

Women in maths: mathematician cards for IGCSE and GCSE: answers

IGCSE Math Revision · IGCSE and GCSE (Higher and Extended) · Teacher answers and notes

The starter is non-calculator. A calculator is allowed in the main activity.

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.
- In card 3, students often double the radius for double the cases: ask what happens to the area.

Starter

1. **Yes, 23**
 - 23 has no factors except 1 and 23.
2. **5×19**
 - $95 \div 5 = 19$, and 19 is prime.
3. **$6\pi \text{ cm}^2$**
 - $60/360 \times \pi \times 6^2 = 6\pi$
4. **1**
 - $8 \div 8 = 1$

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 all prime.
 - The other primes give 15, 27, 35, 39, 63, 75, 87, 95, which are not prime.
- b. **$p = 7 (2 \times 7 + 1 = 15)$**
 - 2, 3, 5 give 5, 7, 11, all prime. 7 gives $15 = 3 \times 5$.
- c. **$95 = 5 \times 19$**
 - $2 \rightarrow 5 \rightarrow 11 \rightarrow 23 \rightarrow 47 \rightarrow 95$, and $95 = 5 \times 19$.

Task B: Card 2: the witch of Agnesi

- a. **2, 1.6, 1, 0.62, 0.4**
 - $8/4 = 2, 8/5 = 1.6, 8/8 = 1, 8/13 = 0.615\dots, 8/20 = 0.4$
 - x and $-x$ give the same y , because x^2 is the same.
- b. **$(0, 2); x = 0$**
 - $x^2 + 4$ is smallest when $x = 0$, so y is biggest there.
- c. **$x = \pm 3.46$**
 - $x^2 + 4 = 16$, so $x^2 = 12$.
 - $x = \pm\sqrt{12} = \pm 3.464\dots$

Task C: Card 3: Nightingale's rose diagram

a. **30°**

- $360^\circ \div 12 = 30^\circ$

b. **6.54 cm²**

- $30/360 \times \pi \times 5^2 = 25\pi/12 = 6.544\dots$

c. **65 cases**

- $6.544\dots \times 10 = 65.4\dots$, so about 65.

d. **10 cm**

- Area is proportional to radius squared, so the radius is multiplied by $\sqrt{4} = 2$: $5 \times 2 = 10$.

Extension

1. **53, 83, 89**

- $53 \rightarrow 107$, $83 \rightarrow 167$ and $89 \rightarrow 179$ are prime.
- $59 \rightarrow 119 = 7 \times 17$, $61 \rightarrow 123$, $67 \rightarrow 135$, $71 \rightarrow 143 = 11 \times 13$, $73 \rightarrow 147$, $79 \rightarrow 159 = 3 \times 53$, $97 \rightarrow 195$ are not.

2. **4 times**

- Area scale factor = $(6/3)^2 = 4$.

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