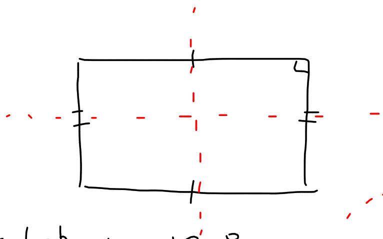
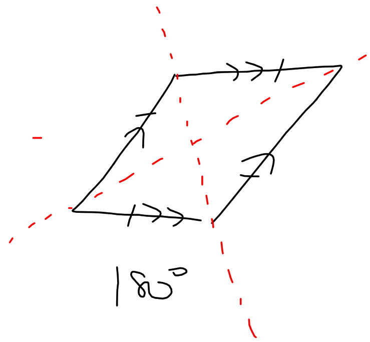
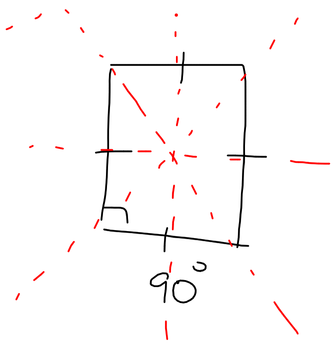
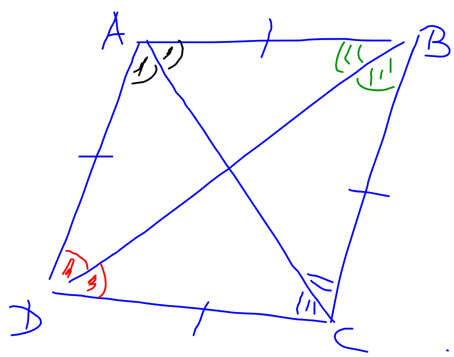
3)

rotation: 180° 180° 90°

reflection

7a)



$AB = AD = BC = DC$ (given)

BD is common

$\triangle ABD \equiv \triangle CBD$ (SSS)

$\angle ADB = \angle BDC$ (matching $\angle$'s in $\equiv \triangle$'s)

$\angle ABD = \angle DBC$ (")

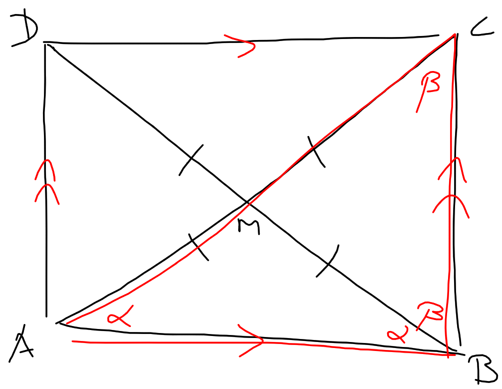
Similarly

$\angle DAC = \angle BAC$

and $\angle DCA = \angle BCA$

$\therefore ABCD$ is a rhombus (diagonals bisect vertices)

9b)(iv)



(∠ sum ΔABC)

$$\angle ABC + \angle BCA + \angle CAB = 180^\circ$$

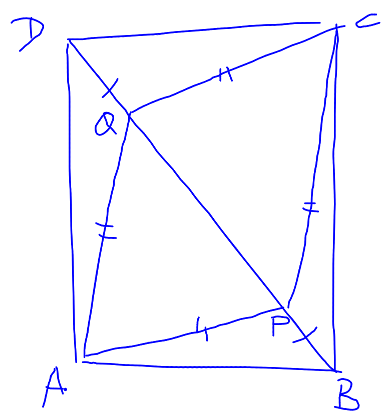
$$\alpha + \beta + \beta + \alpha = 180$$

$$2\alpha + 2\beta = 180$$

$$\alpha + \beta = 90$$

$$\therefore \underline{\angle ABC = 90^\circ}$$

15a)



$\triangle ABP$, $\triangle CBP$, $\triangle CDQ$, $\triangle ADQ$

$BP = BP = QD = QD$ (given)

$\angle PBA = \angle PBC = \angle CDQ = \angle ADQ$ (diagonal in square bisect vertex)

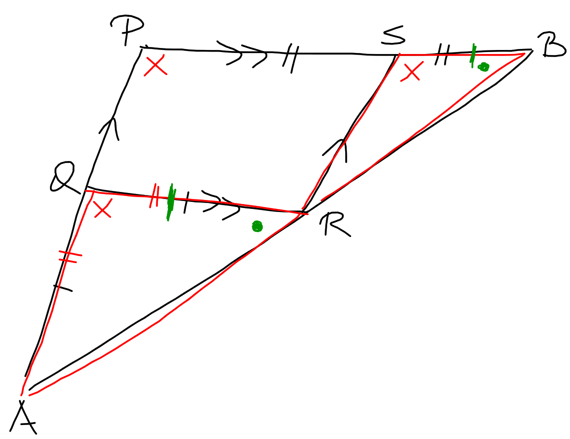
$AB = BC = CD = AD$ (sides in square)

$\triangle ABP \equiv \triangle CBP \equiv \triangle CDQ \equiv \triangle ADQ$ (SAS)

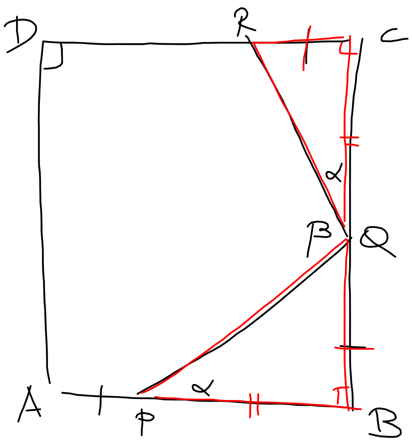
$AP = PC = CQ = AQ$ (matching sides in $\equiv \triangle$'s)

$\therefore PCQA$ is rhombus (all sides $=$)

16/



17b)



Let $\angle CQR = \alpha$

$\therefore \angle QPB = \alpha$ (matching $\angle$'s in $\equiv \triangle$'s)

Let $\angle PQR = \beta$

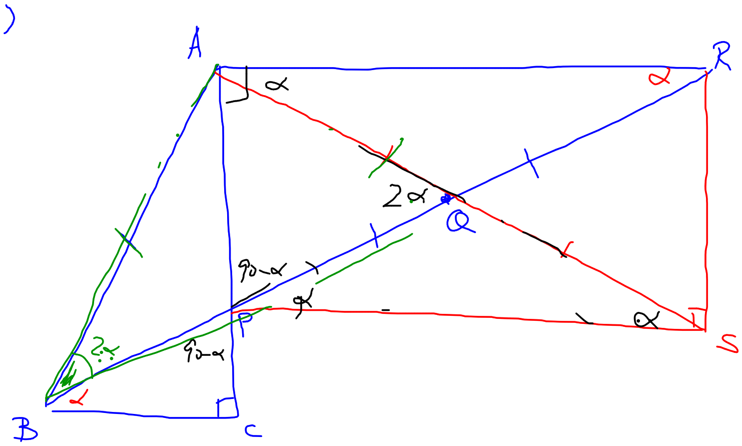
$\angle CQP = \angle QBP + \angle QPB$ (exterior $\angle$ $\triangle QPB$)

$\alpha + \beta = 90 + \alpha$

$\beta = 90$

$\therefore \angle PQR = 90$

19c)



Let

$\angle PBC = \alpha = \angle BRA$

$\angle RPS = \alpha$ (alternate $\angle$s, $AR \parallel PS$)

$PQ = QS = QA = QR$ (= diagonals in rectangle bisect)

$\triangle PQS$ is isosceles (2 = sides)

$\angle QSP = \alpha$ (= $\angle$'s in isosceles $\triangle PQS$)

$\angle AQB = \angle QSP + \angle QPS$

$= 2\alpha$ (exterior $\angle$, $\triangle QPS$)

$AB = PQ$ (given)

$\therefore AB = AQ$

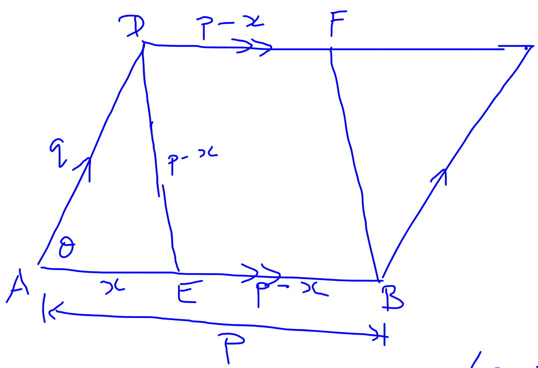
$\triangle ABQ$ is isosceles (2 = sides)

$\angle ABQ = \angle AQB$ (= sides in isosceles $\triangle ABQ$)

$\angle ABQ = 2\alpha$

$\therefore \angle ABQ = 2 \times \angle PBC$

21/



$AB = AE + BE$ (common side)

$p = x + BE$

$BE = p - x$

$BE = DE$ (sides in rhombus FDEB)

$\therefore DE = p - x$

$(p-x)^2 = x^2 + q^2 - 2qx\cos\theta$

$p^2 - 2px + x^2 = x^2 + q^2 - 2qx\cos\theta$

$-2px + 2qx\cos\theta = q^2 - p^2$

$2x(q\cos\theta - p) = q^2 - p^2$

$$x = \frac{p^2 - q^2}{2(p - q\cos\theta)}$$