on the middle rung of a ladder. He went up 3 rungs, then down 5 rungs and then up 7 rungs where he rested. Later he climbed up the remaining 7 rungs on the ladder. How many rungs did the ladder have?

- a) 9 b) 25 c) 21 d) 18 e) 17

12. What is the difference between the biggest and smallest three-digit numbers which each formed by different digits?

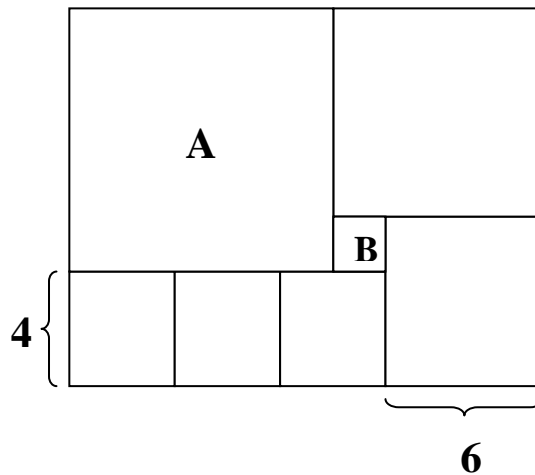
- a) 100 b) 889 c) 885 d) 81 e) 100

13. If $P \times Q = 10$, $Q \times R = 15$ and $P \times R = 54$ then what is the value of $P \times Q \times R$?

- a) 90 b) 49 c) 64 d) 81 e) 100

14. The figure, shown in the picture, consists of 7 squares. Square A is the biggest one; square B is the smallest one. How many squares B can square A be divided into?

- a) 30 b) 25 c) 20 d) 5
e) Impossible to determine



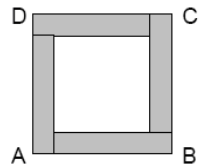
15. A number is called “palindrome” if it reads the same backwards as forwards. For example, 13931 is palindrome. What is the difference between the least 5 digit palindrome number and the greatest 6-digit palindrome number?

- a) 998998 b) 989989 c) 989998 d) 999898 e) 999988

SECTION B

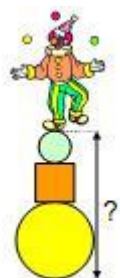
16. Square ABCD is consist of one inner square and four congruent rectangles. Each colored rectangle has a perimeter of 18 cm. What is the area of square ABCD?

- a) 36 b) 49 c) 64 d) 81 e) 100



17. The picture shows Zama the clown dancing at the top of two balls and one cubic box. The radius of the lower ball is 9 dm, the radius of upper ball is three times less. The side of cubic box is 8 dm longer than radius of the upper ball. How high above the ground is Zama standing?

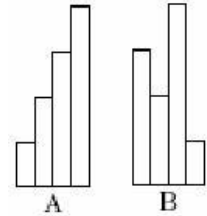
- a) 24 b) 26 c) 28 d) 32 e) 35



18. Marry got either a 90% or a 80% on each of her 5 maths tests. The average of all her maths tests is 84 %. How many 80% did she get?

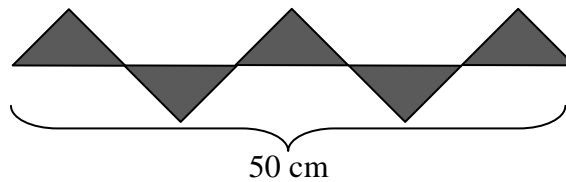
- a) 1 b) 2 c) 3 d) 4 e) 5

19. Figure A is made of 4 rectangles each 5 inches wide and each rectangle is 20 inches longer than the previous. Figure B is made by rearranging the rectangle that make up figure A. By how much does the perimeter of B exceed the perimeter of A?



- a) 40 in b) 25 in c) 10 in d) 20 in e) No change

20. The figure on the drawing consists of five isosceles right triangles of equal size. Find the area of the shaded figure.



- a) 125 cm² b) 75 cm² c) 100 cm² d) 150 cm² e) 50 cm²

21. Eighteen grade 6 learners hired a bus for their trip to Port Elizabeth. Just before they started their trip 6 more learners decided to go. This resulted in each of original 18 learners getting R50 back. What was the hiring coast of the bus?

- a) R3200 b) R4900 c) R6400 d) R3600 e) R4200

22. Tinyiko has 20 small balls of different colours: yellow, green, blue and black. 18 of the balls are not green, 6 are black, 13 are not yellow. How many blue balls does Tinyiko have?

- a) 8 b) 3 c) 5 d) 6 e) 4



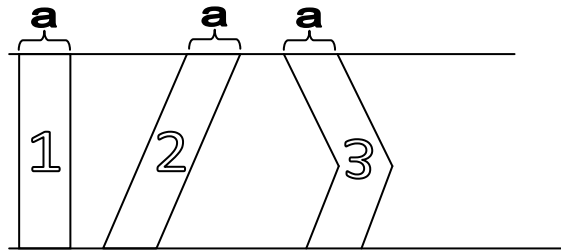
pppst.com

23. Which of the following numbers is odd for every integer n ?

- a) $2009n$ b) n^2+2009 c) n^3 d) $n+2010$ e) $2n^2+2009$

24. In the picture, three strips 1, 2, 3 are marked of the same horizontal width a . These strips connect the two parallel lines. Which strip has the biggest area?

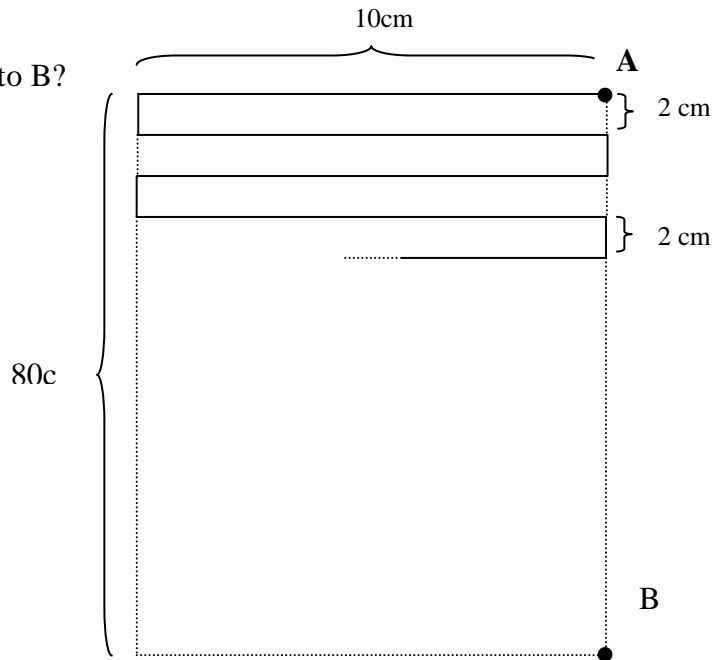
- a) All three strips have the same area
 b) Strip 1
 c) Strip 2
 d) Strip 3
 e) It is impossible to determine



25. Use the diagram:

What is the length of broken line from A to B?

- a) 800 cm
 b) 480 cm
 c) 490 cm
 d) 880 cm
 e) 860 cm



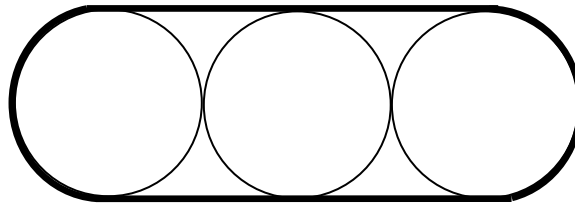
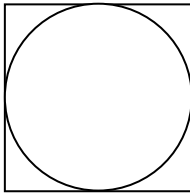
26. Thabo has 12 identical cubes, each with the edge 1 cm long. He used all cubes to construct a rectangular prism. The perimeter of the base of that prism is 6 cm. What is its height?

- a) 5 cm b) 10 cm c) 7 cm d) 6 cm e) 4 cm

27. The value of the expression $(1 + \frac{1}{2}) \times (1 + \frac{1}{3}) \times \dots \times (1 + \frac{1}{2009})$ is equal to

- a) 2008 b) 2009 c) 2010 d) $\frac{1}{2009}$ e) 1005

28. Area of the square in the picture is S and the area of each of the circle is C . What is the area enclosed by the thick line?



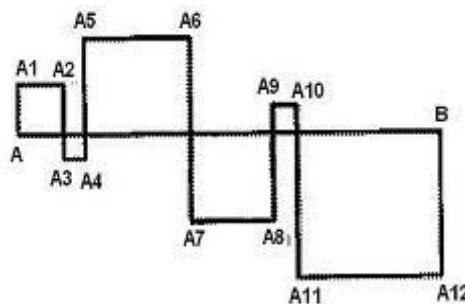
- a) $3C+S$ b) $S+2C$ c) $2S+C$ d) $2S+2C$ e) $S+3C$

29. In this addition each of the letters X, Y, and Z represents a distinct non-zero digit. The letter X will then have to stand for

$$\begin{array}{r} XX \\ YY \\ ZZ \\ \hline ZYX \end{array}$$

- a) 1 b) 2 c) 7 d) 8 e) 9

30. The squares on the figure are formed by intersecting the segment AB by the broken line $AA_1A_2\dots A_{12}B$. The length of AB is 24 cm. What is the length of the broken line $AA_1A_2\dots A_{12}B$?



- a) 48 cm b) 72 cm c) 96 cm d) 56 cm e) 106 cm

