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Dr. Z, History of Math
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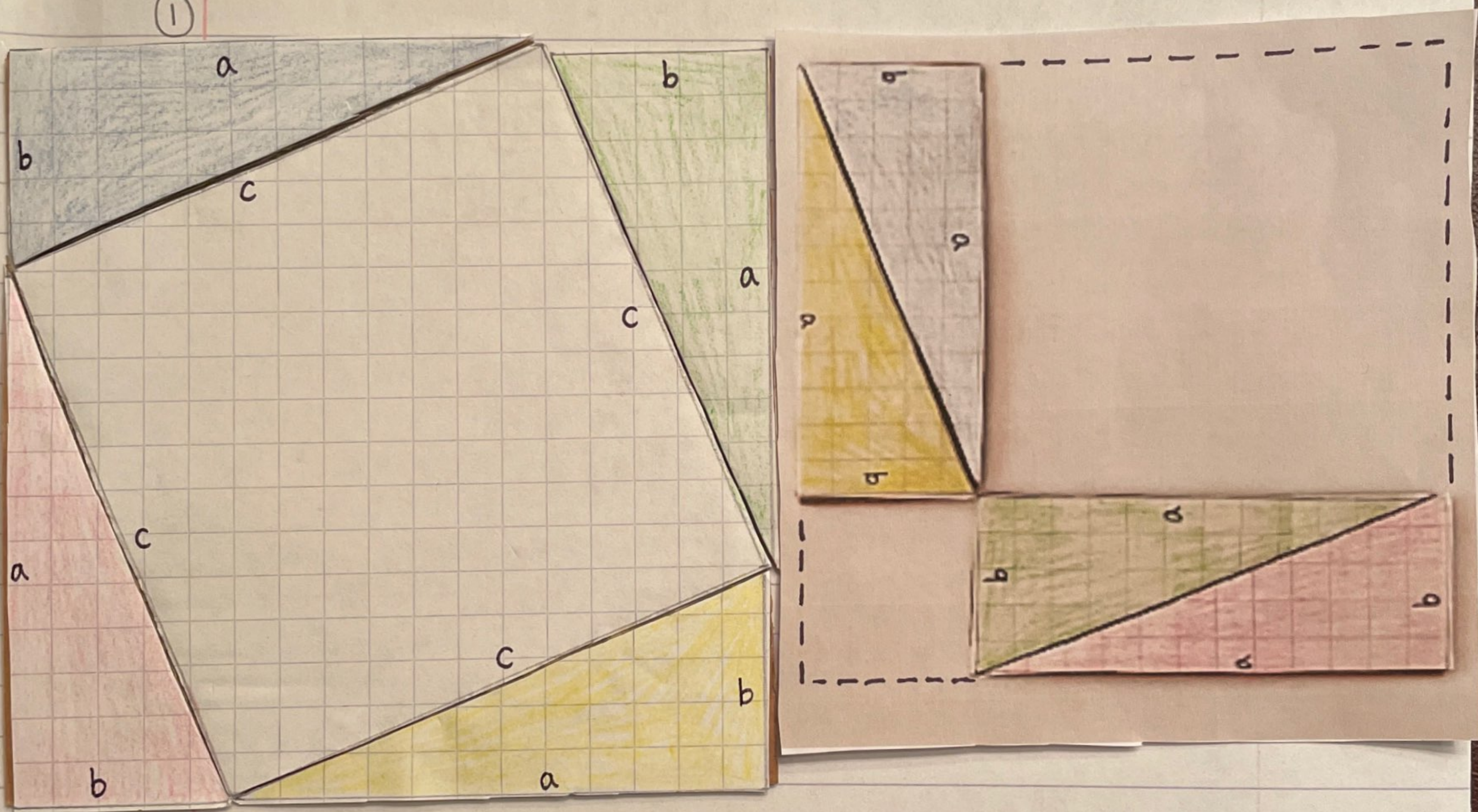
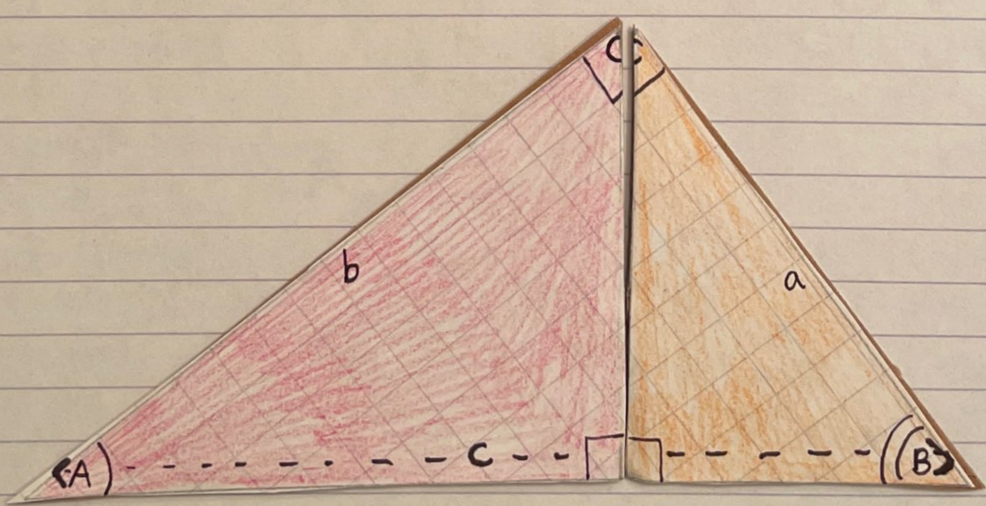
Homework for Lecture 5 - OK to post

(1)



(2)



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③ $a = 120 = 2mn$ $\quad b = m^2 - n^2$ $\quad c = m^2 + n^2$

Since $120 = 2mn$, then $60 = mn$, so m and n are factors of 60.
So the possible combinations of m and n are

(m, n)			
$(60, 1)$	$a = 120$	$b = 60^2 - 1^2 = 3599$	$c = 60^2 + 1^2 = 3601$
$(30, 2)$	$a = 120$	$b = 30^2 - 2^2 = 896$	$c = 30^2 + 2^2 = 904$
$(20, 3)$	$a = 120$	$b = 20^2 - 3^2 = 391$	$c = 20^2 + 3^2 = 409$
$(15, 4)$	$a = 120$	$b = 15^2 - 4^2 = 209$	$c = 15^2 + 4^2 = 241$
$(12, 5)$	$a = 120$	$b = 12^2 - 5^2 = 119$	$c = 12^2 + 5^2 = 169$
$(10, 6)$	$a = 120$	$b = 10^2 - 6^2 = 64$	$c = 10^2 + 6^2 = 136$

So the Pythagorean triples are

$(120, 3599, 3601)$ primitive because $\gcd(120, 3599, 3601) = 1$
$(120, 896, 904)$
$(120, 391, 409)$ primitive because $\gcd(120, 391, 409) = 1$
$(120, 209, 241)$ primitive because $\gcd(120, 209, 241) = 1$
$(120, 119, 169)$ primitive because $\gcd(120, 119, 169) = 1$
$(120, 64, 136)$

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④ Let m and n be positive integers such that $m > n > 0$. Then the integers a, b, and c can be written as

$$a = m^2 - n^2 \qquad b = 2mn \qquad c = m^2 + n^2$$

We will show that $c^2 - a^2 - b^2 = 0$, so that $a^2 + b^2 = c^2$. We rewrite $c^2 - a^2 - b^2$ as

$$c^2 - a^2 - b^2 = (m^2+n^2)^2 - (m^2-n^2)^2 - (2mn)^2$$

$$= m^4 + 2m^2n^2 + n^4 - m^4 + 2m^2n^2 - n^4 - 4m^2n^2$$

$$= 0$$

Since $c^2 - a^2 - b^2 = 0$, then $a^2 + b^2 = c^2$.

⑤ Fermat

⑥ Euler

⑦ Fermat

⑧ Andrew Wiles

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