Asia Pacific Mathematical Olympiad for Primary Schools 2015

First Round
2 hours
(150 marks)

1. Amy and Ben start running on a 200-metre circular track at the same time and starting point in a clockwise direction. The speeds of Amy and Ben are 6 m/s and 4 m/s respectively. How many times did Amy overtake Ben within the first 16 minutes of the run?

(SMOPS 2015 Q. 1)

2. A cuboid has its length, breadth and height in the ratio of 4 : 3 : 2. Given that the sum of all its edges is 72 cm, find the volume of the cuboid.

(SMOPS 2015 Q. 2)

3. Find the value of

$$(101 + 234 + 567) \times (234 + 567 + 89) - (101 + 234 + 567 + 89) \times (234 + 567)$$

(SMOPS 2015 Q. 3)

4. There are 10 red, yellow and green balls in a container. The balls are identical in size. The red balls are marked with the number "4" while the yellow and green balls are marked with "5" and "6" respectively. If 8 balls are drawn and the sum of numbers on the balls is 39, how many of these are red balls?

(SMOPS 2015 Q. 4)

5. Given that

$$\frac{5}{9} < \frac{9}{A} < 1$$

where A is an integer, find the number of possible values of A.

(SMOPS 2015 Q. 5)

6. A certain month has 31 days and the number of Mondays and Fridays are the same. On which day of the week will the 10th of the month be?

(SMOPS 2015 Q. 6)

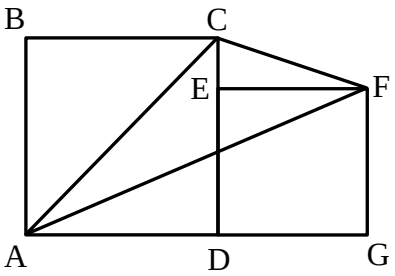
7. When a whole number N is multiplied by 411, the last 4 digits of the result are 2015. Find the smallest value of N.

(SMOPS 2015 Q. 7)

8. A standard soccer ball is a sphere made up of 32 regular pentagons and hexagons. The diagram below shows a sample of a soccer ball where the hexagons are white and the pentagons are black. How many hexagons are there on the surface of a soccer ball?

(SMOPS 2015 Q. 8)

9. The diagram below shows two squares ABCD and DEFG where ADG is a straight line and the point E lies on DC. The length of each side of square ABCD is 8 cm. What is the area of triangle ACF?

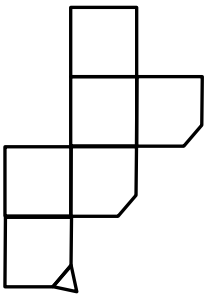


(SMOPS 2015 Q. 9)

10. During a class gathering, Andy bought some bottled drinks under a special offer from a supermarket. For every 5 empty bottles, Andy can exchange 1 free bottled drink from the supermarket. Andy's class drank a total of 109 bottled drinks, some of which are obtained from the exchange of empty bottles. How many bottled drinks did Andy buy?

(SMOPS 2015 Q. 10)

11. The figure below shows the net expansion of a solid figure. Find the number of edges of this solid figure.



(SMOPS 2015 Q. 11)

12. Given that 2^{29} is a number comprising 9 different digits, which digit is not in this number?

(SMOPS 2015 Q. 12)

13. In a class of 52 students, there are 30 students who can swim, 35 students who can cycle and 42 students who can play table tennis. At least how many students are there in this class who can swim, cycle and play table tennis?

(SMOPS 2015 Q. 13)

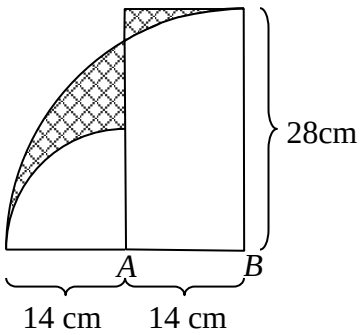
14. A transport company has two types of delivery trucks. A larger truck can carry 7 tons of goods and a smaller truck can carry 4 tons of goods. The fuel consumption for a larger truck and a smaller truck is 14 litres per trip and 9 litres per trip respectively. Find the minimum total fuel consumption required for the company to deliver 89 tons of goods.

(SMOPS 2015 Q. 14)

15. The sum of the other interior angles of a convex polygon, excluding an interior angle of a vertex, is 2015°. What is the measure of this excluded interior angle?

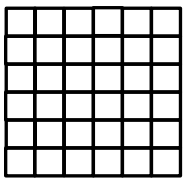
(SMOPS 2015 Q. 15)

16. In the diagram below, points A and B are the centres of 2 quadrants with radius 14 cm and 28 cm respectively. What is the difference in area between the two shaded regions? Take $\pi = \frac{22}{7}$.



(SMOPS 2015 Q. 16)

17. The diagram below shows a 6 × 6 grid.



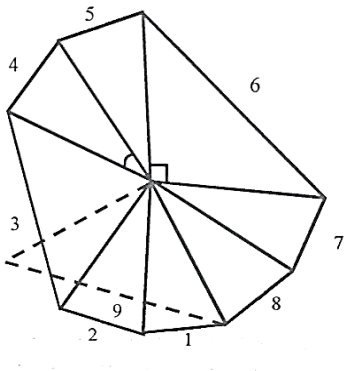
How many shapes of  ,  ,  and  are there altogether in a 6 × 6 grid?

(SMOPS 2015 Q. 17)

18. When an integer is divided by another, the quotient is 15 and the remainder is 5. Given that the sum of the dividend, divisor, quotient and remainder is 2169, find the value of the dividend.

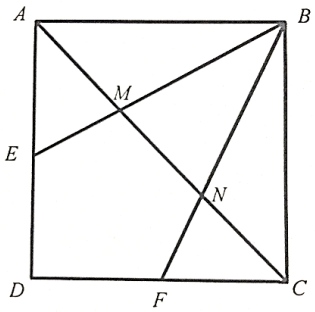
(SMOPS 2015 Q. 18)

19. The figure below, not drawn to scale, is formed by combining two types of triangles. Triangle 1 and 2 are isosceles triangles each with a 30° angle at one of its vertices. Triangle 3 is a right-angled isosceles triangle. Triangles 4 and 5 are isosceles triangles each with a vertex of 30°. Triangle 6 is a right-angled isosceles triangle. This pattern continues with subsequent isosceles triangles. Given that the n^{th} triangle overlaps with Triangle 1, find the smallest possible value of n.



(SMOPS 2015 Q. 19)

20. The diagram below shows a square ABCD and the points E and F are mid-points of AD and CD respectively. BE and BF intersect the diagonal AC at points M and N respectively. Given that the area of the square is 48 cm^2, find the area of the pentagon EDFNM.



(SMOPS 2015 Q. 20)

21. Four soccer teams played matches with each other. In each match, the winning team scored 3 points while the losing team scored 0 point. If the two teams end in a draw, both teams each scored 1 point. The final scores of the four teams are consecutive numbers. Find the product of the four numbers.

(SMOPS 2015 Q. 21)

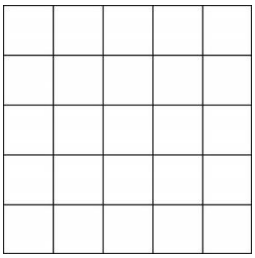
22. A large pool uses 5 taps to fill it up with water. If the 1st to 4th taps are turned on, it will take 6 hours to fill up the pool completely with water. If the 2nd to 5th taps are turned on, it will take 8 hours. If the 1st and 5th taps are turned on, it will take 12 hours. How many hours will it take the 5th tap alone to fill up the pool completely with water?

(SMOPS 2015 Q. 22)

23. Let $N = 5 \times 10 \times 15 \times 20 \times \ldots \times 2010 \times 2015$. How many consecutive zeroes are there altogether at the end of the number N?

(SMOPS 2015 Q. 23)

24. In the 5 × 5 grid below, some squares are to be shaded such that in any 3 × 3 grid, there are exactly 4 shaded squares. At least how many squares are to be shaded in the 5 × 5 grid?



(SMOPS 2015 Q. 24)

25. There are 49 balls in a bag. Each ball was labelled with a number from 1 to 49. Some balls are selected to form a circle such that the product of numbers on any two adjacent balls is always less than 100. What is the maximum number of balls to be selected?

(SMOPS 2015 Q. 25)

26. Alex and Bill started driving from Town A and B respectively at the same time to Town C which is in between. The ratio of Alex's speed to Bill's speed is 3 : 2. Alex reached Town C at 9 a.m. while Bill reached Town C at 7 p.m. on the same day. At what time of the day did both Alex and Bill meet along the route?

(SMOPS 2015 Q. 26)

27. Let each of a, b and c represent a digit from 0 to 9 but not necessarily distinct. The recurring decimal $0.\dot{a}b\dot{c}$ can be represented as a fraction in its simplest form. Find the number of different numerators.

(SMOPS 2015 Q. 27)

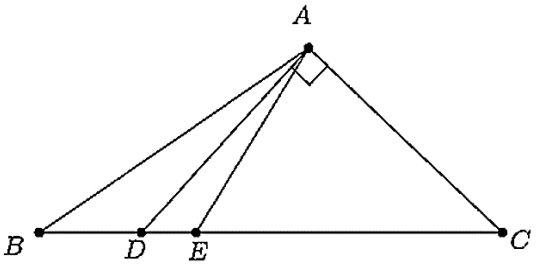
28. Five poker cards A, K, Q, J and 10 are to be placed into five envelopes labelled A, K, Q, J and 10 respectively. If each envelope contained only 1 card, how many ways are there to place these five poker cards into the five envelopes such that the last card would be placed in a wrong envelope?

(SMOPS 2015 Q. 28)

29. How many 5-digit numbers are there such that each is divisible by 3 and comprises at least one digit '3'?

(SMOPS 2015 Q. 29)

30. In the following figure, not drawn to scale, B, D, E and C lie on a straight line. Given that ∠BAD = ∠DAE = 12°, AC is perpendicular to AD, and BC = AB + AE, find ∠ABC in degrees.



(SMOPS 2015 Q. 30)

Number of correct answers for Q1 to Q10 : _____ Marks (×4) : _____
Number of correct answers for Q11 to Q20 : _____ Marks (×5) : _____
Number of correct answers for Q21 to Q30 : _____ Marks (×6) : _____

Answers:

SMOPS 2015					
1	9	11	15	21	120
2	192	12	4	22	48
3	8989	13	3	23	398
4	1/2/3/4	14	181	24	7
5	7	15	145	25	18
6	Thursday	16	70	26	1 p.m.
7	2365	17	100	27	648
8	20	18	2015	28	44
9	32	19	23	29	12504
10	88	20	16	30	44