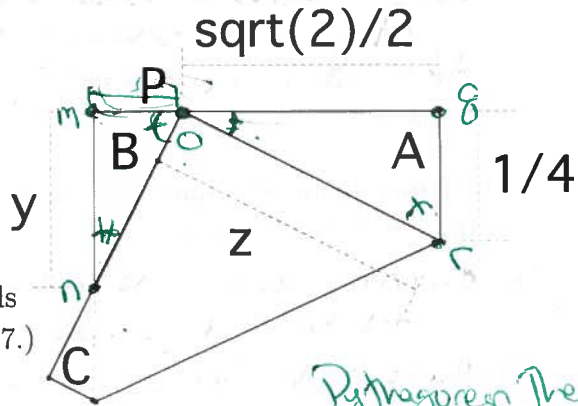


score 122: Quiz 4

Key

1. (Wks #5) Suppose you folded a patty paper so that the measurements shown in the diagram to the right were satisfied (where the length of the original patty paper has length one).



(If you are more comfortable with decimals you may use the approximation: $\frac{\sqrt{2}}{2} \approx .707$.)

- (a) [1] Find the length of z .

started 0.5
got it 1.5

$$z = 1 - \frac{1}{4} \quad \text{or}$$

$$= \frac{3}{4}$$

b/c the side length of the patty paper is 1

- (b) [4] Find the length of y .

started 0.5

$$\triangle A \sim \triangle B \quad (1.5)$$

$$\triangle mOP \sim \triangle gPO \quad (1.5)$$

$$\frac{mO}{mP} = \frac{gP}{gO} \Rightarrow \frac{mO}{y} = \frac{1/4}{\sqrt{2}/2}$$

(1) (1.5)

Pythagorean Theorem!

$$z^2 = \left(\frac{1}{4}\right)^2 + \left(\frac{\sqrt{2}}{2}\right)^2$$

$$= \frac{1}{16} + \frac{2}{4} = \frac{1}{16} + \frac{8}{16} = \frac{9}{16}$$

note $mO = 1 - \frac{\sqrt{2}}{2} = \frac{2-\sqrt{2}}{2}$ (1.5)

alg (1.5)

$$\frac{2-\sqrt{2}}{2} = \frac{1/4}{\sqrt{2}/2} \Rightarrow \frac{\sqrt{2}}{2} \cdot \frac{2-\sqrt{2}}{2} = \frac{1}{4} y$$

$$\Rightarrow \frac{2\sqrt{2} - 2}{2} = y$$

2. [2] Lockhart's *A Mathematician's Lament* begins with a nightmare (two actually). Describe either nightmare.

(1.5) start
(1) correct
(1.5) in paper

A musician has a nightmare that music students don't get to play or make their own music. Students instead spend their time drawing notes, studying scales, & transitioning to other scales. Students don't get any hands on experience until grad school.

A painter has a nightmare that art students learn to paint by using paint by number techniques. They are not allowed to free paint until grad school.

3. [3] What is the Lockhart's thesis in the first few pages of *A Mathematician's Lament*? What evidence does he use to support his claim?

(1.5) start
(1.5) actually in the text
(1) get thesis
(1) evidence

Math is art & should be treated (partially) as that.

Evidence: 1) quote from a famous mathematician who said that "math is the art of finding patterns"

2) starts working an example of a triangle in a rectangle & points out that he needs to be creative to find the relationship.

3) starts drawing parallels with musician & painter who had the nightmares

4. [2] (4/27 Lecture) Name two characteristics that distinguish the cult of Pythagorus.

every # was either whole or a ratio of 2 whole #'s
 They did not believe in the existence of irrational #'s such as π , e , $\sqrt{2}$, etc)
 discovered / knew about Pythagorean Theorem.
 numbers were sacred.

5. [2] (Paper Handout) Name two resources that the library has made available to help with your research paper.

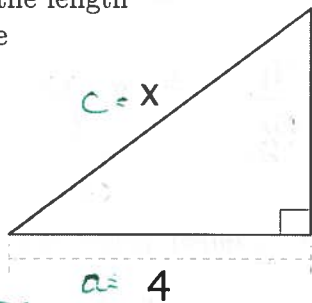
- (+) an online class guide with a bibliography tab.
databases & journals along with links to other webpages are posted.
- (+) Three books were put on reserve at the circulation desk.

6. [1] There are a few deadlines set up to help you make progress on your paper. For instance, you had to write a journal entry on three people and bring two sources to class today. What and when is the next deadline for your paper?

The draft is due on Wed
 (+.5) (+.5)

7. [5] (Wheater §8.1) Find the length the side marked x for the following right triangles:
 (Note: the diagrams are not to scale.)

started (+.5)

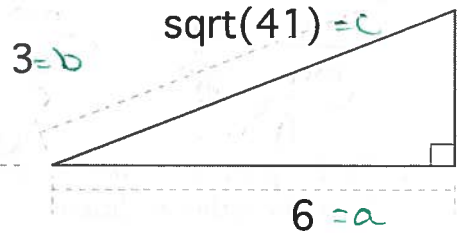


$$3^2 + 4^2 = x^2 \quad (+.5)$$

$$9 + 16 = x^2$$

$$25 = x^2$$

$$\Rightarrow x = 5 \quad \text{alg } (+.5)$$



$$6^2 + x^2 = (\sqrt{41})^2 \quad (+.5)$$

$$36 + x^2 = 41$$

$$x^2 = 5$$

$$x = \sqrt{5} \quad \text{alg } (+.5)$$

sense/rotation (+.5)