3.4: Measuring the Egyptian Way

Focus Question: "If a triangle with side lengths a, b and c satisfies the relationship $a^2 + b^2 = c^2$, is the triangle a right triangle?"

(A)

Side Lengths (units)	Do the side lengths satisfy $a^2 + b^2 = c^2$?	Is the triangle a right triangle?
3, 4, 5	$9 + 16 = 25$ yes	Yes
5, 12, 13	$25 + 144 = 169$ yes	Yes
5, 6, 10	$25 + 36 \neq 100$ no	no
6, 8, 10	$36 + 64 = 100$ yes	Yes
4, 4, 4	$16 + 16 \neq 16$ no	no
1, 2, 2	$1 + 4 \neq 4$ no	no

(B) 1. If a triangle's side lengths satisfy the relationship $a^2 + b^2 = c^2$, then the triangle is a right triangle.

2. If a triangle's side lengths do not satisfy the relationship $a^2 + b^2 = c^2$, then the triangle is <u>not</u> a right triangle.

3. Sides 4, 4, and 4 : all sides are equal, which means all angles are equal, which means all three angles are 60°.

Possible Answer:

Also: $4^2 + 4^2 \neq 4^2$

(C) 1. 12, 16 and 20 → Yes: $(12)^2 + (16)^2 \stackrel{?}{=} (20)^2$

$144 + 256 \stackrel{?}{=} 400$

$400 = 400$ ✓

2. 8, 15 and 17 → Yes: $(8)^2 + (15)^2 \stackrel{?}{=} (17)^2$

$64 + 225 \stackrel{?}{=} 289$

$289 = 289$ ✓

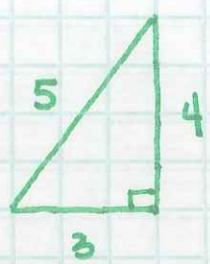
3. 12, 9 and 16 → No: $(12)^2 + (9)^2 \stackrel{?}{=} (16)^2$

$144 + 81 \stackrel{?}{=} 256$

$225 \neq 256$

4.

Triangle from Question A: 3, 4, 5



$a^2 + b^2 = c^2$

$(3)^2 + (4)^2 = (5)^2$

$9 + 16 = 25$

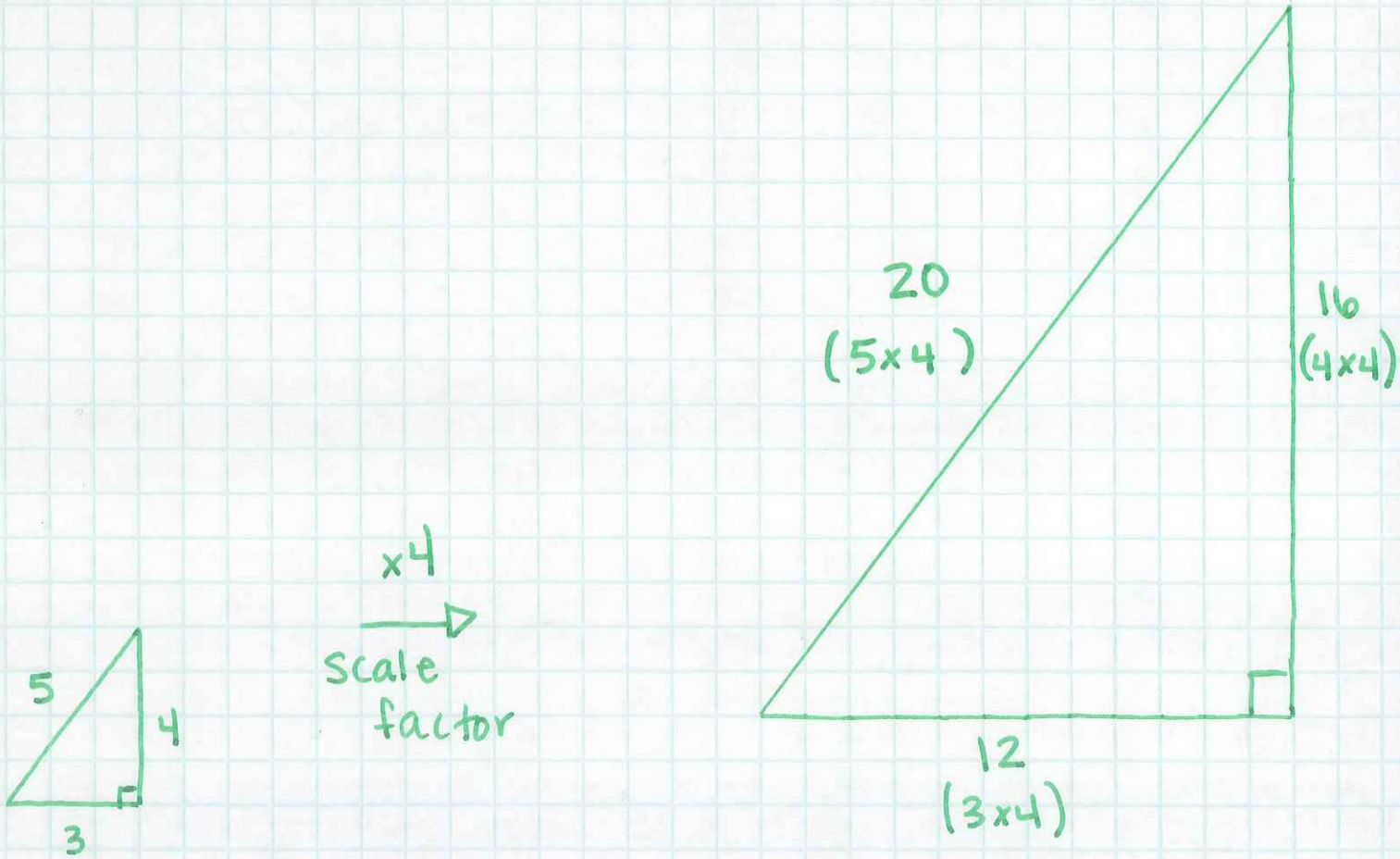
$25 = 25$

$a = 3$
$b = 4$
$c = 5$

Triangle from Question C using scale factor:

next page...

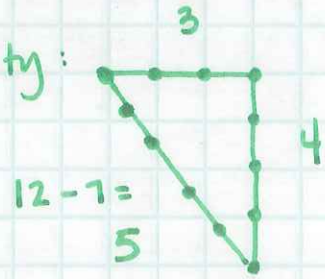
(C) 4. continued



5. Yes, Raeka is correct. Her use of the two shorter sides as the legs, and the third side has the same relationship as the Pythagorean Theorem.

(D) 1.

only right triangle possibility:



$3^2 + 4^2 = 5^2$

$9 + 16 = 25$

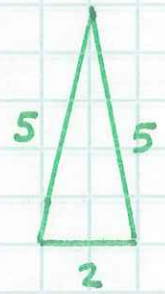
$25 = 25$ ✓

$3 + 4 + 5 = 12$ ✓

(D) 2. Possible answer: 2, 5, 5

$2^2 + 5^2 \neq 5^2$

$2 + 5 + 5 = 12$



2, 5 and 5 make an acute triangle, not a right triangle.