

The golden ratio: questions

In the following questions τ is the golden ratio.

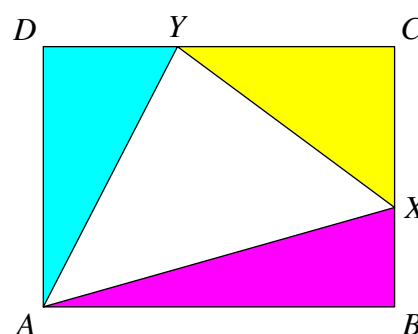
Question 1

- (a) Show that $\tau^4 = 3\tau + 2$.
- (b) Find integers m and n such that $\tau^8 = m\tau + n$.

Question 2

In the rectangle $ABCD$, the points X and Y divide the sides BC and DC in the ratio $1 : \tau$, as shown.

Show that the three coloured triangles have equal areas.



Question 3

The diagram shows a regular pentagon with sides of length 1 cm enclosing six smaller pentagons with sides of length a cm.

Prove that $a = 2 - \tau$.

[You may assume without proof that the length of a diagonal of a regular pentagon is τ times the side length.]

