Diwali maths activities for IB Maths SL and HL: IGCSE / GCSE: answers

IB Math Revision · CBSE Class 9 and Class 10 · Teacher answers and notes

No calculator. Every answer works out exactly; use π = 22/7 where a question says so.

Teacher notes

- Invite students to design their own rangoli on squared paper with a stated number of lines of symmetry and order of rotational symmetry, then swap and check.
- In the diya task, cancel 3.5 = 7/2 early: 22/7 × 7/2 × 7/2 keeps every step exact.
- Tessellation links to Class 8 and 9 angle work; the last part is a good test of reasoning rather than recall.

Starter

1. **6**
   - A regular n-sided polygon has n lines of symmetry.
2. **135°**
   - Exterior angle = 360° ÷ 8 = 45°, so interior angle = 180° − 45° = 135°.
3. **154 cm^2**
   - 22/7 × 7 × 7 = 154
4. **(3, 5)**
   - Reflecting in the x-axis changes the sign of the y-coordinate.

Task A: A rangoli on a grid

a. **All sides 2√2 and both diagonals 4**
   - AB = BC = CD = DA = $\sqrt{(2^2 + 2^2)} = 2\sqrt{2}$.
   - Diagonals AC = BD = 4. Equal sides and equal diagonals, so ABCD is a square.

b. **8 square units**
   - $(2\sqrt{2})^2 = 8$, or half the product of the diagonals: ½ × 4 × 4 = 8.

c. **(−1, 3), (1, −3), (−1, −3); area 12**
   - Reflect in the y-axis: (−1, 3). In the x-axis: (1, −3). In both: (−1, −3).
   - The rectangle is 2 wide and 6 tall: area 12.

Task B: A circular rangoli

a. **693/4 = 173.25 cm^2**
   - Whole circle: 22/7 × 21 × 21 = 1386 cm^2.
   - One sector: 1386 ÷ 8 = 173.25 cm^2.

b. **16.5 cm**
   - Circumference: 2 × 22/7 × 21 = 132 cm. One arc: 132 ÷ 8 = 16.5 cm.

c. **378 cm^2**
   - 42 × 42 − 1386 = 1764 − 1386 = 378

Task C: The diya

a. **77 cm^2**
   - 2 × 22/7 × 3.5 × 3.5 = 77

b. **539/6 cm^3 (89⅚ cm^3)**
   - $\frac{2}{3}$ × 22/7 × 3.5 × 3.5 × 3.5 = $\frac{2}{3}$ × 22/7 × 343/8 = 539/6

c. **5 diyas**
   - Bottle: 22/7 × 3.5 × 3.5 × 12 = 462 cm^3.
   - 462 ÷ 539/6 = 2772/539 = 5 and a bit, so 5 full diyas.

Task D: Tiles for a rangoli floor

a. **108° does not divide 360°**
   - Each interior angle is 108°, and 360 ÷ 108 = 10/3 is not a whole number.

b. **135° + 135° + 90° = 360°**
   - Each octagon angle is 135° and the square's is 90°: 135 + 135 + 90 = 360.

c. ***n* = 12**
   - 2 × interior angle + 60° = 360°, so the interior angle is 150°.
   - Exterior angle = 30°, so n = 360 ÷ 30 = 12.

Extension

1. **84 cm^2**
   - s = (13 + 14 + 15)/2 = 21.
   - Area = $\sqrt{(21 \times 8 \times 7 \times 6)} = \sqrt{7056} = 84$
2. **8**
   - A polygon with n sides has $n(n - 3)/2$ diagonals.
   - $n(n - 3) = 40$ gives $n^2 - 3n - 40 = 0$, so $(n - 8)(n + 5) = 0$ and $n = 8$.

Every question is original and every answer was checked before publishing.