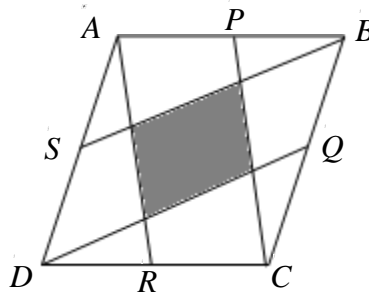**Asia Pacific Mathematical Olympiad
for Primary Schools 2012**

**First Round
2 hours
(150 marks)**

1. Find the value of $29999 + 2999 + 299 + 29 + 9$.

(SMOPS 2012 Q.1)

2. *ABCD* is a parallelogram. *P*, *Q*, *R* and *S* are the midpoints of the 4 sides of the parallelogram. If the area of the shaded region is 20cm², find the area of the parallelogram *ABCD*.
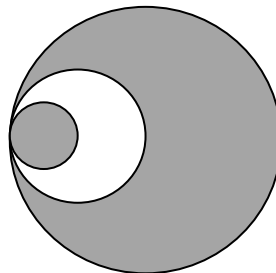

(SMOPS 2012 Q.2)

3. Jane added up all the digits of the whole number

$$\underbrace{3 \times 3 \times 3 \times ... 3}_{product\ of\ 2012\ of\ 3's}$$

and obtained a new number n_1. She then added up all the digits of n_1 and obtained another number n_2. She continued doing this until she obtained a single digit number. Find the value of this number.

(SMOPS 2012 Q.3)

4. The diagram shows 3 circles. The circumference of the smallest circle passes through the centre of the middle circle and the circumference of the middle circle passes through the centre of the largest circle. Find the ratio of the shaded area to the unshaded area.
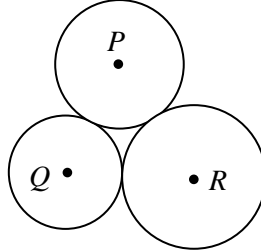

(SMOPS 2012 Q.4)

5. The product of 4 consecutive whole numbers is 5040. Find the value of the smallest number.

(SMOPS 2012 Q.5)

6. The diagram shows 3 circles with centres *P*, *Q* and *R* respectively. Each circle has a point of contact with the other circles. If *PQ* = 35cm, *QR* = 36cm, and *PR* = 37cm, find the radius of the circle with centre *R*.

(SMOPS 2012 Q.6)

7. 12! is equal to
    (1)   479001600
    (2)   479000610
    (3)   479000160
    (4)   479000061
    (5)   479000016
    [Note: $n! = (n) \times (n-1) \times (n-2) \times ... \times 3 \times 2 \times 1$, for example $5! = 5 \times 4 \times 3 \times 2 \times 1$.]
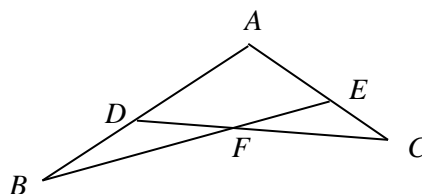
(SMOPS 2012 Q.7)

8. Only 1 of the 3 boys Abel, Ben and Cain can swim. Abel says, "I can swim." Ben says, "I cannot swim." Cain says, "Abel cannot swim." Only 1 boy is telling the truth. Who can swim?

(SMOPS 2012 Q.8)

9. 10 boys received their test papers. The test paper has a maximum score of 10. Each boy added the scores of the other 9 boys. If the 10 totals obtained are 66, 66, 67, 67, 68, 68, 69, 70, 71 and 72, find the lowest score.
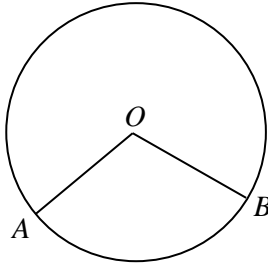
(SMOPS 2012 Q.9)

10. In the diagram, *D* and *E* are the mid-points of *AB* and *AC* respectively. *BE* cuts *CD* at *F*. If the area of the 4-sided figure *ADFE* is 256cm², find the area of the triangle *ABE*.

(SMOPS 2012 Q.10)

11. A circle with centre O passes through points A and B as shown. If the circle has a radius of 5 cm and angle AOB is 120°, find the radius of another circle that passes through points O, A and B.

(SMOPS 2012 Q.11)

12. A line can divide a plane into a maximum of 2 regions. 2 lines can divide a plane into a maximum of 4 regions. Find the number of regions that 5 lines can divide a plane into.

(SMOPS 2012 Q.12)

13. Find the value of
$$\frac{1}{1} + \frac{1}{2} + \frac{2}{2} + \frac{1}{3} + \frac{2}{3} + \frac{3}{3} + \frac{1}{4} + \frac{2}{4} + \frac{3}{4} + \frac{4}{4} + \cdots + \frac{1}{100} + \frac{2}{100} + \frac{3}{100} + \cdots + \frac{98}{100} + \frac{99}{100} + \frac{100}{100}.$$

(SMOPS 2012 Q.13)

14. Trains A and B are travelling towards each other at 48 km/h. In train A, Jane notices that it takes 6 seconds for train B to pass her. Find the length of train B in metres.

(SMOPS 2012 Q.14)

15. Find the largest whole number smaller than
$$\frac{1}{\frac{1}{101} + \frac{1}{102} + \cdots + \frac{1}{109} + \frac{1}{110}}$$

(SMOPS 2012 Q.15)

16. Find the largest whole number k such that $\underbrace{12 \times 12 \times 12 \cdots \times 12}_{50} > \underbrace{k \times k \times k \cdots \times k}_{75}.$
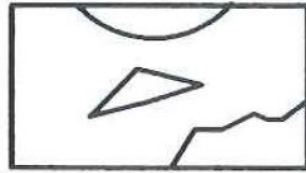
(SMOPS 2012 Q.16)

17. Jane was given a sum of money for her 10 day trip. At the end of day 1, she spent $\frac{1}{10}$ of the money. At the end of day 2, she spent $\frac{1}{9}$ of the remaining sum. At the end of day 3, she spent $\frac{1}{8} \cdots$. At the end of day 9, she spent $\frac{1}{2}$ of the remaining sum and has \$99 left. How much money did she have at the beginning?

(SMOPS 2012 Q.17)

18. 4 classes, *A*, *B*, *C* and *D* each has less than 50 students and the average number of students is 46. Class *A* and class *B* differ in number of students by 4, class *B* and class *C* by 3, and class *C* and class *D* by 2. If class *A* has the most numbers of students, find the number of students in *A*.
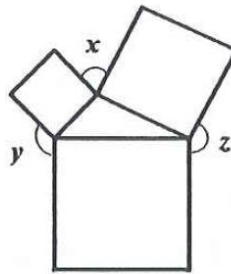
(SMOPS 2012 Q.18)

19. The diagram shows a figure comprising 4 regions. 4 different colours are used at most to colour the figure such that each region is coloured by only 1 colour and regions adjacent to each other cannot have the same colour. Find the number of different ways to colour the figure.
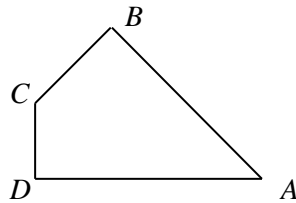

(SMOPS 2012 Q.19)

20. The figure consists of 3 squares and a triangle. Find the sum of angles x, y and z in degrees.

(SMOPS 2012 Q.20)

21. In the diagram, $AD = 6$ cm, $BC = 2$cm, angle $ABC = $ angle $ADC = 90°$ and angle $BCD = 135°$. Find the area of the 4-sided figure $ABCD$ in cm².
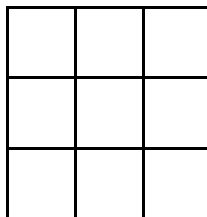

(SMOPS 2012 Q.21)

22. A bus was scheduled to travel from Town *A* to Town *B* at a constant speed of x km/h. If the speed of the bus increased by 20%, it could arrive at Town *B* two hours ahead of schedule. If the bus travelled the first 240 km at x km/h and then the speed decreased to 80%, it could arrive at Town *B* two hours behind schedule. Find the distance, in km, between the 2 towns.

(SMOPS 2012 Q.22)

23. In how many ways can we shaded exactly 2 of the 9 squares such that the 2 squares have no sides in common?

(SMOPS 2012 Q.23)

24. Jane has an alarm clock that is slower by 5 minutes for every actual hour. One night, Jane reset the clock correctly at **2100**. If she wanted the alarm clock to ring at **0700** (the actual time) the following morning, what is the time she should set for the clock to ring?
[**2100** denotes 9 p.m., **0700** denotes 7 a.m.]

(SMOPS 2012 Q.24)

25. A particular month has 5 Tuesdays. The first and the last day of the month are not Tuesdays. The last day of the month is a _____.
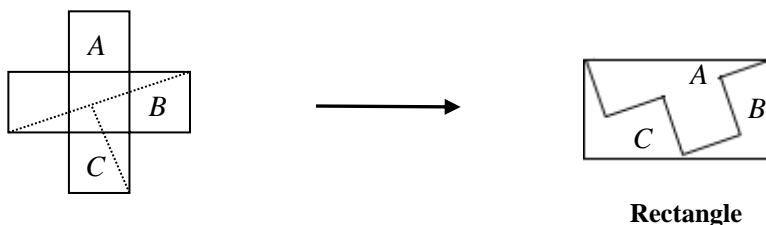
(SMOPS 2012 Q.25)

26. Find the value of
$$\left(1 - \frac{1}{2} - \frac{1}{3} - \cdots - \frac{1}{2011}\right) \times \left(\frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{2011} + \frac{1}{2012}\right) - \left(1 - \frac{1}{2} - \frac{1}{3} - \cdots - \frac{1}{2011} - \frac{1}{2012}\right) \times \left(\frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{2011}\right)$$

(SMOPS 2012 Q.26)

27. A cross shaped figure comprising 5 identical squares is cut into 3 prices *A*, *B* and *C* by 2 straight cuts as indicated by the dotted lines. *A*, *B* and *C* can be rearranged to form a rectangle as shown. If the length of the rectangle is 12 cm, find the width of the rectangle in cm.


Rectangle

(SMOPS 2012 Q.27)

28. David wants to go from level 2 to level 1 in a shopping centre. If he walks down 14 steps while taking the escalator, he can move from the top to the bottom of the escalator in 30 seconds. If he walks down 28 steps, he can do the same in 20 seconds. Find the number of steps of the escalator.

(SMOPS 2012 Q.28)

29. *ABE* and *BCD* are right-angled triangles. *D* lies on *BE* such that *AE = ED = DC* = 1 cm and *DB* = 2 cm. Find the value of angle *ABC* in degrees.
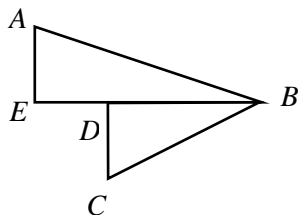
(SMOPS 2012 Q.29)

30. A 6-digit number $\overline{abcdef}$ is such that $\overline{defabc} = 6 \times \overline{abcdef}$. Find the 6-digit number $\overline{abcdef}$.

(SMOPS 2012 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 2012					
1	33335	11	5	21	16
2	100	12	16	22	720
3	9	13	2575	23	24
4	13:3	14	160	24	0610
5	7	15	10	25	Wed
6	19	16	5	26	$\frac{1}{2012}$
7	(1)	17	990	27	6
8	Ben	18	48	28	56
9	4	19	108	29	45
10	384	20	360	30	142857