

Mathlete Training Centre
SMOPS 2004

1. (SMOPS 04Q1) A student multiplies the month and the day in which he was born by 31 and 12 respectively. The sum of the two resulting products is 170. Find the month and the date in which he was born.

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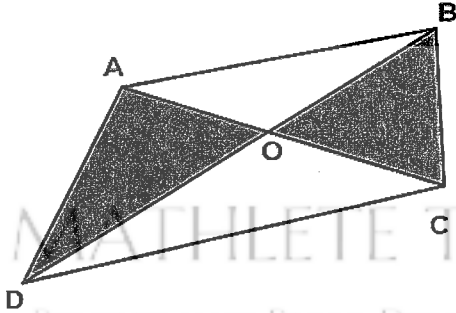
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2. (SMOPS 04Q2) Given that five whole numbers a, b, c, d and e are the ages of 5 people and that a is 2 times of b , 3 times of c , 4 times of d and 6 times of e , find the smallest possible value of $a + b + c + d + e$.

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3. (SMOPS 04Q3) Lines AC and BD meet at point O . Given that $OA = 40$ cm, $OB = 50$ cm, $OC = 60$ cm and $OD = 75$ cm, find the ratio of the area of triangle AOD to the area of triangle BOC .



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4. (SMOPS 04Q4) 1000 kg of a chemical is stored in a container. The chemical is made up of 99% water and 1% oil. Some water is evaporated from the chemical until the water content is reduced to 96%. How much does the chemical weigh now?

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5. (SMOPS 04Q5) A student arranges 385 identical squares to form a large rectangle without overlapping. How many ways can he make the arrangement?

[Note: The arrangements as shown in figure (1) and figure (2) are considered the same arrangement.



Figure (1)



Figure (2)

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6. (SMOPS 04Q6) A bag contains identical sized balls of different colours:
10 red, 9 white, 7 yellow, 2 blue and 1 black.
Without looking into the bag, Peter takes out the balls one by one from it.
What is the least number of balls Peter must take out to ensure that at least 3 balls have the same colour?

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7. (SMOPS 04Q7) Find the value of $\frac{1 \times 5 \times 18 + 2 \times 10 \times 36 + 3 \times 15 \times 54}{1 \times 3 \times 9 + 2 \times 6 \times 18 + 3 \times 9 \times 27}$.

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8. (SMOPS 04Q8) If the base of a triangle is increased by 10% while its height decreased by 10%, find the area of the new triangle as a percentage of the original one.

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9. (SMOPS 04Q9) A box of chocolates has gone missing from the refrigerator.
The suspects have been reduced to 4 children.
Only one of them is telling the truth.
John: "I did not take the chocolate."
Wendy: "John is lying."
Charles: "Wendy is lying."
Sally: "Wendy took the chocolate."
Who took the chocolate?

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10. (SMOPS 04Q10) How many digits are there before the hundredth 9 in the following number
97977977797777977779777779...?

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11. (SMOPS 04Q11) A particular month has 5 Tuesdays.
The first and last days of the month are not Tuesdays.
What day is the last day of the month?

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12. (SMOPS 04Q12) In the following division, what is the sum of the first 2004 digits after the decimal point?
 $2004 \div 7 = 286.285714285714\dots$

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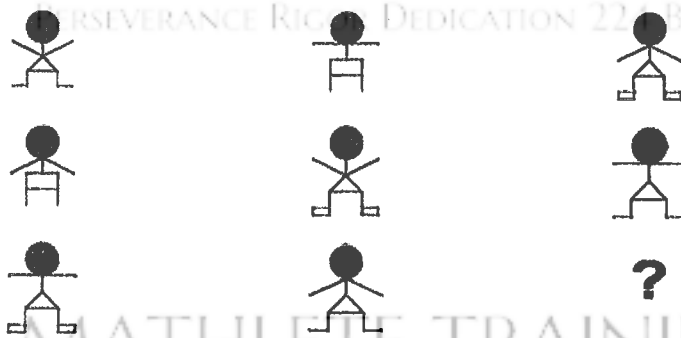
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13. (SMOPS 04Q13) A three digit number $5ab$ is written 99 times as $5ab5ab5ab\dots5ab$. The resultant number is a multiple of 91. What is the three digit number?

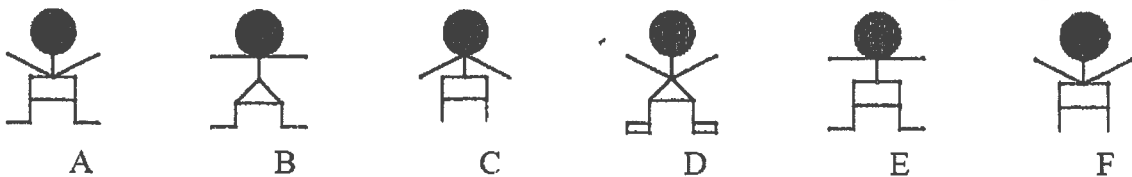
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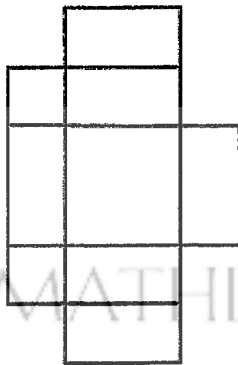
14. (SMOPS 04Q14)



Which one of the following is the missing figure?



15. (SMOPS 04Q15) How many rectangles are there in the following diagram?



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16. (SMOPS 04Q16) Placed on a table is a mathematics problem,

$$89 + 16 + 69 + 6\Delta + \square 8 + 88$$

where each of the symbols represent a digit.

Two students A and B sit on the opposite sides of the table facing each other.

They read the problem from their directions and both get the same answer.

What is their answer?

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17. (SMOPS 04Q17) Find the value of $\frac{1}{4 \times 9} + \frac{1}{9 \times 14} + \frac{1}{14 \times 19} + \dots + \frac{1}{1999 \times 2004}$.

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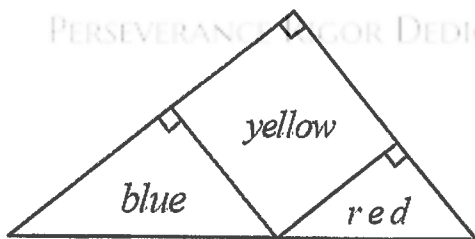
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18. (SMOPS 04Q18) The diagram shows a right-angled triangle formed from three different coloured papers.

The red and blue coloured papers are right-angled triangles with the longest sides measuring 3 m and 5 cm respectively.

The yellow paper is a square.

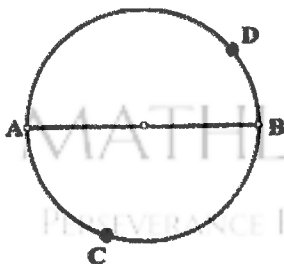
Find the total area of the red and blue coloured papers.



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19. (SMOPS 04Q19) The diagram shows a circular track with **AB** as its diameter. Betty starts walking from point **A** and David starts from point **B**. They walk towards each other along the circular track. They meet at point **C** which is 80 m from **A** the first time. Then they meet at point **D** which is 60 m from **B** the second time. What is the circumference of the circular track?



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20. (SMOPS 04Q20) A triangle, figure (1), is folded along the dotted line to obtain a figure as shown in figure (2). The area of the triangle is 1.5 times that of the resulting figure. Given that the total area of the three shaded regions is 1 unit², find the area of the original triangle.

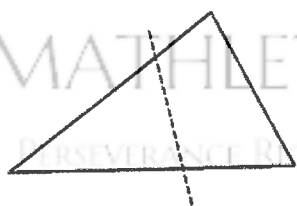


Figure (1)



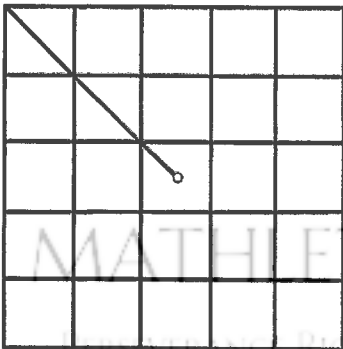
Figure (2)

21. (SMOPS 04Q21) What is the missing number in the following number sequence?
2, 2, 3, 5, 14, _____, 965

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22. (SMOPS 04Q22) The figure shown in the diagram below is made up of 25 identical squares. A line is drawn from one corner of the figure to its center. On the answer sheet provided, show how to add in 4 more non-parallel lines so as to divide the figure into 5 equal areas.



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23. (SMOPS 04Q23) There are three bowls on a table, each containing different types of fruits.
To the right of the green bowl is the banana.
To the left of the banana is the orange.
To the right of the star-fruit is the green bowl.
To the left of the white bowl is the blue bowl.
What is the colour of the bowl containing the orange?
(Note: The “right” or “left” here do not necessarily refer to the immediate right nor immediate left.)

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24. (SMOPS 04Q24) At 7.00 am, a vessel contained 4000 cm^3 of water.
Water was removed from the vessel at a constant rate of 5 cm^3 per minute.
At 8.00am, 80 cm^3 of water was added.
A further 80 cm^3 was added at the end of each hour after that.
Find the time when the vessel was empty for the first time.

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25. (SMOPS 04Q25) A car travels from town **P** to **Q** at a constant speed.
When it increases its speed by 20%, the journey from **P** to **Q** takes 1 hour less than its usual time
When it travels at its usual speed for 100 km before increasing its speed by 30%, the journey also takes 1 hour less than usual.
Find the distance between the two towns.

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26. (SMOPS 04Q26) A piece of pasture grows at a constant rate everyday.
200 sheep will eat up the grass in 100 days.
150 sheep will eat up the grass in 150 days.
How many days does it take for 100 sheep to eat up the grass?

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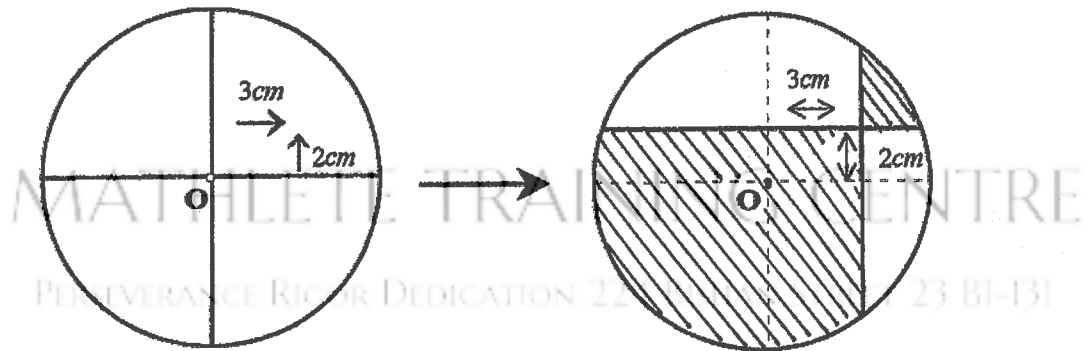
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27. (SMOPS 04Q27) The digits 3,4,5 and 7 can form twenty four different four digit numbers. Find the average of these twenty four numbers.

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28. (SMOPS 04Q28) The vertical diameter of a circle is shifted to the right by 3cm and the horizontal diameter is shifted up by 2cm as shown in the diagram below.



Find the difference between the shaded and the unshaded areas.

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29. (SMOPS 04Q29) The Sentosa High School's telephone number is an eight digit number. The sum of the two numbers formed from the first three digits and last five digits respectively is 66558. The sum of the two numbers formed from the first five digits and the last three digits is 65577. Find the telephone number of The Sentosa High School.

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30. (SMOPS 04Q30) A confectionery shop sells three types of cakes. Each piece of chocolate and cheese cake costs \$5 and \$3 respectively. The mini-durian cakes are sold at 3 pieces a dollar. Mr Ng bought 100 pieces of cakes for \$100. How many chocolate, cheese and durian cakes did he buy? Write down all the possible answers.

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