MTH 202.1 FS 2007 EXAM 2 **Name:** ANSWER KEY **PID:** A00000000

Instructions:

You must show ALL the work required in ALL questions. Use only the space provided for each question. Read the statements of the questions very carefully. You will be graded on your methods, not just your answers.

You need only a pencil and an eraser for the exam. Any use of rulers, protractors, and calculators is prohibited.

You will have EXACTLY 50 minutes for the exam, which consists of problems numbered 1 – 13. Request a new copy of the exam if any of the problems are missing or hard to read.

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1) (6 points) Indicate whether the given statement is "always true" (**T**) or "not always true" (**F**).

(each: 1pt)

	Trapezoid	Kite	Parallelogram	Rectangle	Rhombus	Square
There are 2 pairs of adjacent equal sides.	F	T	F	F	T	T

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2) (10 points) Complete the following definitions.

a) A polygon is regular if

i) all sides have the same length (2),

and *ii)* all angles have the same measure (2).

b) A unit square is a square of side length 1 unit (2).

c) The square unit is the area of a unit square (2).

d) State the complete precise definition of the *intersection* of regions *R* and *S*.

The intersection of regions R & S, $R \cap S$, is the set of all points in the plane that are in both R and S.

(2)

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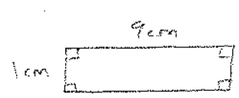
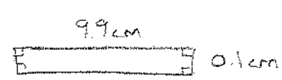
3) (6 points) Sketch rectangles of perimeter 20 cm, with area: a) 9 cm^2. b) 0.99 cm^2.

a)



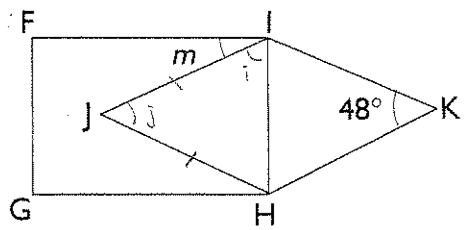
(3)

b)



(3)

4) (6 points) If *FGHI* is a rectangle, and *IJHK* is a rhombus, circle the value of $\angle m$.



$j = 48°$ (opp ∠s of //gram IJHK)

$i = (180-48) \div 2$ (∠sum of ΔIJH) (base ∠ of isos. ΔIJH)

$i = 132 \div 2 = 66°$

$m = 90 - 66°$ (∠s of rect FGHI) (angles add)

$= 24°$

(no partial credit)

12   24   30   42   48

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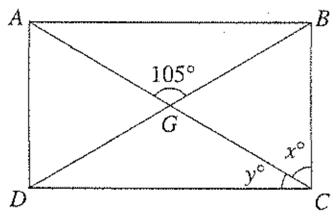
5) (8 points) *ABCD* is a rectangle. Find the values of *x* and *y*, showing the reasoning and facts used.



$\angle DGC = 105°$ (vertical ∠s) (2)

$y = (180-105) \div 2$ (∠sum of ΔDGC) (base ∠ of isos. ΔDGC) (2)

$= 75 \div 2 = 37.5°$ (1)

$x = 90 - y$ (∠s of rect ABCD) (angles add) (2)

$= 90 - 37.5° = 52.5°$ (1)

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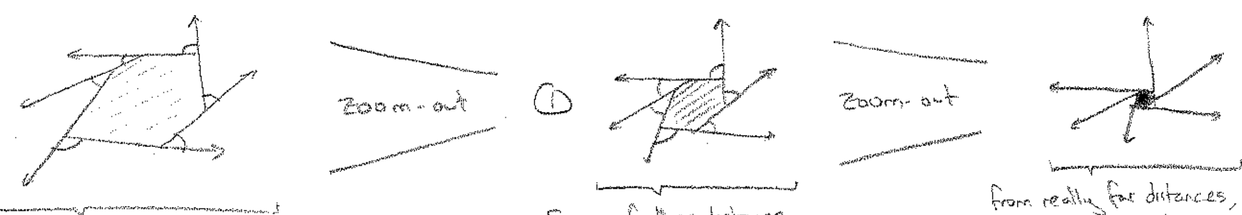
6) (8 points) Teacher Explanation: Draw a series of pictures (with short one-sentence explanations for each picture) to explain the "zoom-out" demonstration of "the sum of exterior angles of a convex polygon is 360".

(1)



(2)

(1) Extend all sides of the polygon counterclockwise to rays & label ext. ∠s

(1) From a further distance, the polygon is smaller, but still the rays extend indefinitely

From really far distances, the polygon looks like a point, ext. angles look like the angles around a pt. ⟹ they add to 360° (2)

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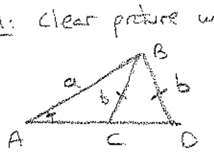
7) (8 points) Teacher Explanation: Draw a series of pictures (with short one-sentence explanations for each picture) to explain why there is no SSA test for triangle congruence.

M1: Clear picture without numbers:



(4)

ΔABC ≇ ΔABD (since ΔABD bigger) (2)

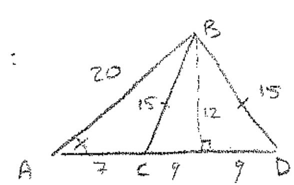
although they have the same (2)

S: |BC| = b = |BD|

S: |AB| = a = |AB| common

A: ∠BAC = ∠BAC common

M2: With numbers: (using Pyth triples is optional)



(4)

ΔABC ≇ ΔABD (since |AC| = 7 ≠ 25 = |AD|) (2)

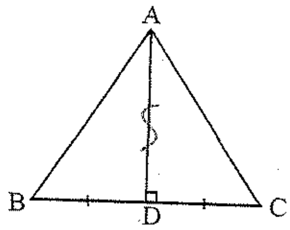
although they have the same (2)

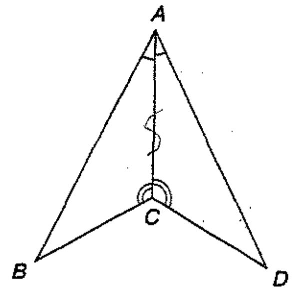
S: |BC| = 15 = |BD|

S: |AB| = 20 = |AB| common

A: ∠BAC = ∠BAC common

8) (8 points) State the congruent triangles and the test used. [Example: $\Delta XYZ \cong \Delta RST$ (SSS)]





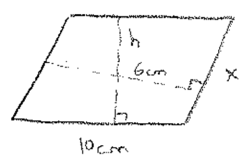
$\Delta ACB \cong \Delta ACD$ (2)

(ASA) (2)

$\Delta ADB \cong \Delta ADC$ (2)

(SAS) (2)

9) (10 points) The area of a parallelogram is 30 cm^2. One of the sides is 10 cm and one height is 6 cm. Find the other height and the perimeter.



(2)

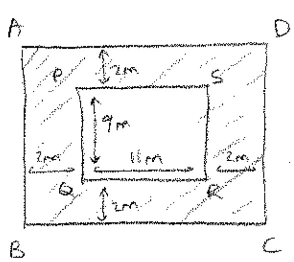
$10h = 30$
$h = 3\text{cm}$ (2)
(1)

$6x = 30$
$x = 5\text{cm}$ (2)

$P = 2(x+10) = 2(5+10) = 2 \cdot 15 = 30\text{ cm}$ (2)
(1)

10) (10 points) Give a Teacher Solution, including *a sketch with labels for lengths and vertices*:

A rectangular flower-bed measures 9 meters by 11 meters.
It has a path 2 meters wide around it. Find the area of the path.



(2)

$|AD| = 2 + 11 + 2 = 15\text{ m}$ (lengths add)
$|AB| = 2 + 9 + 2 = 13\text{ m}$ (lengths add) (2)

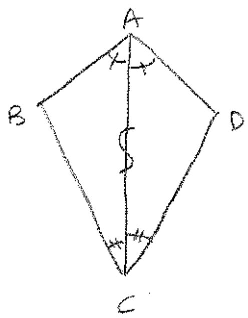
Area(ABCD) $= 15 \times 13$ (rectangle area)
$= 195\text{ m}^2$ (2)

Area(PQRS) $= 11 \times 9$ (rectangle area)
$= 99\text{ m}^2$ (2)

Area(Shaded Region) = Area(ABCD) − Area(PQRS) (areas add)
$= 195 - 99 = 96\text{m}^2$ (2)

11) (10 points) Give a proof for the following. Make sure to include the "setup" steps and a sketch.

In a quadrilateral $ABCD$, if $\overline{AC}$ bisects $\angle BAD$ and $\angle BCD$, then $AB = AD$ and $CB = CD$.



1

Given: Quad. $ABCD$ with $\overline{AC}$. 1

$\angle BAC = \angle DAC$ & $\angle BCA = \angle DCA$ 1

To Prove: $|AB| = |AD|$ & $|CB| = |CD|$ 1

Proof:
A: $\angle BAC = \angle DAC$ given
S: $|AC| = |AC|$ common
A: $\angle BCA = \angle DCA$ given
2

$\therefore \triangle ABC \cong \triangle ADC$ (ASA) 2

Then $|AB| = |AD|$ & $|CB| = |CD|$ (corr. sides of $\cong \triangle$s) 2

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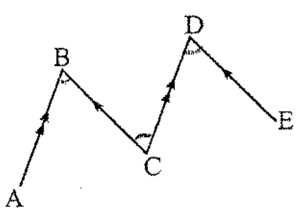
12) (10 points) In the figure, $\overline{AB} \parallel \cancel{\overline{AC}}$ $\overline{CD}$ and $\overline{CB} \parallel \overline{ED}$. Prove that $\angle ABC = \angle CDE$.



Given: $\overline{AB} \parallel \overline{CD}$ & $\overline{CB} \parallel \overline{ED}$ 2

To Prove: $\angle ABC = \angle CDE$ 1

Proof: $\angle ABC = \angle BCD$ (alt. int $\angle$s, $\overline{AB} \parallel \overline{CD}$) 3

$\angle BCD = \angle CDE$ (alt. int $\angle$s, $\overline{BC} \parallel \overline{DE}$) 3

$\therefore \angle ABC = \angle BCD = \angle CDE$ 1

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13) Extra Credit: (5 points) Find the area of the given composite figure.

Area (Figure) = Area (Rectangle PQRS)

$= 5 \times 6 = 30 \text{ cm}^2$