

Women in maths: mathematician cards for CBSE

Class 10: answers

CBSE Math Revision · CBSE Class 10 (Class 9 can try most of it) · Teacher answers and notes

No calculator. Use $\pi = 22/7$ where a question says so.

Teacher notes

- Print the three tasks as cards and rotate groups between them.
- The cards name each mathematician only through the maths named after her or that she is known for: invite students to research one of them for homework from a reliable source.
- Card 1 (c) uses Euclid's division lemma in the same way as the textbook proofs about odd and even numbers.

Starter

1. **Yes, 59**

- 59 is not divisible by 2, 3, 5 or 7, and $8^2 = 64 > 59$.

2. **5×19**

- $95 = 5 \times 19$

3. **38.5 cm^2**

- $90/360 \times 22/7 \times 7 \times 7 = \frac{1}{4} \times 154 = 38.5$

4. **1**

- Both are prime.

Task A: Card 1: Sophie Germain primes

a. **2, 3, 5, 11, 23, 29, 41: seven**

- $2 \rightarrow 5, 3 \rightarrow 7, 5 \rightarrow 11, 11 \rightarrow 23, 23 \rightarrow 47, 29 \rightarrow 59, 41 \rightarrow 83$ are prime.
- $7 \rightarrow 15, 13 \rightarrow 27, 17 \rightarrow 35, 19 \rightarrow 39, 31 \rightarrow 63, 37 \rightarrow 75, 43 \rightarrow 87, 47 \rightarrow 95$ are not.

b. **7, because $15 = 3 \times 5$**

- 2, 3, 5 give 5, 7, 11; 7 gives 15.

c. **$2p + 1 = 3(4q + 1)$**

- $2(6q + 1) + 1 = 12q + 3 = 3(4q + 1)$
- So, for $p > 3$, $2p + 1$ is a multiple of 3 bigger than 3, and not prime.

Task B: Card 2: Nightingale's rose diagram

a. **$154/3 = 51 \frac{1}{3} \text{ cm}^2$**

- $30/360 \times 22/7 \times 14 \times 14 = 1/12 \times 616 = 154/3$

b. **28 cm**

- Area is proportional to r^2 : 4 times the area needs 2 times the radius, 28 cm.

c. **$106/3 = 35 \frac{1}{3} \text{ cm}$**

- Arc = $30/360 \times 2 \times 22/7 \times 14 = 22/3$.
- Perimeter = $14 + 14 + 22/3 = 106/3$

Task C: Card 3: the witch of Agnesi

a. **2, 8/5, 1, 8/13, 2/5**

- $8/4 = 2$, $8/5$, $8/8 = 1$, $8/13$, $8/20 = 2/5$
- x and $-x$ give the same y .

b. **$x = \pm 2\sqrt{3}$**

- $x^2 + 4 = 16$, so $x^2 = 12$ and $x = \pm\sqrt{12} = \pm 2\sqrt{3}$.

c. **Yes**

- $8/(2^2 + 4) = 8/8 = 1$, which matches $y = 1$.

Extension

1. **53, 83 and 89**

- $53 \rightarrow 107$, $83 \rightarrow 167$, $89 \rightarrow 179$ are prime.
- $59 \rightarrow 119 = 7 \times 17$, $61 \rightarrow 123$, $67 \rightarrow 135$, $71 \rightarrow 143 = 11 \times 13$, $73 \rightarrow 147$, $79 \rightarrow 159$, $97 \rightarrow 195$ are not.

2. **14 cm**

- $140 = 4 \times 35$, so the area is 4 times as big and the radius 2 times: 14 cm.

Every question is original and every answer was recomputed by computer before publishing.