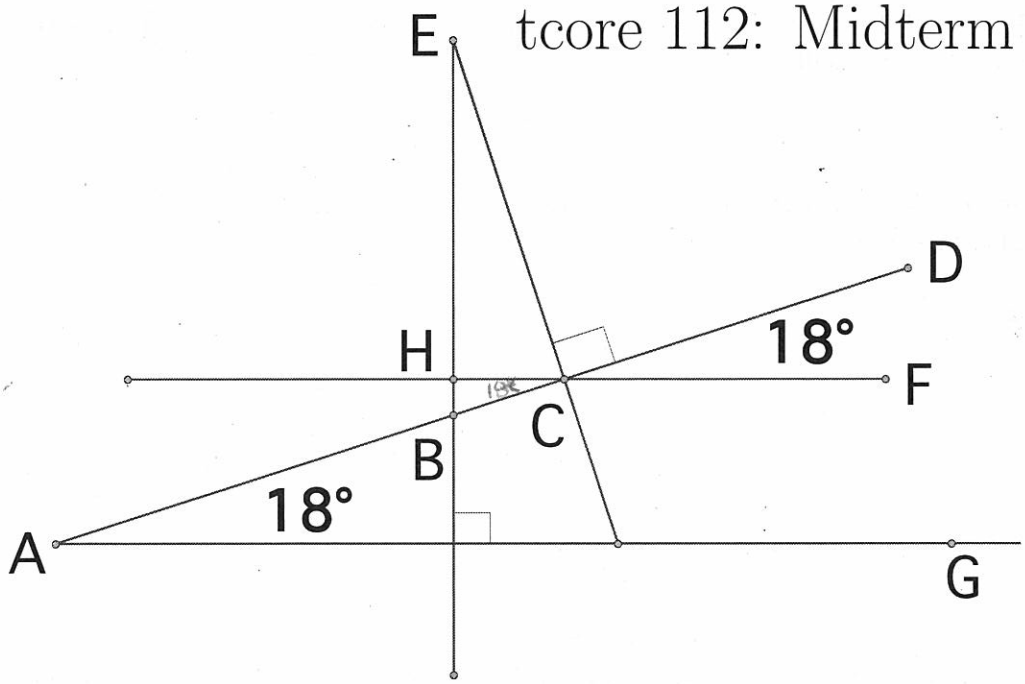
Key

tcore 112: Midterm



Refer to the diagram above when answering the questions on this page.

1. [3] (Wheater §3.2) For each of the pair of lines, determine if they are parallel, perpendicular, or neither. You do not need to justify your answers.

   - $\overline{CE}$ and $\overline{AG}$ neither
   - $\overline{HF}$ and $\overline{AG}$ parallel b/c corresponding angles are the same
   - $\overline{BE}$ and $\overline{HF}$ perpendicular b/c $\overline{BE} \perp \overline{AG}$ and $\overline{AG} \parallel \overline{HF}$

2. [6] (Wheater §2.7) Find the measure of the following angles. You do not need to justify your answers.

   - $\angle HCB$ 18° b/c vertical angle
   - $\angle HBC$ 180° - 90° - 18° b/c makes a $\triangle HBC$
     90° - 18° = 72°
   - $\angle BEC$ $\triangle EBC \Rightarrow \angle BEC + \angle ECB + \angle EBC = 180°$
     $\angle BEC + 90° + \angle HBC = 180°$
     $\angle BEC + 72° = 90°$ from above
     $\angle BEC = 90° - 72° = 18°$

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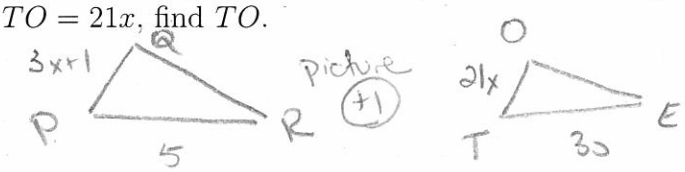
3. [2] (Wheater §1.3 #5) Write the converse of the following sentence: "If you run a marathon, then you will be tired."

If you will be tired, then you ran a marathon,

4. [4] (Wheater §7.4 #16) If $\triangle PQR \sim \triangle TOE$, $PQ = 3x + 1$, $PR = 5$, $TE = 30$, and $TO = 21x$, find TO.



picture (+1)

(+1) sim △ ratio
(+1) plug in

$\cancel{5} \cdot \frac{3x+1}{\cancel{5}} = \frac{21x}{30} \cdot \cancel{5}$

$30 \cdot \frac{3x+1}{\cancel{30}} = \frac{105x}{\cancel{30}} \cdot \cancel{30}$

$90x + 30 = 105x$
$-90x \quad -90x$

$\frac{30}{15} = \frac{15x}{15}$

$x = 2$ so

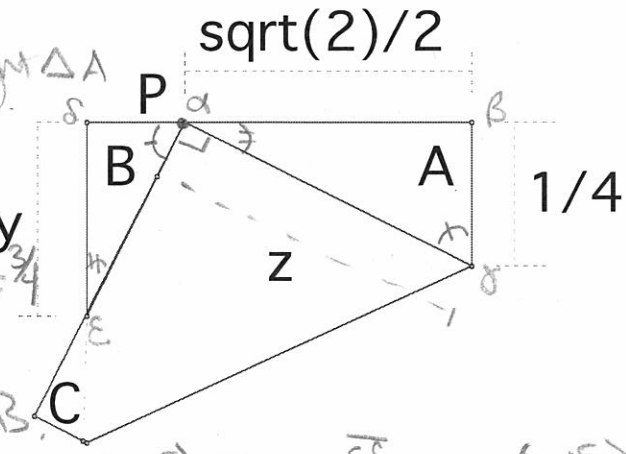
$TO = 21 \cdot 2 = 42$ (+.5)

alg (+.5)

5. (Wks 4) This question is based off of worksheet 4 where we let the side of a patty paper be length 1. The lower left corner of the patty paper was folded up to the top of the patty paper as shown below. Note that the diagram is *not* to scale. Use this diagram to answer the following questions.

(If you would like, you can use the approximation $\frac{\sqrt{2}}{2} \approx .707$.)

(a) [2] Find the length of z.



z is the hypotenuse on a right △A

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

$\frac{1}{16} + \frac{2}{4} = z^2$

$\frac{1}{16} + \frac{8}{16} = \frac{9}{16} = z^2 \Rightarrow z = \frac{3}{4}$

or notice $z + \frac{1}{4} = 1$ b/c of the right side of the patty paper

(b) [4] Find the length of y

(+.5)

Triangle A is similar to △B.

$\triangle \gamma\alpha\beta \sim \triangle \alpha\varepsilon\delta$ (+.5)

$\Rightarrow \frac{\alpha\beta}{\gamma\beta} = \frac{\varepsilon\delta}{\delta\alpha}$ (+.5)

$\frac{\frac{\sqrt{2}}{2}}{\frac{1}{4}} = \frac{\varepsilon\delta}{1 - \frac{\sqrt{2}}{2}}$ (+.5) $\cdot \frac{1}{4}$

$\left(1 - \frac{\sqrt{2}}{2}\right)\frac{\sqrt{2}}{2} = \frac{\overline{\varepsilon\delta}}{1 - \frac{\sqrt{2}}{2}} \cdot \frac{1}{4}\left(1 - \frac{\sqrt{2}}{2}\right)$

$4 \cdot \frac{\sqrt{2}}{2} - \frac{2}{4} = \frac{1}{4}\overline{\varepsilon\delta} \cdot 4$

$4\left(\frac{2\sqrt{2}}{4} - \frac{2}{4}\right) = \overline{\varepsilon\delta}$ alg (+.5)

$2\sqrt{2} - 2 = \overline{\varepsilon\delta}$

$.828 \approx$

$\frac{.707}{.25} = \frac{\varepsilon\delta}{.293} \Rightarrow$

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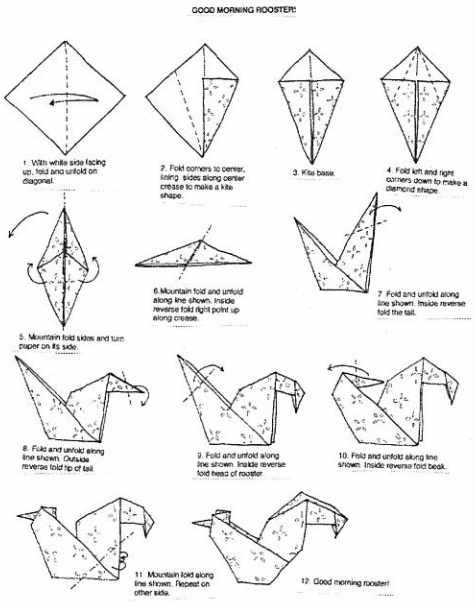
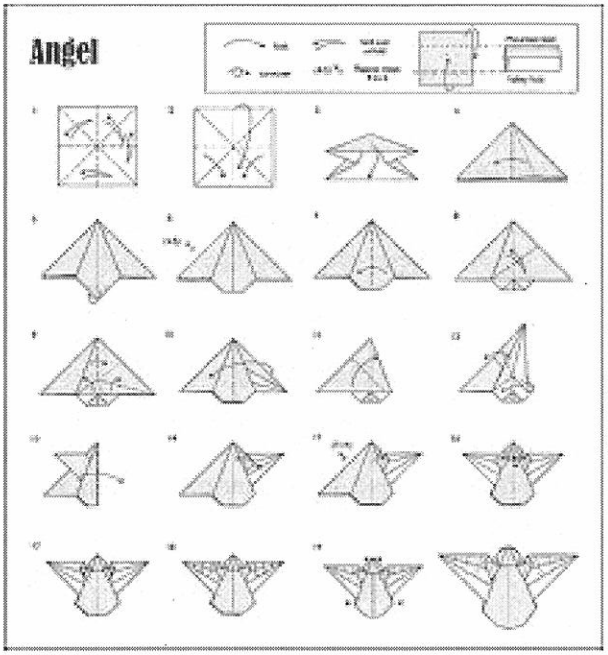
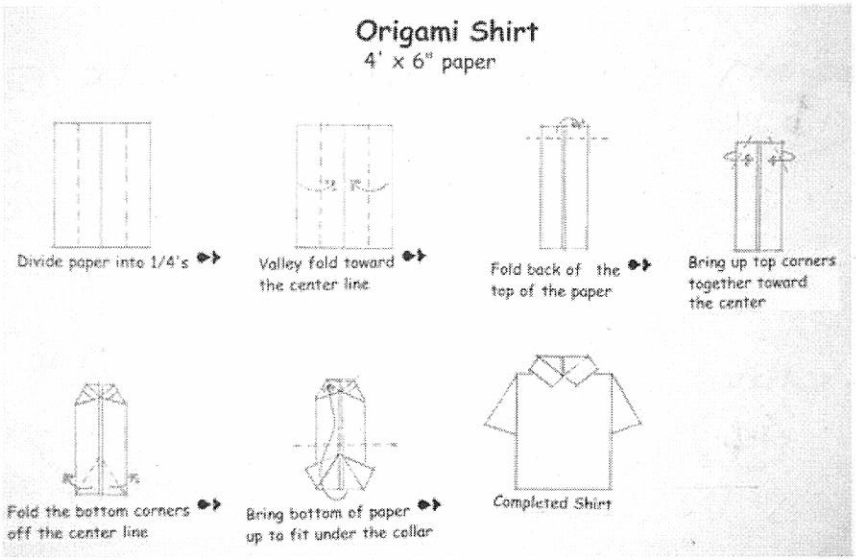
6. [3 each] (Lecture 1/26) Identify the base each of the origami directions below make use of.



Kite



waterbomb



Cupboard.

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7. [2] (Quiz 1 #3) What does the word "origami" translate to in English?

paper folding (+1.5) (+.5) started

in more detail: 'ori' means to fold + 'gami' comes from 'kami' meaning paper.

8. [2] (Lecture 1/3) How was origami used/taught initially (ie before it spread to the Arabic & Spanish world).

(+.5) started
(+1) true
(+.5) sense

used: for religious purposes + in Shinto weddings

taught: one had to find a teacher who is specialized in the practice although some patterns were passed down from mother to daughter

9. [2] (Lecture 1/24) What physical tools did the cult of pythagorus use in their geometric investigations? (For example, when you do patty paper investigations, your tools are: patty paper and pencil.)

(+.5) started
(+1) true
(+.5) the 2 I'm looking for

straight edge + compass

10. [4] (Quiz 2 #6) Write down the three rules of logic as written by Aristotle in 384 BC (and discussed in class on 1/5).

(+.5) started
(+.5) ~~[illegible]~~ instead
sense

- Identity: a statement's truth value is consistent. (+.5)

- Excluded middle: a statement is either true or false (+.5)

- non contradiction: a statement cannot be both true and false (+.5)

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