Day one

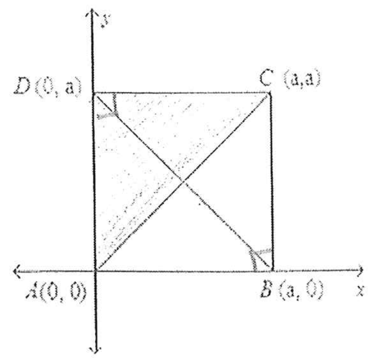
Name: ______________________

Hour: _____

Coordinate Proofs of Congruent Triangles

1. Given: the Coordinates of Square ABCD

Prove: $\Delta ABC \cong \Delta ADC$



$AD = a$ $\quad$ $AB = a$ $\quad$ $AD \cong AB$

$DC = a$ $\quad$ $BC = a$ $\quad$ $DC \cong BC$

$AC^2 = a^2 + a^2$ $\quad$ $AC \cong AC$ reflexive

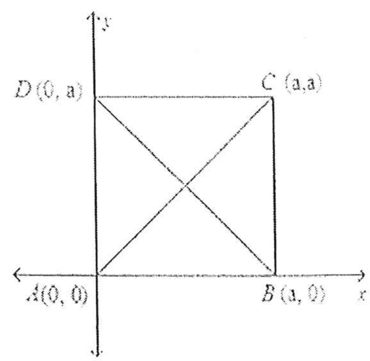
$AC^2 = 2a^2$

$AC = a\sqrt{2}$

$\Delta ABC \cong \Delta ADC$ by SSS

2. Given: the Coordinates of Square ABCD

Prove: $AC \cong BD$



$AC^2 = a^2 + a^2$ $\quad$ $BD^2 = a^2 + a^2$

$\sqrt{AC^2} = \sqrt{2a^2}$ $\quad$ $\sqrt{BD^2} = \sqrt{2a^2}$

$AC = a\sqrt{2}$ $\quad$ $BD = a\sqrt{2}$

$AC \cong BD$

3. Given: the Coordinates of Square ABCD

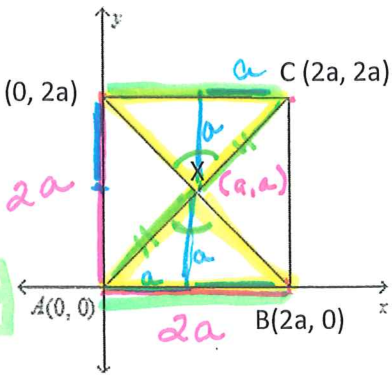
Prove: $\Delta ABX \cong \Delta CDX$

How could we prove by SSS?

$DC = 2a$

$AB = 2a$

$\boxed{DC \cong AB}$



$a^2 + a^2 = AX^2$

$2a^2 = AX^2$

$\boxed{AX = a\sqrt{2}}$

$a^2 + a^2 = CX^2$

$\boxed{CX = a\sqrt{2}}$

$AX \cong CX$ Side

Angle $\angle CXD \cong \angle AXB$ vertical $\angle$s are $\cong$

$a\sqrt{2} = DX$

$a\sqrt{2} = BX$

$\boxed{BX \cong DX}$ Side

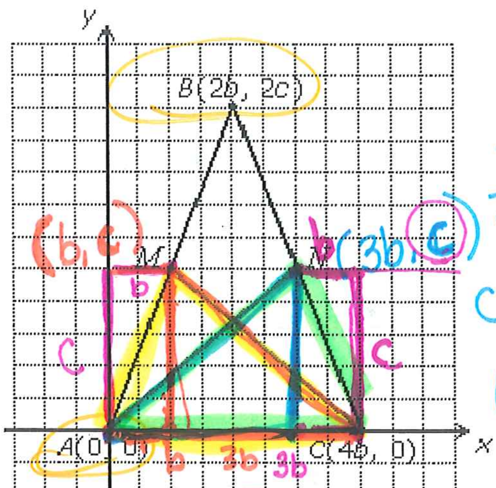
$\therefore$ by SAS $\Delta ABX \cong \Delta CDX$

4. Given A(0,0), B(2b,2c) and C(4b,0) and M and N are the midpoints of AB and BC respectively.

Prove: $\Delta MCA \cong \Delta NAC$

midpoint formula

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$



To Find N

B(2b, 2c)

C (4b, 0)

$$\left(\frac{2b+4b}{2}, \frac{2c+0}{2}\right)$$

$$\left(\frac{6b}{2}, \frac{2c}{2}\right) = N(3b, c)$$

Find M

A(0,0) B(2b, 2c)

$$\left(\frac{0+2b}{2}, \frac{0+2c}{2}\right)$$

$$\left(\frac{2b}{2}, \frac{2c}{2}\right) = M(b, c)$$

AC $\cong$ AC by Reflexive

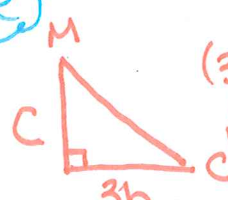
$b^2 + c^2 = NC^2$

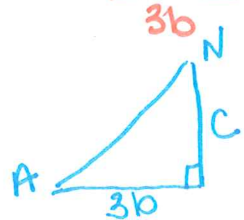
$\boxed{\sqrt{b^2+c^2} = NC}$

$b^2 + c^2 = MA^2$

$\boxed{\sqrt{b^2+c^2} = MA}$

$NC \cong MA$





$(3b)^2 + c^2 = MC^2$

$\sqrt{9b^2 + c^2} = \sqrt{MC^2}$

$\boxed{MC = \sqrt{9b^2+c^2}}$

$(3b)^2 + c^2 = AN^2$

$9b^2 + c^2 = AN^2$

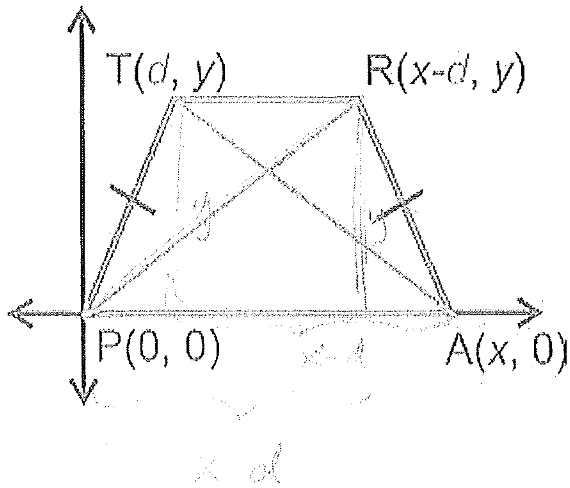
$\boxed{AN = \sqrt{9b^2+c^2}}$

$MC \cong NA$

$\Delta MCA \cong \Delta NAC$ by SSS

7. Given: the coordinates of figure PTRA

Prove: $\Delta PTR \cong \Delta ART$



$PR^2 = (x-d)^2 + y^2$

$PR = \sqrt{(x-d)^2 + y^2}$

$TA^2 = (x-d)^2 + y^2$

$TA = \sqrt{(x-d)^2 + y^2}$

$PR \cong TA$

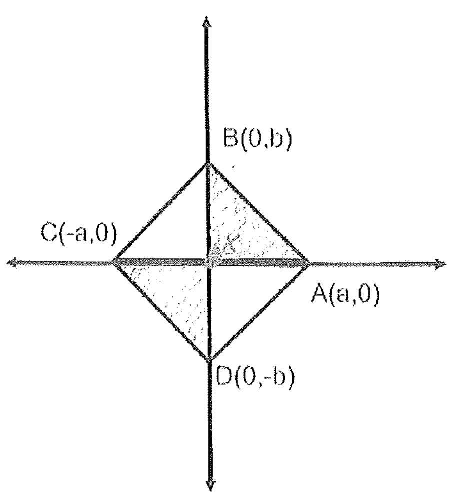
$TR \cong TR$ Reflex

$TP \cong RA$ Given

SSS

8. Given: the coordinates of ΔAXB and ΔCXD

Prove: $\Delta AXB \cong \Delta CXD$



$XB = b$ $\quad XD = b$ $\quad XB \cong XD$

$XA = a$ $\quad XC = a$ $\quad XA \cong XC$

$AB^2 = a^2 + b^2$ $\quad CD^2 = a^2 + b^2$

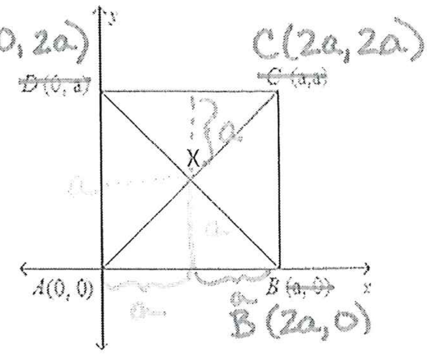
$AB = \sqrt{a^2 + b^2}$ $\quad CD = \sqrt{a^2 + b^2}$

$AB \cong CD$

$\Delta AXB \cong \Delta CXD$ by SSS

3. Given: the Coordinates of Square ABCD

Prove: $\Delta ABX \cong \Delta CDX$



$AB = 2a$, $DC = 2a$ } $AB \cong DC$

$AX^2 = a^2 + a^2$

$AX = a\sqrt{2}$

$BX^2 = a^2 + a^2$

$BX = a\sqrt{2}$

$XD^2 = a^2 + a^2$

$XD = a\sqrt{2}$

$XC^2 = a^2 + a^2$

$XC = a\sqrt{2}$

$AX \cong XD$

$BX \cong XC$

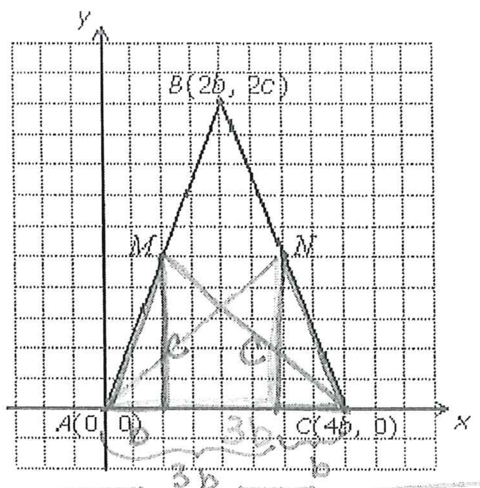
$\Delta ABX \cong \Delta CDX$ by SSS

4. Given A(0,0), B(2b,2c) and C(4b,0) and M and N are the midpoints of AB and BC respectively.

Prove: ΔMCA ≅ ΔNAC

$M = \left(\frac{0+2b}{2}, \frac{0+2c}{2}\right) = (b, c)$

$N = \left(\frac{2b+4b}{2}, \frac{2c+0}{2}\right) = (3b, c)$



$AC \cong AC$ reflexive

$\sqrt{MA^2} = \sqrt{b^2 + c^2}$

$MA = \sqrt{b^2 + c^2}$

$\sqrt{MC^2} = \sqrt{3b^2 + c^2}$

$MC = \sqrt{3b^2 + c^2}$

$\sqrt{NC^2} = \sqrt{b^2 + c^2}$

$NC = \sqrt{b^2 + c^2}$

$\sqrt{AN^2} = \sqrt{3b^2 + c^2}$

$AN = \sqrt{3b^2 + c^2}$

$MA \cong NC$

$MC \cong AN$

$\Delta MCA \cong \Delta NAC$ by SSS