

tc core 122: Quiz 2

Key

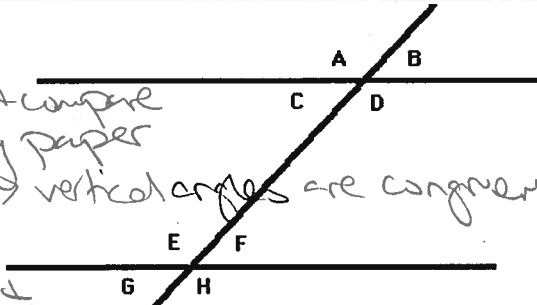
1. (Patty Wks 3) Given that the horizontal lines in the picture below are parallel, determine if the following are true or false. Briefly justify your answers.

(a) [1] $A \cong D$

true we can trace & compare them w/ patty paper or cite wks 1 \Rightarrow vertical angles are congruent.

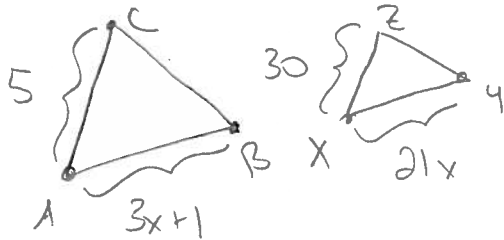
(b) [1] $C \cong F$

true we can trace & compare them w/ patty paper or cite wks 3 \Rightarrow interior alternating angles are congruent when between parallel lines.



Note: Int. alt. angles are not always congruent - only is here b/c // lines

2. [3] (Wheater §7.4) Let $\triangle ABC \sim \triangle XYZ$, $\overline{AB} = 3x + 1$, $\overline{AC} = 5$, $\overline{XY} = 21x$, and $\overline{XZ} = 30$. Find the value of x .



picture/labeling (+1)

Since the two Δ 's are similar we know

$$\frac{AC}{XZ} = \frac{AB}{XY}$$

(+1) 1.5 ratios
+5 right ratios

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

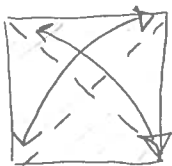
(+5) Plug in #'s.

alg (+5)

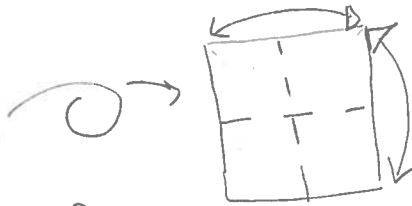
$$\begin{aligned} \Rightarrow (21x)5 &= (3x+1)30 \\ &= 105x = 90x + 30 \\ &\quad -90x \quad -90x \end{aligned}$$

$$\begin{aligned} \Rightarrow \frac{15x}{15} &= \frac{30}{15} \\ \Rightarrow X &= 2 \end{aligned}$$

3. [5] (Lecture 4/11) Write down instructions for folding the diamond shape that you used when forming open and closed sinks.



fold & unfold along both diagonals



flip over

fold & unfold (like a book)

45°



pull the three top corners down to the bottom corner & fold back the side



1

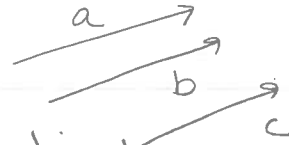
we now have a diamond

started (+5) flaps in
knew figure (+5) steps lead to
rotation (+1) cut part thing (+1)
clear/precise (+1)
step order distinct (+1)

4. [4] (Wheater §3.2) Fill in each blank with the word sometimes, always, or never. Explain briefly why.

(a) Line a is parallel to line b . Line b is parallel to line c .

Line a is always parallel to line c .



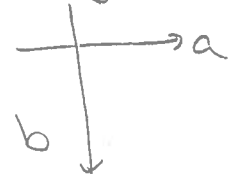
answer (1.5)

start reasoning (1.5)
reasoning (1.0)

if a and b are 'pointing' in the same direction
& b and c are 'pointing' in the same direction
then a and c must be pointing in the same direction

(b) Line a is perpendicular to line b . Line b is perpendicular to line c .

Line a is Sometimes parallel to line c .



answer (1.5)

start reasoning (1.5)
reasoning (1.0)

if we are confined to a plane then
answer would be always but
in 3D we have corners.

5. [2] (Mathematician's Lament) What mathematical "adventure of of the imagination" does Paul Lockhart use as an example to highlight the stark difference between the current school systems approach to math and the approach that he is championing?

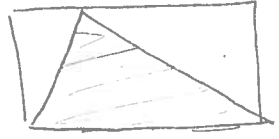
reading (1.5)

Lockhart considers the formula for the area of a triangle

summary (1.5)

and looks at a picture like:

correct (1.0)



By drawing one vertical line:



it's easy to see the Δ takes up half the area of the box

6. [4] (Mathematician's Lament) Make at least two arguments to defend or argue against Paul Lockhart's statement that "math is art".

start (1.0)

defend "math is art"

argue "math is not art"

reason (1.0) / took outside

2 arguments (1.0)

1) Math has a set of rules like a lot of artists do
expressions that have to rhyme or use the correct # of syllables

1) Math has rules but artists don't

2) Artists create patterns, just like mathematicians

2) Mathematicians discover patterns but don't make anything

3) Geometry even looks like art

3) Algebra doesn't even look pretty

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