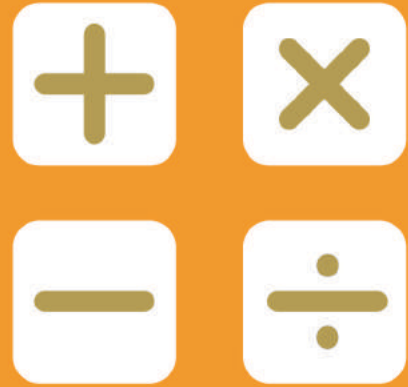


PAPER D



SEAMO

Southeast Asian
Mathematical
Olympiads

SAMPLE

DO NOT OPEN THIS BOOKLET UNTIL INSTRUCTED.

STUDENT'S NAME:

Read the instructions on the **ANSWER SHEET** and fill in your **NAME, SCHOOL** and **OTHER INFORMATION**.

Use a 2B or B pencil.

Do **NOT** use a pen

Rub out any mistakes completely.

You **MUST** record your answers on the **ANSWER SHEET**.

JUNIOR

Mark only **ONE** answer for each question.

Marks are **NOT** deducted for incorrect answers.

SECTION A

Use the information provided to choose the **BEST** answer from the five possible options.

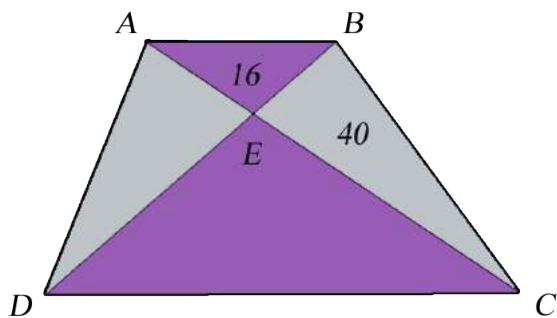
On your **ANSWER SHEET** fill in the oval that matches your answer.

SECTION B

On your **ANSWER SHEET** fill in your answer within the box provided.

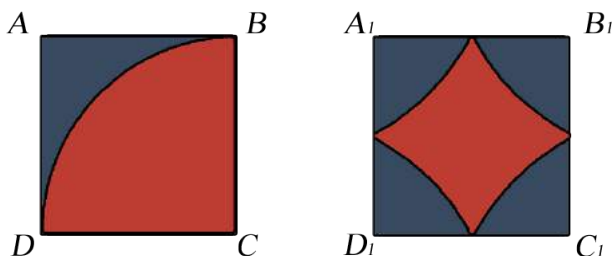
You are **NOT** allowed to use a calculator.

1. Given that $AB \parallel CD$, the area of $\triangle BCE$ is 40 cm^2 and the area of $\triangle ABE$ is 16 cm^2 , find the area of the trapezium.



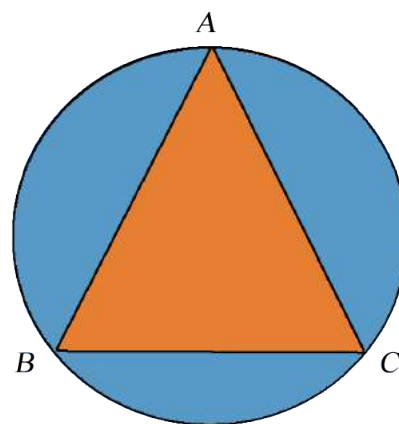
- (A) 144 cm^2
 (B) 196 cm^2
 (C) 200 cm^2
 (D) 220 cm^2
 (E) None of the above

2. Squares $ABCD$ and $A_1B_1C_1D_1$ have sides of length a . Let S and S_1 be the two red regions respectively. Which of the following is true?



- (A) $S < S_1$
 (B) $S = S_1$
 (C) $S = 1.2 S_1$
 (D) $S > S_1$
 (E) Cannot be determined

3. The vertices of an equilateral triangle ABC lie on the circumference of a circle. Find the area of the circle, given that the side of the equilateral triangle is $2\sqrt{3}$.



- (A) 3π
 (B) 4π
 (C) 5π
 (D) 6π
 (E) None of the above

4. A fair die is numbered from 1 to 6 on each of its 6 faces respectively. The die is thrown twice and the two scores are added. Which of the following events has the highest chance of happening?



- (A) Total score is an odd number
 (B) Total score is a multiple of 3
 (C) Total score is a perfect number
 (D) Total score is a prime number
 (E) Total score is divisible by 4

QUESTION 5 IS FREE RESPONSE

Write your answer in the boxes provided on the ANSWER SHEET and fill in the ovals that match your answer.

5. Matchsticks are used in the pattern as shown below.



Figure 1

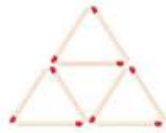


Figure 2

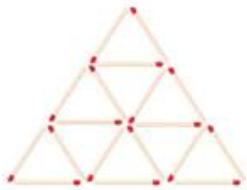


Figure 3

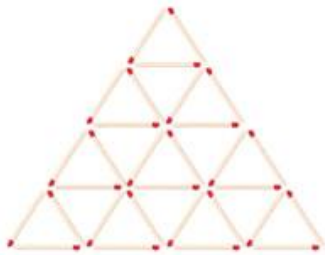


Figure 4

In Figure 1, there is 1 small equilateral triangle.

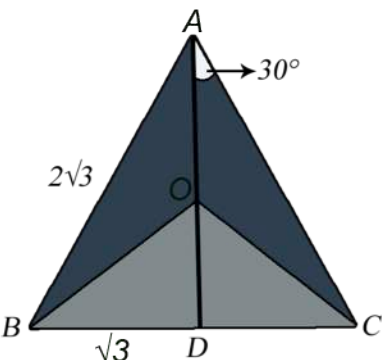
In Figure 2, there are 4 small equilateral triangles.

In figure 3, there are 9 small equilateral triangles.

In figure 4, there are 16 small equilateral triangles.

In which figure will there be 16900 small equilateral triangles?

END OF PAPER

QUESTION	ANSWER	SOLUTION	TOPIC	DIFFICULTY
1	B	$\Delta ABE : \Delta BCE$ $16 : 40$ $2 : 5$ $\therefore AE : EC = 2 : 5$ $\therefore \Delta ABE \sim \Delta CDE,$ $BE : ED = 2 : 5$ $\frac{\Delta DCE}{\Delta BCE} = \frac{5}{2}$ $\Delta DCE = 100\text{cm}^2$ Area of trapezium = $16 + 40 + 40 + 100$ $= 196\text{cm}^2$	Geometry	Medium/Hard
2	B	$S = a^2 - \frac{1}{4}\pi a^2$ $= a^2 \left(1 - \frac{1}{4}\pi\right)$ $S_1 = a^2 - \pi \left(\frac{1}{2}a\right)^2$ $= a^2 - \frac{1}{4}a^2\pi$ $= a^2 \left(1 - \frac{1}{4}\pi\right)$ $\therefore S = S_1$	Circles	Easy
3	B	We know  By Pythagoras' Theorem, $AD = 3$	Pythagorean Theorem	Hard

		<p>Area of $\Delta ABC = \frac{1}{2} \cdot 2\sqrt{3} \cdot 3$</p> $= 3\sqrt{3}cm^2$ <p>Area of $\Delta AOC = \text{Area of } \Delta BOC$</p> $= \text{Area of } \Delta AOB$ <p>Area of $\Delta BOC = \frac{3\sqrt{3}}{3}$</p> $= \sqrt{3}cm^2$ <p>Let $DO = h$,</p> $\frac{1}{2} \cdot 2\sqrt{3} \cdot h = \sqrt{3}$ $h = 1cm$ <p>radius = $AO = AD - DO$</p> $= 3 - 1$ $= 2cm$ <p>Area of circle = $2 \cdot 2 \cdot \pi = 4\pi cm^2$</p>		
4	A	<p>(A) Total is odd:</p> <p>(1, 2)(1, 4) (1, 6)(2, 3)</p> <p>(2, 5)(3, 4)(3, 6)(4, 5)(5, 6)</p> $(5, 6) < P(\text{odd}) = \frac{9}{36} = \frac{1}{4}$ <p>(B) Total is a multiple of 3:</p> <p>(1, 2)(1, 5)</p> <p>(2, 4)</p> <p>(3, 3), (3, 6)</p> <p>(4, 5)</p> <p>(6, 6)</p> <p>P (sum is multiple of 3)</p> $= \frac{7}{36}$ <p>(C) Total is a perfect number: 6</p> $P = \frac{1}{36}$	Probability	Medium/Hard

		<p>(D) $P(\text{Prime}) = \frac{5}{36}$ 2, 3, 5, 7, 11</p> <p>(E) 4, 8, 12, $P(\text{divisible by } 4) = \frac{3}{36}$ $= \frac{1}{12}$</p>												
5	130	<table border="1"> <tr> <td>Figure</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>Number of Triangles</td> <td>1</td> <td>4</td> <td>9</td> <td>16</td> </tr> </table> <p>In Figure n, the number of small triangles is n^2.</p> <p>When the number of triangles is 16900,</p> $n^2 = 16900$ $n = \sqrt{16900}$ $= 130$	Figure	1	2	3	4	Number of Triangles	1	4	9	16	Square Numbers	Easy
Figure	1	2	3	4										
Number of Triangles	1	4	9	16										

Level of difficulty refers to the expected level of difficulty for the question.

Easy	more than 75% of candidates will choose the correct option
Medium	about 50–75% of candidates will choose the correct option
Medium/Hard	about 25–50% of candidates will choose the correct option
Hard	less than 25% of candidates will choose the correct option