

Pi Approximation Day puzzles for IGCSE and GCSE: answers

IGCSE Math Revision · IGCSE and GCSE (Higher and Extended) · 22 July · Teacher answers and notes

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

Teacher notes

- Pi Approximation Day is 22 July because $22/7$, written day first, is the famous fraction for π .
- This is a short set for the last days of term or summer school: each puzzle stands alone.
- In task C (a), insist on complete turns: 454, not 455.

Starter

1. **$3 \frac{1}{7}$**

- $22 \div 7 = 3$ remainder 1

2. **66 cm**

- $22/7 \times 21 = 66$

3. **154 cm^2**

- $22/7 \times 49 = 154$

4. **3.143 and 3.14**

- 3 d.p.: 3.143; 3 s.f.: 3.14

Task A: How good is $22/7$?

a. **3.14286 and 3.14159: $22/7$ is bigger**

- $22 \div 7 = 3.142857...$
- $\pi = 3.141592...$

b. **0.040%**

- $(22/7 - \pi) \div \pi \times 100 = 0.0402...$

c. **616 m^2 and 615.8 m^2 ; 0.2 m^2**

- $22/7 \times 196 = 616$
- $\pi \times 196 = 615.75...$, which is 615.8
- $616 - 615.8 = 0.2$

Task B: The best fraction

a. **$22/7$**

- Find how far each is from 3.14159: $22/7$ is 0.00126 away; the next best, $16/5$, is 0.0584 away.

b. **3.1415929; 6**

- $355 \div 113 = 3.14159292...$
- $\pi = 3.14159265...$: the first 6 decimal places match.

c. **$-1/791$**

- $(355 \times 7 - 22 \times 113) \div (113 \times 7) = (2485 - 2486)/791 = -1/791$

Task C: Circle puzzles

a. **454 complete turns**

- One turn: $22/7 \times 70 = 220$ cm.
- $100\,000 \div 220 = 454.5\dots$, so 454 complete turns.

b. **72 cm**

- Arc: $\frac{1}{2} \times 22/7 \times 28 = 44$. Add the diameter: $44 + 28 = 72$.

c. **21 cm; 1386 cm²**

- $2 \times 22/7 \times r = 132$, so $r = 21$.
- $22/7 \times 21^2 = 1386$

Extension

1. **3.1408 and 3.1429; 1/497**

- $223 \div 71 = 3.14084\dots$, $22 \div 7 = 3.14285\dots$
- $22/7 - 223/71 = (1562 - 1561)/497 = 1/497$

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