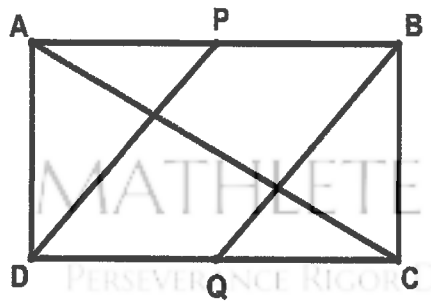
Mathlete Training Centre
SMOPS 2005

1. (SMOPS 2005Q1) There is a triangle and a circle on a plane. Find the greatest number of regions that the plane can be divided into by the triangle and the circle.

2. (SMOPS 2005Q2) The diagram shows a rectangle **ABCD**.
P and **Q** are the midpoints of **AB** and **CD** respectively.
What fraction of the rectangle is shaded?



3. (SMOPS 2005Q3) There is a glass of water and a glass of wine. A small amount of water is poured from the glass containing water into the glass containing wine. Then an equal amount of the wine-water mixture is poured back into the glass containing water.
Which one of the following statements is correct?
(A) There is now more water in the wine than there is wine in the water.
(B) There is now less water in the wine than there is wine in the water.
(C) There is now an equal amount of water in the wine as there is wine in the water.
(D) It is uncertain whether there is more or less water in the wine than wine in the water.

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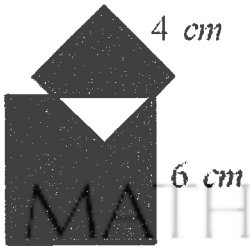
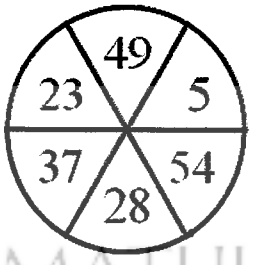
4. (SMOPS 2005Q4) Two squares with lengths 4 cm and 6 cm respectively are partially overlapped as shown in the diagram below. What is the difference between shaded area **A** and shaded area **B**?



5. (SMOPS 2005Q5) The diagram shows a dartboard.
What is the least number of throws needed in order to get a score of exactly 100?



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6. (SMOPS 2005Q6) Find the value of $1 - \frac{5}{6} + \frac{7}{12} - \frac{9}{20} + \frac{11}{30} - \frac{13}{42} + \frac{15}{56} - \frac{17}{72} + \frac{19}{90}$.

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7. (SMOPS 2005Q7) Julia and Timothy each has a sum of money.
   Julia's amount is $\frac{3}{5}$ that of Timothy's.
   If Timothy were to give Julia \$168 then his remaining amount would be $\frac{7}{9}$ that of Julia's.
   How much does Julia have originally?

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8. (SMOPS 2005Q8) When a number (the dividend) is divided by another number (the divisor), the quotient is 4 and the remainder is 8. Given that the sum of the dividend, the divisor, the quotient and the remainder is 415, find the dividend.
   (Note: When 17 is divided by 3, the quotient is 5 and remainder is 2.)

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9. (SMOPS 2005Q9) Six different points are marked on each of two parallel lines.
   Find the number of different triangles which may be formed using 3 of the 12 points.

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10. (SMOPS 2005Q10) How long, in hours, after 12 noon, will it take for the hour hand of the clock to lie directly over its minute hand for the first time?

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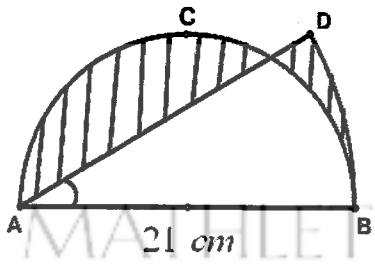
11. (SMOPS 2005Q11) The lengths of two rectangles are 11 m and 19 m respectively. Given that their total area is 321 m^2, find the difference in their areas. (Note: Both their widths are whole numbers)

12. (SMOPS 2005Q12) Lala speaks ther truth only on Monday, Wednesday, Friday and Sunday. Nana speaks the truth only on Monday, Tuesday, Wednesday and Thursday. Find the day when both said "Yesterday I lied".

13. (SMOPS 2005Q13) The diagram shows a semicircle ACB with diameter $AB = 21$ cm. Angle $DAB = 30°$ and arc DB is part of another circle with centre A. Find the perimeter of the shaded region, using π as $\frac{22}{7}$.



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14. (SMOPS 2005Q14) Find the value of $20042005 \times 20052004 - 20042004 \times 20052005$.

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15. (SMOPS 2005Q15) In how many ways can $\frac{7}{12}$ be written as a sum of two fractions in lowest term given that the denominators of the two fractions are different and are each not more than 12?

16. (SMOPS 2005Q16) There are 72 students in Grade 6.
Each of them paid an equal amount of money for their mathematics text books.
The total amount collected is \$ □ 35.0□ where two of the digits indicated with □ cannot be recognized. How much money did each student pay for the books?

17. (SMOPS 2005Q17) Numbers such as 1001, 234332, 897798, 3456543 are known as palindromes. If all of the digits 2,7,0,4 are used and each digit cannot be used more than twice, find the number of different palindromes that can be formed.

18. (SMOPS 2005Q18) There are three classes **A**, **B** and **C**.
Class **A** has 2 more students than class **B**.
Class **B** has 1 more student than class **C**.
The product of the number of students in the three classes is 99360.
How many students are there in class **A**?

19. (SMOPS 2005Q19) Find the value of
$1 + 2 + 2^2 + 2^3 + \cdots + 2^{11}$.
(Note: $2^2 = 2 \times 2, 2^3 = 2 \times 2 \times 2$)

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20. (SMOPS 2005Q20) Three boys Abel Ben and Chris participated in a 100 m race.
When Abel crossed the 100 m mark, Ben was at 90 m.
When Ben crossed the 100 m mark, Chris was at 90 m.
By how many metres did Abel beat Chris?
(Note: They were running at constant speeds thoughout the race.)

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21. (SMOPS 2005Q21) There are 5 students. Each time, two students are weighed, giving a total of 10 readings, in kilograms, as listed below:
103, 115, 116, 117, 118, 124, 125, 130, 137, 139.
What is the weight of the third heaviest student?

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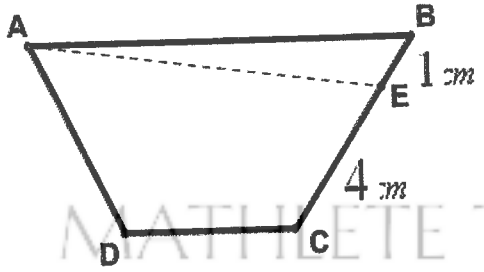
22. (SMOPS 2005Q22) One pan can fry 2 pieces of meant at one time. Every piece of meat needs two minutes to be cooked (one minute for each side). Using only one pan, find the least possible time required to cook
(i) 2000,
(ii) 2005 pieces of meats.

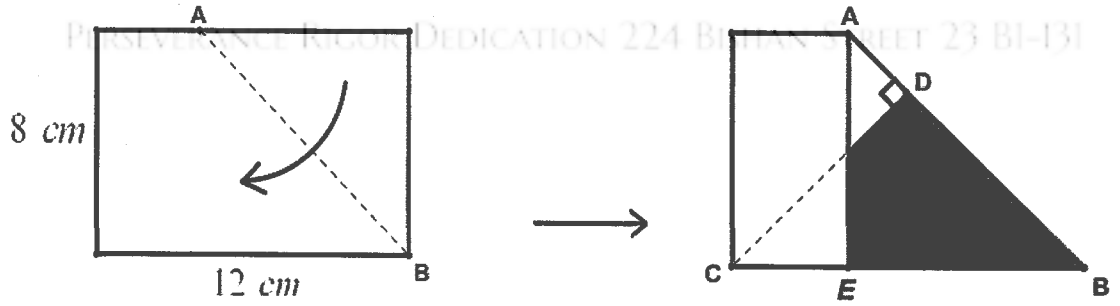
23. (SMOPS 2005Q23) The distance between **A** and **B** is 7 km. At the beginning, both Greogry and Catherine are at **A**. Gregory walked from **A** to **B** at a constant speed. After Gregory had walked for 1 km, Catherine discovered he had left his belongings at **A**. She immediately ran after him at a constant speed of 4km/h. After handing over the belongings to Gregory, she turned back and started running towards **A** at the same speed. Given that both Catherine and Gregory reaches **A** and **B** respectively at the same time, what was Gregory's speed?

24. (SMOPS 2005Q24) The diagram shows a trapezium $ABCD$.
E is a point on BC such that $BE = 1$ cm and $EC = 4$ cm.
AE divides $ABCD$ into two parts.
The areas of the two parts are in the ratio 1:6. Find the ratio of the lengths $AB : DC$.



25. (SMOPS 2005Q25) David's father picks him up from school every evening at 6 pm. One day, David was dismissed early at 5 pm. He walked home taking the same route that his father usually drives. When he met his father along the way, he boarded the car and returned home 50 minutes earlier than usual. Given that his father drove at a constant speed and planned to reach the school at 6 pm sharp, how long, in minutes, had he walked before he was picked up by his father?

26. (SMOPS 2005Q26) A piece of rectangular paper measuring 12 cm by 8 cm is folded along the dotted line AB to form the figure on the right. Given that CD is perpendicular to AB, find the area of the shaded region.



27. (SMOPS 2005Q27) Four girls need to cross and dark narrow tunnel and they have only a torch among them.
Girl A can cross the tunnel in 1 minute.
Girl B can cross the tunnel in 2 minutes.
Girl C can cross the tunnel in 5 minutes.
Girl D can cross the tunnel in 10 minutes.
Given that they need a torch to cross at all times and that the tunnel can only allow two girls to go through at any given time, find the least possible time for the four girls to get across the tunnel. (Note: The time taken by the slower girl is taken to be the time of each crossing.)

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28. (SMOPS 2005Q28) Which of the following is true?
(A) $\frac{10}{13} > \frac{11}{14}$
(B) $\frac{4567}{6789} > \frac{3456}{5678}$
(C) $\frac{12}{19} > \frac{20}{31}$
(D) $\frac{111}{1111} > \frac{1111}{11111}$

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29. (SMOPS 2005Q29) Mrs Wong is preparing gifts for the coming party.
She buys 540 notepads, 720 pens and 900 pencils.
The total cost of each type of stationery is equal.
She divides the notepads equally in red gift boxes, pens equally in yellow gift boxes and pencils equally in blue gift boxes.
She wishes that the cost of each gift box is equal and as low as possible.
Find the number of notepads she needs to put in each red gift box.

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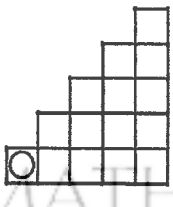
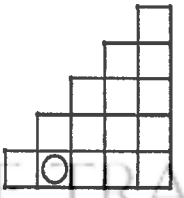
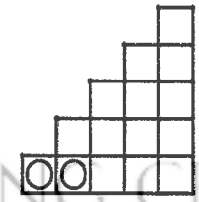
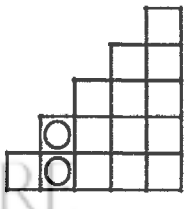
30. (SMOPS 2005Q30) Find the value of x in figure **H**.

A	B	C	D
			
1	2	3	4

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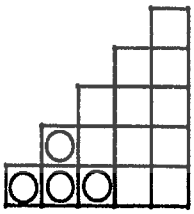
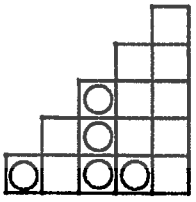
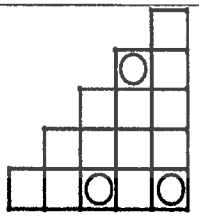
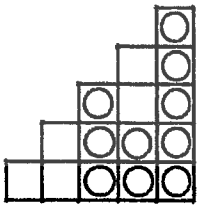
E	F	G	H
			
11	43	150	x

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