SOUTH AFRICAN MATHEMATICS OLYMPIAD

Organised by the
SOUTH AFRICAN MATHEMATICS FOUNDATION

2012 FIRST ROUND
JUNIOR SECTION: GRADE 9

19 March 2012 **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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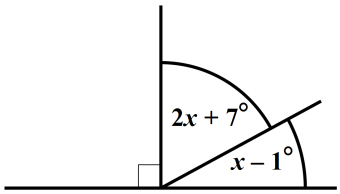
Organisations involved: AMESA, SA Mathematical Society,
SA Akademie vir Wetenskap en Kuns

1. $\frac{1}{2}+\frac{1}{3}=$

(A) $\frac{1}{5}$ (B) $\frac{5}{6}$ (C) $\frac{3}{5}$ (D) $\frac{4}{5}$ (E) 1

2. The value of x is

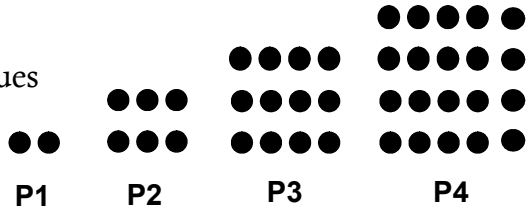


(A) 28º (B) 30º (C) 34º (D) 38º (E) 40º

3. A sheet of paper has been folded 4 times, and now has thickness 2,5 mm. If it were possible to fold it 10 times its thickness would become

(A) 25 mm (B) 32 mm (C) 64 mm (D) 128 mm (E) 160 mm

4. Betty makes patterns of dots as shown. If she continues like this, the number of dots in P30 will be



(A) 900 (B) 910 (C) 920 (D) 930 (E) 940

5. Two primes add up to 36. Their product is not

(A) 323 (B) 299 (C) 155 (D) 203 (E) 161

6. South America and Africa are drifting apart at 30 cm per century. Approximately how many millimetres is that per week?

(A) 60 (B) 30 (C) 6 (D) 0,6 (E) 0,06

7. A racing cyclist circles the cycling track every 2 minutes and 40 seconds. How many full laps will he complete in four hours at the same rate?

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

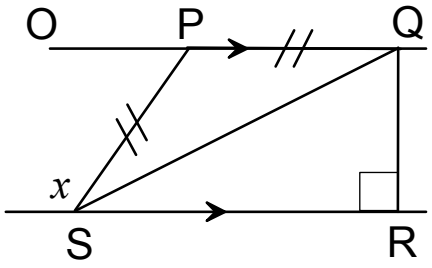
8. My cellphone costs me a monthly subscription plus a charge per minute of talking. If I talk for 12 minutes the total cost is R25, and if I talk for 15 minutes the total cost is R 28. The total cost if I talk for 25 minutes will be

(A) R 34 (B) R 38 (C) R 42 (D) R 46 (E) R 50

9. If n^* means $2n + 1$, then the value of $(3^*)^*$ is

(A) 9 (B) 11 (C) 13 (D) 15 (E) 17

10. OQ is parallel to SR and PS = PQ. In terms of x, the size of $R\hat{Q}S$ is

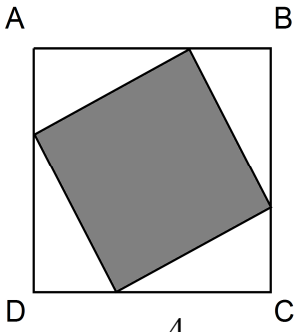


(A) $\frac{x}{3}$ (B) $90^\circ - x$ (C) $\frac{x}{2}$ (D) $45^\circ - x$ (E) $45^\circ + x$

11. In order to achieve a total of 400 the number of terms in the sum $1 + 3 + 5 + 7 + \ldots$. must be

(A) 12 (B) 14 (C) 16 (D) 18 (E) 20

12. ABCD is a square of side 3 units. Points that divide its sides in the ratio 2:1 are joined to form a new, shaded, square. The proportion of the original square which is shaded is

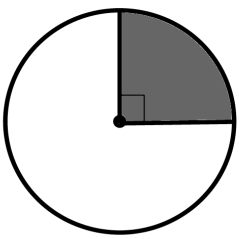


(A) $\frac{5}{9}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{7}{9}$ (E) $\frac{4}{9}$

13. Anne is now three times as old as she was three years before she was half as old as she is now. Anne's age now is

(A) 9 (B) 12 (C) 15 (D) 16 (E) 18

14. The shaded quarter-circle has area 9π. The perimeter of the shaded region is



(A) 3π (B) $3(\pi + 4)$ (C) 6π (D) $6\pi + 4$ (E) $6\pi + 12$

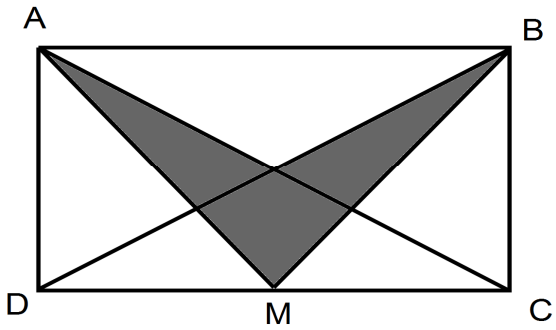
15. How many three-digit **odd** numbers become bigger when their digits are reversed?

(A) 120 (B) 145 (C) 200 (D) 260 (E) 360

16. If M and N are natural numbers, and if exactly one of the following sentences is true, which is it?

(A) M is odd
(B) N^2 is even
(C) M – N is odd
(D) N is odd
(E) M, N have no common factor other than 1

17. M is the midpoint of the side DC of rectangle ABCD. The fraction of the rectangle that is shaded is



(A) $\frac{2}{5}$ (B) $\frac{1}{4}$ (C) $\frac{1}{2}$ (D) $\frac{3}{5}$ (E) $\frac{1}{3}$

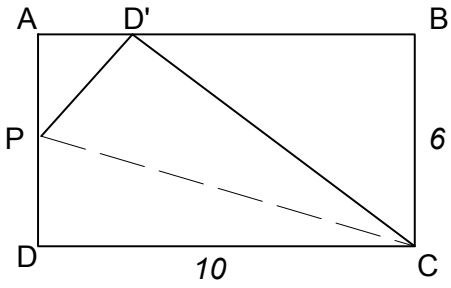
18. Shona has already scored a practical mark of 82%, and will also write a test. If $\frac{3}{4}$ of her final mark is obtained from the practical and the other $\frac{1}{4}$ from the test, then if she wants a final mark of exactly 80% the score she needs to get in the test is

(A) 70 % (B) 72 % (C) 74% (D) 76 % (E) 78 %

19. The remainder when $1^2 + 3^2 + 5^2 + 7^2 + \ldots + 1013^2$ is divided by 8 is

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

20. The rectangle ABCD is folded about the line CP so that D falls on AB in the position marked D'. BC = 6 cm and CD = 10 cm. The distance DP is (in cm)



(A) $\frac{10}{3}$ (B) 3 (C) $\frac{8}{3}$ (D) $\sqrt{13}$ (E) $\sqrt{10}$