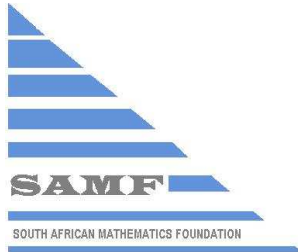




# SOUTH AFRICAN MATHEMATICS OLYMPIAD



Organised by the  
**SOUTH AFRICAN MATHEMATICS FOUNDATION**

## 2009 FIRST ROUND JUNIOR SECTION: GRADES 8 AND 9

**18 March 2009**

**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:
  - 3.1. Each correct answer is worth 5 marks.
  - 3.2. There is no penalty for an incorrect answer or any unanswered question.
4. You must use an HB pencil. Rough paper, a ruler and an eraser 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. Start when the invigilator tells you to do so. You have 60 minutes to complete the question paper.
8. Answers and solutions will be available at [www.samf.ac.za](http://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



## PRACTICE EXAMPLES

1.  $23 + 6 - 4 =$

- A) 6            B) 23            C) 25            D) 29            E) 33

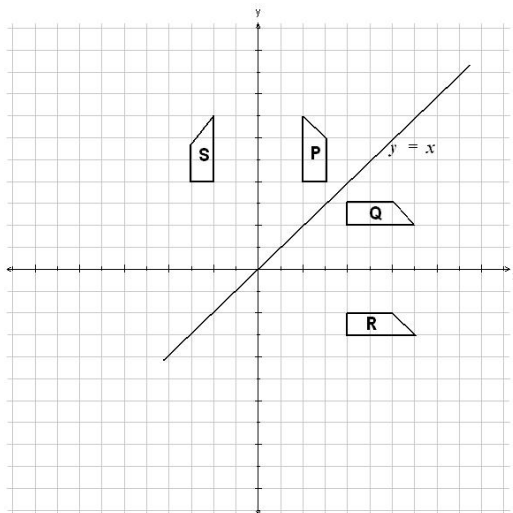
2.  $\frac{1}{5} + \frac{2}{3} \times \frac{1}{2}$  equals

- A)  $\frac{1}{15}$             B)  $\frac{3}{11}$             C)  $\frac{21}{50}$             D)  $\frac{8}{15}$             E)  $9\frac{4}{5}$

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

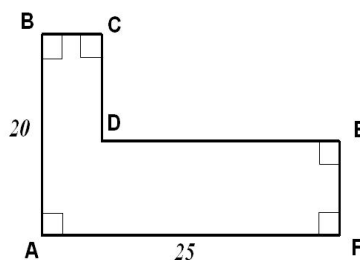
1. Which of the following numbers is the smallest?  
(A) 0,2009      (B) 0,209      (C) 0,029      (D) 0,02009      (E) 0,0209
- 
2. Themba and James sell cakes at school socials. At the first social they sold 50 cakes, and at the second social they sold 58 cakes. The percentage increase in their sales was:  
(A) 14      (B) 15      (C) 16      (D) 17      (E) 18
- 
3. The value of  $3 \div \frac{3}{8}$  is  
(A) 3      (B) 6      (C) 7      (D) 8      (E) 9
- 
4. A group of children see a herd of cattle in the veld. They count the total number of legs and the total number of ears of the cattle. The difference between these two numbers is 92. The number of animals in the herd is:  
(A) 23      (B) 46      (C) 92      (D) 184      (E) Impossible to tell
- 
5. The desks in a classroom are lined up in straight rows. Vusani's desk is in the third row from the front and the fourth row from the back of the classroom. His desk is also the fourth from the left and the sixth from the right.  
The total number of desks in the classroom is:  
(A) 24      (B) 70      (C) 40      (D) 72      (E) 54
- 
6. Pieter and Jacob share a packet of sweets in the ratio 7 : 5. Pieter gets 14 sweets more than Jacob. The number of sweets that was in the packet is:  
(A) 84      (B) 24      (C) 56      (D) 49      (E) 26
-

7. In the given diagram, the two shapes which are reflections of each other in the line  $y = x$  are:



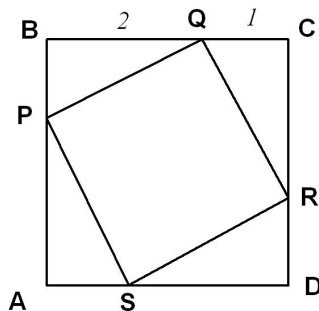
- (A) P and Q (B) P and S (C) R and S (D) Q and R (E) P and R
- 

8. The perimeter of the figure ABCDEF is:



- (A) 75 (B) 80 (C) 85 (D) 90 (E) 95
- 

9. Points  $P$ ,  $Q$ ,  $R$ , and  $S$  are marked on the sides of square  $ABCD$  so that each side is divided in the ratio  $2 : 1$ , and therefore  $PQRS$  is a square. The ratio of the area of  $PQRS$  to the area of  $ABCD$  is:



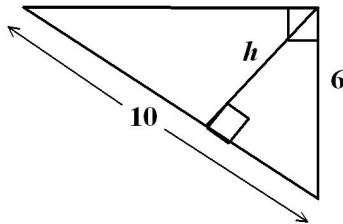
- (A)  $\frac{\sqrt{6}}{9}$  (B)  $\frac{4}{9}$  (C)  $\frac{\sqrt{5}}{9}$  (D)  $\frac{5}{9}$  (E)  $\frac{2}{3}$
-

10. A fraction that lies between  $\frac{4}{7}$  and  $\frac{5}{8}$  is:  
(A)  $\frac{19}{56}$       (B)  $\frac{32}{56}$       (C)  $\frac{33}{56}$       (D)  $\frac{35}{56}$       (E)  $\frac{37}{56}$
- 

11. Liesl has three types of toys: teddybears, cars and jets.  
All her toys except 21 are jets.  
All her toys except 23 are teddybears.  
All her toys except 26 are cars.  
The number of jets she has is:  
(A) 14      (B) 13      (C) 12      (D) 11      (E) 10
- 

12.  $1287a45b$  is an 8-digit number, where  $a$  and  $b$  are not zero. The number is divisible by 18. The maximum possible difference between  $a$  and  $b$  is:  
(A) 4      (B) 5      (C) 6      (D) 7      (E) 8
- 

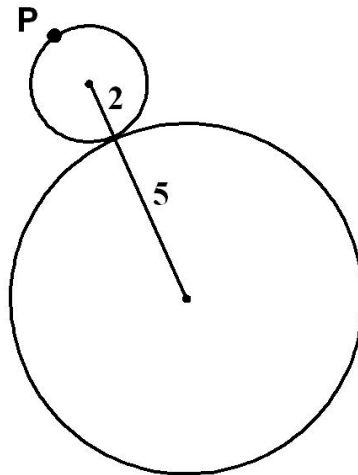
13. The value of  $h$  in the figure is:



- (A)  $\frac{24}{5}$       (B)  $\frac{5}{3}$       (C)  $\sqrt{61}$       (D)  $\frac{18}{5}$       (E)  $\frac{\sqrt{10}}{3}$
- 

14. A beadworker is threading beads onto a straight wire; he has four green beads and two red beads and will use them all. The number of different arrangements he can make is:  
(A) 13      (B) 14      (C) 15      (D) 16      (E) 17
-

15. A small wheel of radius 2 cm rolls around the circumference of a larger wheel of radius 5 cm without slipping. The small wheel has a black spot on it at the point marked P. If the small wheel starts rolling from the position shown in the diagram, how many times will the point P touch the circumference of the larger wheel before P comes back to its original position (and the small circle comes back to its original position)?

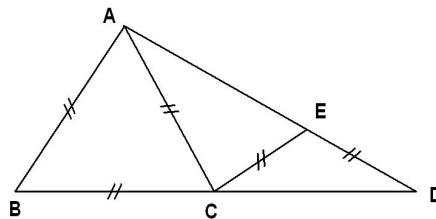


- (A) 2                      (B) 3                      (C) 4                      (D) 5                      (E) 6
- 

16.  $ABD$  is a triangle with points  $C$  and  $E$  on its sides so that

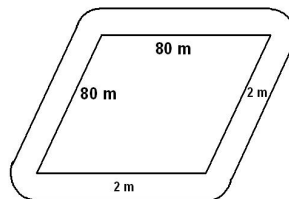
$$CB = AB = AC = CE = ED.$$

The size of  $\angle D$  is:



- (A)  $15^\circ$                       (B)  $20^\circ$                       (C)  $25^\circ$                       (D)  $30^\circ$                       (E)  $35^\circ$
- 

17. A field is in the shape of a rhombus; the length of any one side is 80 m. A path of constant width 2 m goes all round the field. The area of the path, in  $\text{m}^2$ , is:



- (A)  $320 + \pi$     (B)  $320 + 2\pi$     (C)  $640 + 2\pi$     (D)  $640 + 4\pi$     (E)  $4(80 + \pi)$
-

18. Part of Pascal's Triangle is shown:

						1					Row 1					
							1		1		Row 2					
							1		2		1	Row 3				
							1		3		3		1	Row 4		
							1		4		6		4		1	Row 5

If this pattern is continued, in which row does the  $2009^{\text{th}}$  number appear?

- (A) Row 60   (B) Row 61   (C) Row 62   (D) Row 63   (E) Row 64
- 

19. The sum of the digits of  $(111\ 111)^2$  is:

- (A) 25   (B) 36   (C) 49   (D) 64   (E) 81
- 

20. The number of positive integers  $n$  for which  $3n - 6$  is divisible by  $n - 1$  is:

- (A) 0   (B) 1   (C) 2   (D) 3   (E) 4
-

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[www.samf.ac.za/MathTalentSearch](http://www.samf.ac.za/MathTalentSearch)