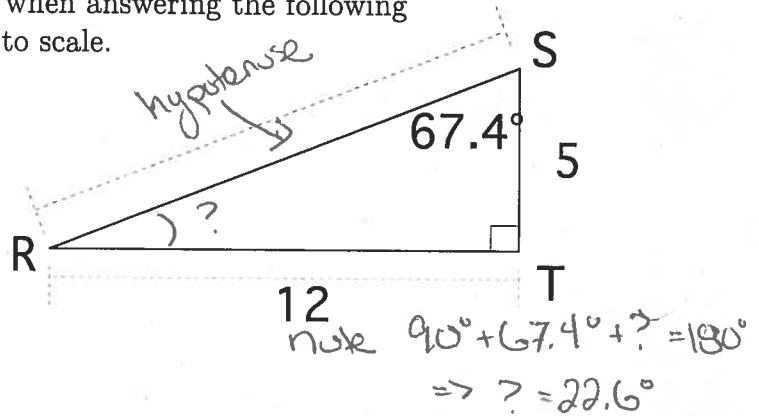


Score 122: Quiz 5

Sohcahtoa

1. (Weater §10.1) Consider the right triangle when answering the following questions. Note, the triangle is not drawn to scale.



(a) [1] Identify the hypotenuse.

\overline{RS}

(b) [1] Find $\tan 67.4^\circ$.

$$\tan 67.4^\circ = \frac{\text{opp}}{\text{adj}} = \frac{12}{5}$$

(c) [2] Find the length of \overline{RS} .

Recall Pythagoras $a^2 + b^2 = c^2 \Rightarrow 12^2 + 5^2 = c^2$
 use correctly (+1) alg (+1) $144 + 25 = c^2$

(d) [2] Find $\cos 22.6^\circ$.

$$\cos 22.6^\circ = \frac{\text{adj}}{\text{hyp}} = \frac{12}{13}$$

$$169 = c^2$$

$$\boxed{13 = c}$$

2. [2] (5/4 Lecture) Name two methods that both scientists & mathematicians will use when they are trying to figure out problems.

both use experimentation (mathematicians do thought experiments) whereas scientists usually go to the lab
 use logic
 try to resolve one question at a time
 assume the 'uniformity of nature' referenced in Okasha

+0.5
 +.5 one
 +.5 answer
 +.5 distinguish

3. [2] (5/4 Lecture) Name a feature that began to emerge after the Scientific Revolution that distinguished the mathematician from the scientist.

Mathematicians work mostly in an 'idealized' world (where a line really is only 1 dimensional). Whereas the scientist typically work in the 'real' world.
 Mathematicians also use much more deductive reasoning than the scientists (primarily because they work in the 'idealized' world).

+1.5 start
 +.5 true
 +.5 distinguish
 +.5 explain clearly

4. [1] (Lang Ch. 5) Define what a split in origami is.

A split creates 2 or more steps from 1 original step.

looks like read (+.5)
get H (+.5)

5. [2] Name or describe two of the splits that Lang introduces in chapter 5 of his text.

Yoshizawa Split.

Ideal Split.

Optimum Yoshizawa Split.

started (+.5)
get one (+.5)
get another (+.5)
looks like read (+.5)

6. (5/4 Lecture & Wheater §10.2) The crease pattern on the right was created by following the directions for the 'optimum Yoshizawa split' given on page 95 and worked with in class on 5/4. Use your knowledge of its construction to answer the following questions. Assume the length of the original square is one.

(a) [2] length of \overline{HF}

$$1^2 + 1^2 = (\overline{HF})^2$$

$$\Rightarrow \overline{HF} = \sqrt{2} \approx 1.414$$

(b) [1] length of \overline{HC}

$$\overline{HC} = \frac{\overline{HF}}{2} = \frac{\sqrt{2}}{2} \approx .707$$

(c) [1] measure of $\angle BHC$

$$\frac{+.5 \cdot 45^\circ}{2} = 22.5^\circ (+.5)$$

(d) [2] length of \overline{HB}

have adj
want hyp

$$\cos 22.5^\circ = \frac{\frac{\sqrt{2}}{2}}{\overline{HB}}$$

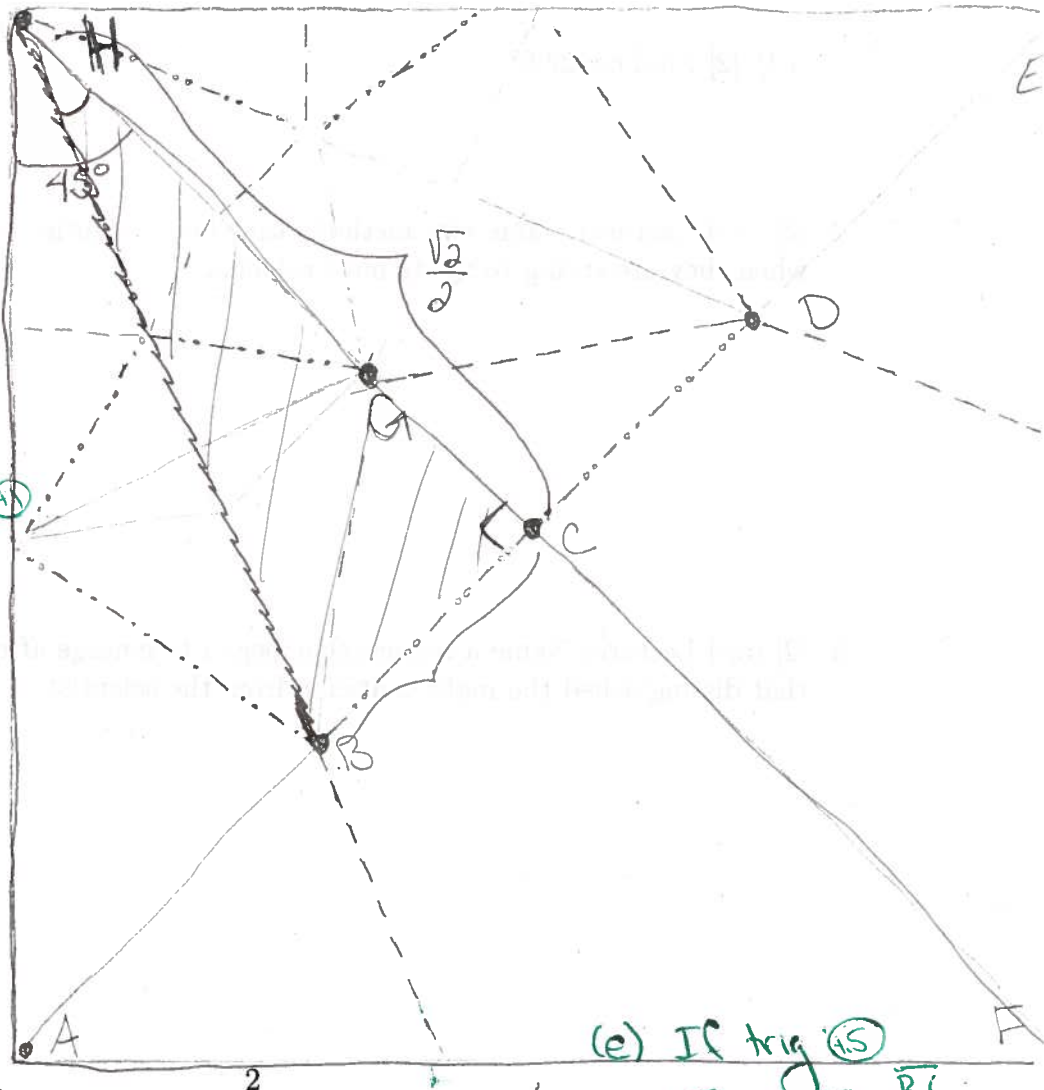
trig (+.5)
correct use (+.5)
adj (+.5)

(e) [1] length of \overline{BC}

$$\overline{HB} = \cos 22.5^\circ = \frac{\sqrt{2}}{2}$$

$$\overline{HB} \cdot .924 = \frac{\sqrt{2}}{2}$$

$$\overline{HB} = \frac{\frac{\sqrt{2}}{2}}{.924} \approx .765$$



(e) If trig (+.5)

(e) If Pyth (+.5)

$$(\overline{HC})^2 + (\overline{BC})^2 = (\overline{HB})^2$$

$$\left(\frac{\sqrt{2}}{2}\right)^2 + (\overline{BC})^2 = \left(\frac{\sqrt{2}}{2}\right)^2$$

alg (+.5)

Substantia

(e) If trig (+.5)

$$\tan 22.5^\circ = \frac{\overline{BC}}{\frac{\sqrt{2}}{2}}$$

alg (+.5)