Homework 5

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Due 9/26

1. see following images

2 see following images

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

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

$60 = mn \quad b = m^2 - n^2 \quad c = m^2 + n^2$

~~$m=1, n=60$~~ $b =$ NEGATIVE

~~$m=2, n=30$~~ ~~$b =$~~

~~$m=3, n=20$~~ ~~$b =$~~

~~$m=4, n=15$~~ ~~$b =$~~

~~$m=5, n=12$~~ ~~$b =$~~

~~$m=6, n=10$~~ ~~$b =$~~

$m=10, n=6 \quad b = 64 \quad c = 136$

* $m=12, n=5 \quad b = 119 \quad c = 169$

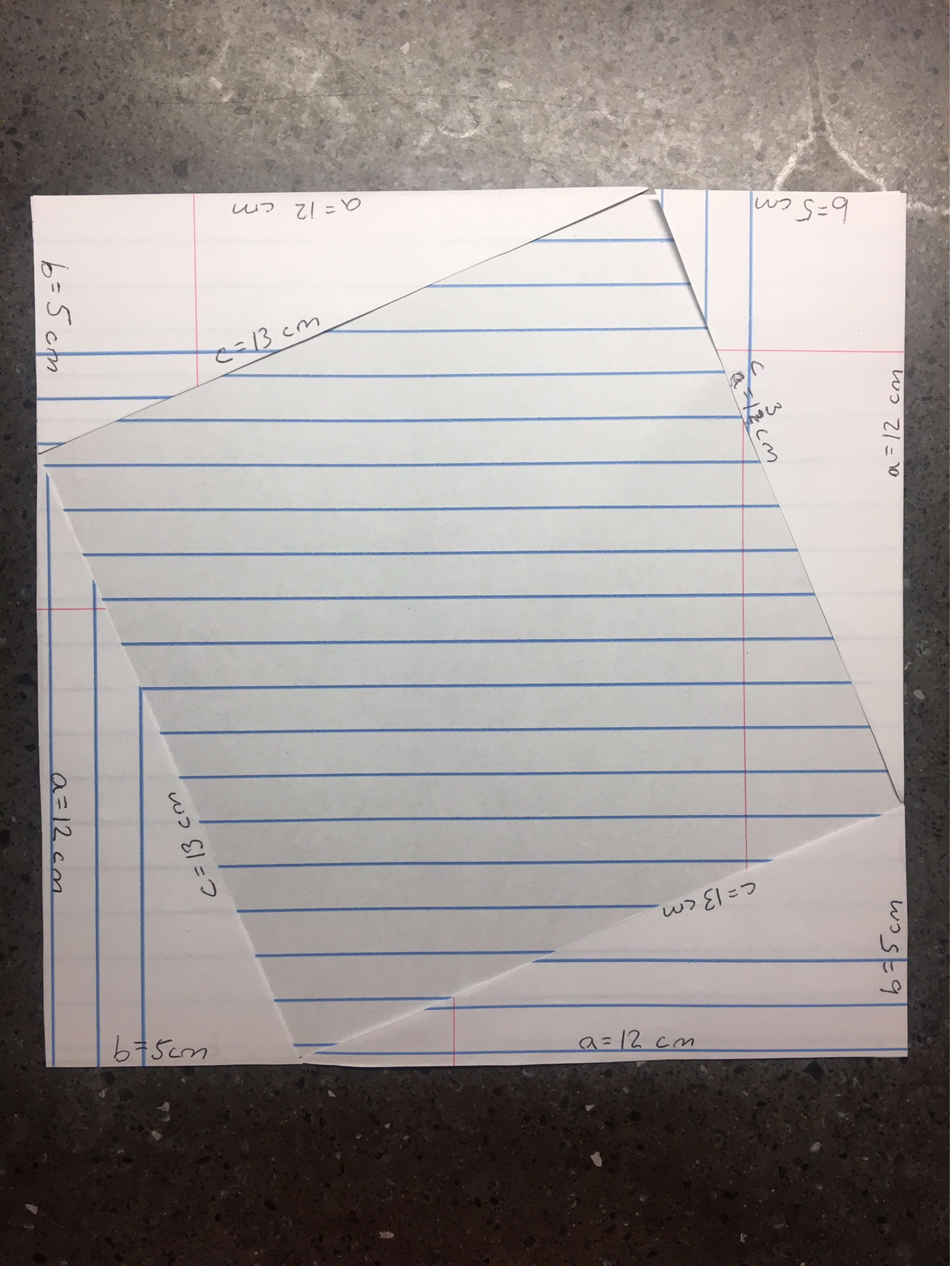
* $m=15, n=4 \quad b = 209 \quad c = 241$

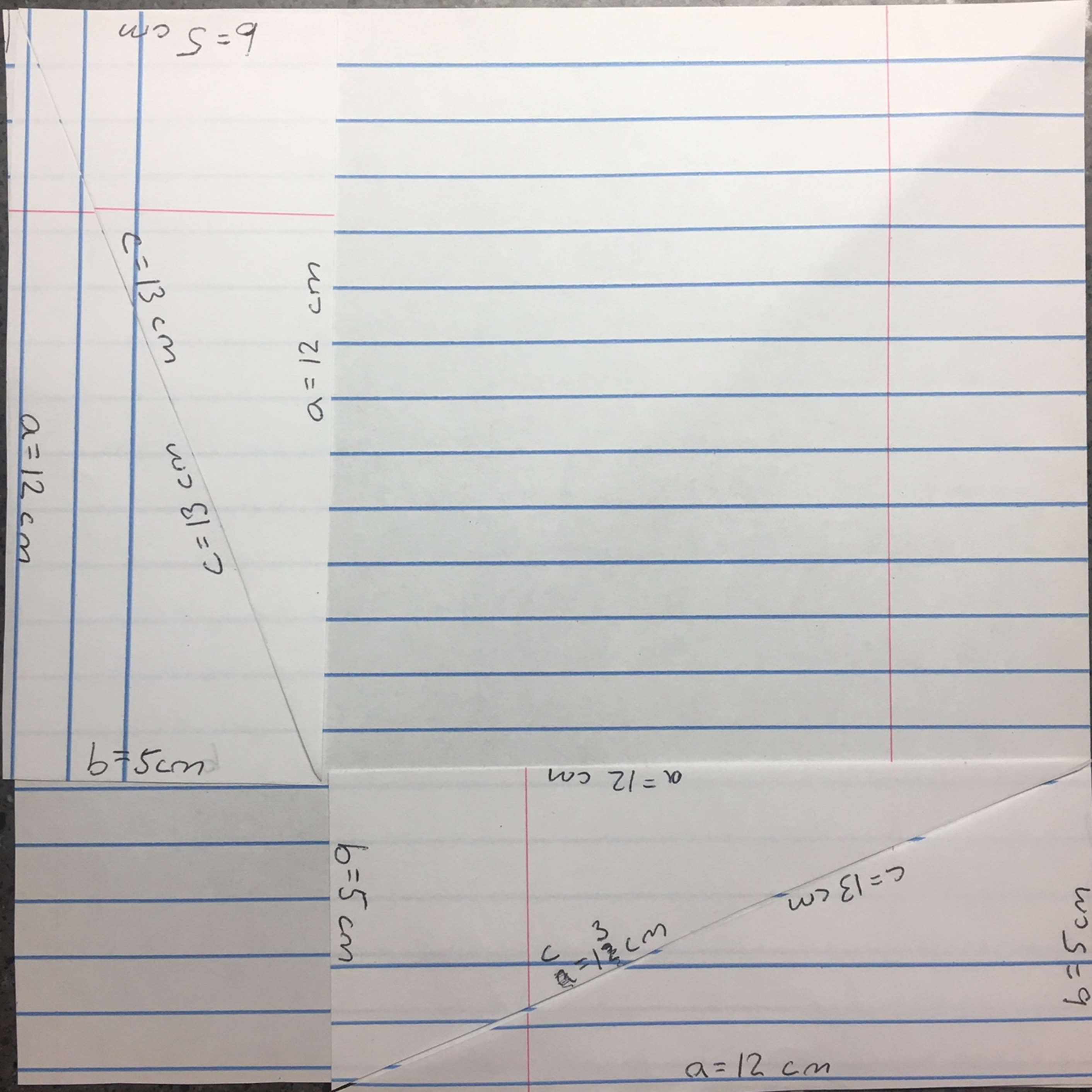
* $m=20, n=3 \quad b = 391 \quad c = 409$

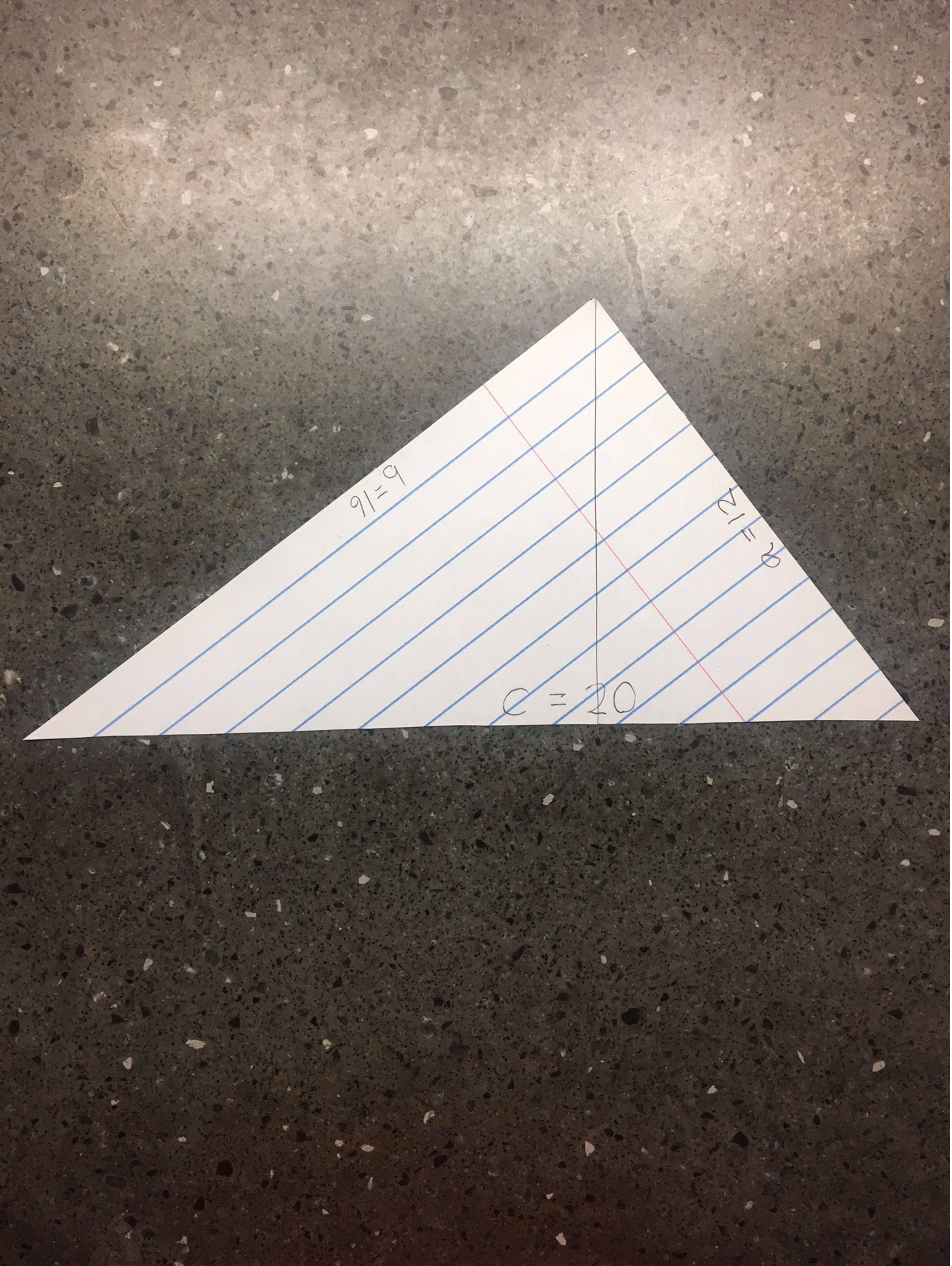
$m=30, n=2 \quad b = 896 \quad c = 904$

* $m=60, n=1 \quad b = 3599 \quad c = 3601$

The 4 starred Pythagorean Triples are primitive.


a=12 cm
b=5 cm
b=5 cm
c=13 cm
c=13 cm
a=12 cm
a=12 cm
c=13 cm
c=13 cm
b=5 cm
b=5cm
a=12 cm


b = 5 cm
c = 13 cm
c = 13 cm
a = 12 cm
a = 12 cm
b = 5cm
a = 12 cm
b = 5 cm
c = 13 cm
c = 13 cm
b = 5 cm
a = 12 cm


b=16
a=12
c = 20

4. $a^2+b^2=c^2$, $a=2mn$, $b=m^2-n^2$, $c=m^2+n^2$

$$(2mn)^2+(m^2-n^2)^2=(m^2+n^2)^2$$

$$\cancel{4m^2n^2}+m^4-2m^2n^2+n^4=m^4+\cancel{2m^2n^2}+n^4$$

$$m^4+n^4=m^4+n^4$$

There are infinite m's and n's for which this is true. Also, multiples of Pythagorean Triples are also Pythagorean Triples. These both show that there are infinitely many Pythagorean Triples.

5. Fermat proved this (only this special case.)

6. This was first proved by Euler.

7. Fermat claimed to have discovered a "truly marvelous" proof, for which the margin was "too narrow to contain."

8. Andrew Wiles formulated the first accurate proof in 1994.