2011P2Q9(I): H&K SUBGROUPS

$I \in H$, $I \in K$, I IS UNIQUE $\Rightarrow I \in H \cap K$ (I)

$h \in H \Rightarrow h^{-1} \in H$ $h \in H, h \in K \Rightarrow h \in H \cap K$

$h \in K \Rightarrow h^{-1} \in K$ $h^{-1} \in H, h^{-1} \in K \Rightarrow h^{-1} \in H \cap K$

IT IS COMPULSORY to write down what you are proving before you prove it. You are wasting my time by not doing so

$h \in H \cap K \Rightarrow h^{-1} \in H \cap K$ (II)

I cannot see what you are assuming here + what you are proving

$h, k \in H \Rightarrow hk \in H$ ~~$h, k \in H$,~~

$h, k \in K \Rightarrow hk \in K$ $h, k \in H; h, k \in K \Rightarrow h, k \in H \cap K$

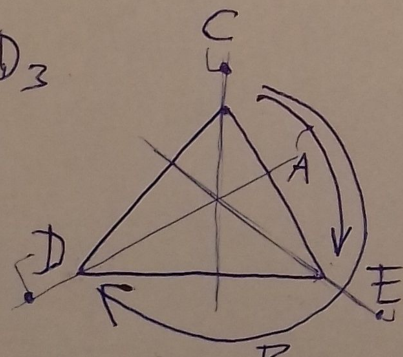
$hk \in H, hk \in K \Rightarrow hk \in H \cap K$

$h, k \in H \cap K \Rightarrow hk \in H \cap K$ (III)

(I), (II), (III) $\Rightarrow H \cap K$ IS A SUBGROUP

you need to show closure, inverse + identity + associativity is inherited from the parent group

• D_3



I: LEAVE TRIANGLE AS IS

A: ROTATE BY $\frac{2\pi}{3}$ 120° DEGREES AS SHOWN

B: ROTATE BY 240° DEGREES AS SHOWN

A, E, D: REFLECT IT ON THE RESPECTIVE AXIS AS SHOWN.

CDE ??

~~I~~	~~A~~	~~B~~	~~C~~	~~D~~	~~E~~
I	A	B	C	D	E
A	B	I	D	E	C
B	I	A	E	C	D
C	B	E	I	B	A
D	C	E	A	I	B
E			B	A	I

I	A	B	C	D	E
A	B	I	D	E	C
B	I	A	E	C	D
C	E	D	I	B	A
D	C	E	A	I	B
E	D	C	B	A	I

✓

NOT ABELIAN, E.G. $CA \neq AC$ ✓

2011P2Q9(II)

ORDER 2 SUBGROUPS OF D3: $\{I, C\} = SG_1$ THERE ARE 3 OF THEM.

better.

$\{I, D\} = SG_2$ ✓

$\{I, E\} = SG_3$

$BC \neq CB$

$BCB^{-1} \neq C \Rightarrow SG_1$: does NOT CONSIST OF COMPLETE CONJUGACY CLASS BECAUSE $B \notin SG_1$ ✓

$\Longrightarrow SG_1$ NOT NORMAL SUBGROUP

$DE \neq ED$

$E \notin SG_2$ $\Rightarrow SG_2$ NOT NORMAL SG ✓

similarly ✓

$EA = AE$

$A \notin SG_3$ $\Rightarrow SG_3$ NOT NORMAL SG.