TCIMO | TERRY CHEW INSTITUTE OF MATHEMATICAL OLYMPIADS

PAPER E

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**.

INTERMEDIATE

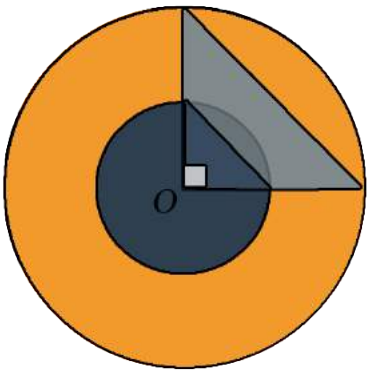
Mark only **ONE** answer for each question.
Marks are **NOT** deducted for incorrect answers.

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. The area of the light gray trapezium is 35 cm^2. Find the area of the orange ring.



(A) 35π

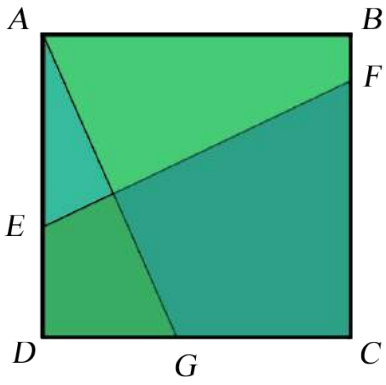
(B) 40π

(C) 50π

(D) 65π

(E) 70π

2. $ABCD$ is a square of side $12\,cm$. E, F and G are points on sides AD, BC and CD respectively. Given that $DG = 5\,cm$ and $EF \perp AG$, what is the length of EF?



(A) 12

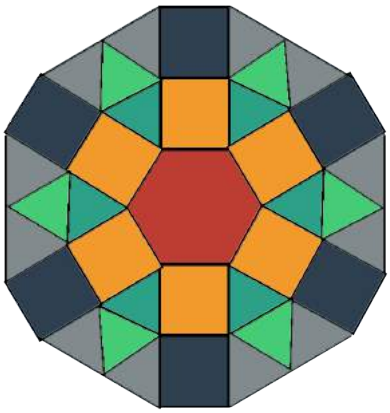
(B) 13

(C) 14

(D) 15

(E) None of the above

3. The pattern of the floor tiles in the mall is such that in the middle is a hexagon. The first ring consists of 6 squares and 6 equilateral triangles. The 2nd ring consists of 6 squares and 18 triangles, and so on. How many triangles are there in the 8th ring?



(A) 48

(B) 60

(C) 72

(D) 84

(E) None of the above

4. Strawberries cost $\$8/kg$ while blueberries cost $\$10/kg$. They are mixed in the ratio $m : n$. The cost of strawberries is decreased by 15% and the cost of blueberries is increased by 10%. However, the cost of the mixture remains unchanged. Find $m : n$.

(A) 2 : 1

(B) 5 : 3

(C) 5 : 4

(D) 6 : 5

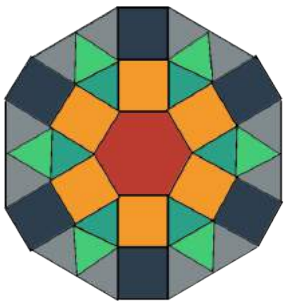
(E) None of the above

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. Let $\overline{37abc}$ be a 5-digit number, such that $\overline{37abc}$, $\overline{37bca}$, $\overline{37cba}$, can be divided by 37. How many such 5-digit numbers are there?

END OF PAPER

QUESTION	ANSWER	SOLUTION	TOPIC	DIFFICULTY
1	E	$\frac{1}{2}(R^2 - r^2) = 35$ $R^2 - r^2 = 70\ cm^2$ Area of the ring $= \pi(R^2 - r^2)$ $= 70\pi$	Circles	**Easy**
2	B	Make CM//EF, where M is a point on the extension of AD. Since $EF \perp AG$, $CM = EF = AG$ Δ ADG $\cong \Delta$ CDM $EF^2 = 5^2 + 12^2$ $= 169$ $\therefore EF = 13cm$	Geo-metry	**Medium**
3	E	In the third ring, there are 30Δs and 6 squares. In the nth ring, there are $6(2n-1)\Delta$s and 6 squares When $n = 8$, $6(16-1) = 90\Delta s$  Regular	Simple Equations	**Medium/Hard**

4	E	$8m + 10n = (8 \text{ x } 0.85)m + (10 \text{ x } 1.1)n$ $= 6.8m + 11n$ $1.2m = n$ $m : n = 1 : 1.2$ $= 5 : 6$	System of Equations	**Medium**
5	28	We Observe $37\|\overline{37abc} \rightarrow 37\|\overline{abc}$ Let $x = \overline{abc}$, $y = \overline{bca}$ and $z = \overline{cab}$ Then, $10x - y = 999a$, $10y - x = 999b$ and $10z - x = 999c$ Now, $37\|999, \frac{999}{37} + 1 = 28$	*Bonus Topic*	**Hard**

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