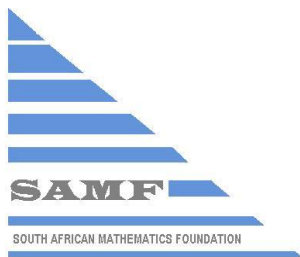


SOUTH AFRICAN MATHEMATICS OLYMPIAD



Organised by the
SOUTH AFRICAN MATHEMATICS FOUNDATION

2014 FIRST ROUND JUNIOR SECTION: GRADE 8

13 March 2014

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.***



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Organisations involved: AMESA, SA Mathematical Society,
SA Akademie vir Wetenskap en Kuns



Grade 8 First Round 2014

1. The value of $\frac{2 \times 0 \times 1 \times 4}{2 + 0 + 1 + 4}$ is

(A) 0 (B) 1 (C) 2 (D) 4 (E) 5

2. In the grid the three numbers in each horizontal row, vertical column and diagonal add up to 15. The value of x is

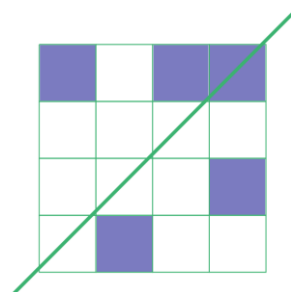
x		
	5	
6	7	

(A) 0 (B) 3 (C) 7 (D) 8 (E) 9

3. $360 \times 20 - 24 \times 300 =$

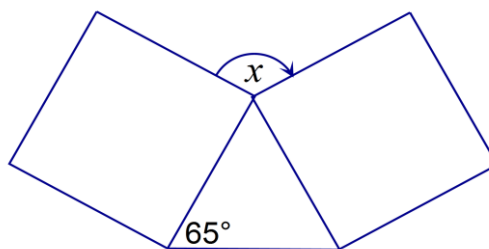
(A) 360 (B) 240 (C) 72 (D) 36 (E) 0

4. Some squares in a grid have been filled in. If the picture must be symmetrical about the diagonal line, more squares need to be shaded. When that has been done the maximum number of small squares not shaded is



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

5. Two identical squares meet at a vertex as shown. The size of the angle marked x is



(A) 105° (B) 120° (C) 130° (D) 150° (E) 160°

6. Which of the following is an odd number?

- (A) $2 + 0 \times 1 \times 4$ (B) $2 \times 0 + 1 \times 4$ (C) $2 \times 0 + 1 + 4$
 (D) $2 + 0 \times 1 + 4$ (E) $2 + 0 + 1 \times 4$

7. The product of three prime numbers is 42. The sum of these three numbers is

- (A) 12 (B) 13 (C) 14 (D) 15 (E) 16

8. If the pattern shown is continued, the number that will appear directly below 49 is

1
 2 3 4
 5 6 7 8 9
 10 11 12 13 14 15 16

- (A) 63 (B) 64 (C) 65 (D) 66 (E) 67

9. Let $\begin{bmatrix} a \\ b \\ c \end{bmatrix}$ be defined as $a^b - c$. The value of $\begin{bmatrix} 5 \\ 2 \\ 6 \end{bmatrix}$ is

- (A) 17 (B) 18 (C) 19 (D) 20 (E) 21

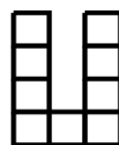
10. Some arrangements of blocks are shown in the diagram:



Pattern 1



Pattern 2

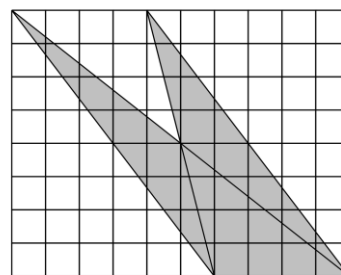


Pattern 3

The number of blocks in Pattern 10 is

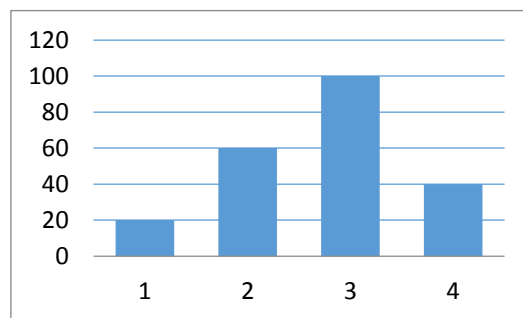
- (A) 15 (B) 17 (C) 19 (D) 21 (E) 23

11. A 10×8 grid is made up of squares each with side 1 cm. The area of the shaded region is



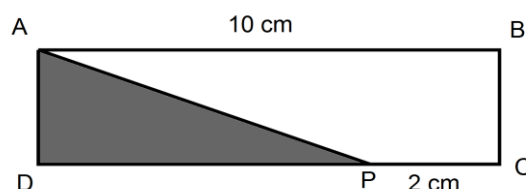
- (A) 10 cm^2 (B) 16 cm^2 (C) 20 cm^2 (D) 24 cm^2 (E) 28 cm^2

12. Boris has been training for four weeks. Each week he records the total distance he ran that week in a bar graph. How far must he run in the fifth week for his average distance per week to be 60 km?

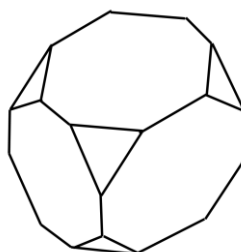


- (A) 20 km (B) 40 km (C) 60 km (D) 80 km (E) 100 km
13. Three normal dice are rolled. The probability that they all show the same number is
- (A) $\frac{1}{6}$ (B) $\frac{1}{12}$ (C) $\frac{1}{18}$ (D) $\frac{1}{36}$ (E) $\frac{1}{72}$

14. A rectangle of length 10 cm has a triangle shaded in it, as shown. The length CP is 2 cm and the shaded area is 12 cm^2 . The area of the rectangle is



- (A) 28 cm^2 (B) 30 cm^2 (C) 32 cm^2 (D) 36 cm^2 (E) 40 cm^2
15. A cube has all its corners cut off as shown. How many edges does the solid have now?



- (A) 12 (B) 18 (C) 24 (D) 30 (E) 36
16. A rectangle is divided into four smaller rectangles by lines parallel to its sides. The areas of three of the small rectangles are given in the diagram, which is not drawn to scale. The area of the fourth small rectangle is

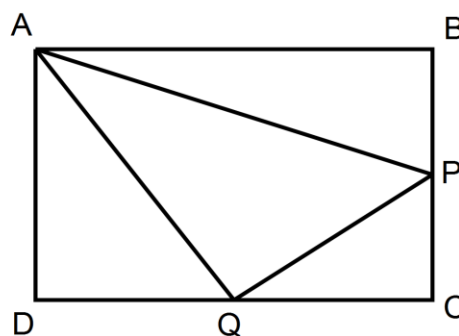
12	20
21	

- (A) 25 (B) 30 (C) 35 (D) 40 (E) 45

17. The value of $\sqrt{(9)^{\sqrt{4}} \times (\sqrt{9})^4}$ is

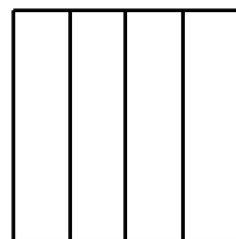
- (A) 4 (B) 9 (C) 27 (D) 36 (E) 81

18. P is the midpoint of side BC of a rectangle, and Q is the midpoint of side DC. The area of rectangle ABCD is 72 cm^2 . The area of triangle APQ is



- (A) 21 cm^2 (B) 27 cm^2 (C) 30 cm^2 (D) 36 cm^2 (E) 40 cm^2

19. A square is divided into four identical rectangles as shown. The perimeter of each of the four rectangles is 20 units. The perimeter of the square is



- (A) 28 units (B) 32 units (C) 36 units (D) 40 units (E) 48 units

20. Four points are on a line segment as shown below. If $AB : BC = 1 : 3$ and $BC : CD = 9 : 5$ then $AB : BD$ is



- (A) 3 : 14 (B) 1 : 4 (C) 2 : 9 (D) 1 : 5 (E) 1 : 6