Section 2.3
Homework Set 7 (pg 45)

Problem 1 (refers to PM 5B, pgs 61-64)

(a) By folding an isosceles triangle in half (that is, along its line of symmetry), we see that the two base angles match.

(b) Prob 2 (pg 64) illustrates the fact that "if a triangle has two equal angles, then it is an isosceles triangle.

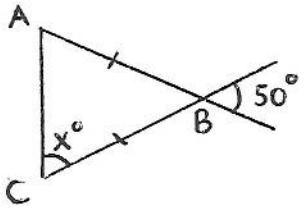
(c) Prob 3: Triangles B and C are isosceles triangles.
($75^\circ, 75^\circ, 30^\circ$)

Prob 4: Triangles P and Q are equilateral triangles.

(d) Prob 5: $\angle BAC = 110^\circ$ "other fact" used: $\angle$ sum of $\Delta$
Prob 6: $\angle PRS = 130^\circ$ "other fact" used: ext $\angle$ of $\Delta$
Prob 7: $\angle ABC = 75^\circ$ "other fact" used: vert $\angle$s

(e) Prob 8: $a = 130^\circ$, $b = 40^\circ$, $c = 120^\circ$, $d = 30^\circ$, $e = 20^\circ$

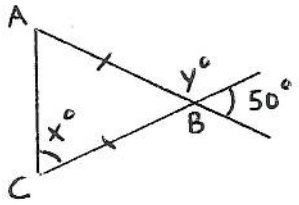
Problem 2




$\angle ABC = 50^\circ$ vert $\angle$s
$\angle BAC = x^\circ$ base $\angle$s of isos $\Delta$
$x + x + 50 = 180$ $\angle$ sum of $\Delta$
$2x = 130$
$\therefore x = 65$

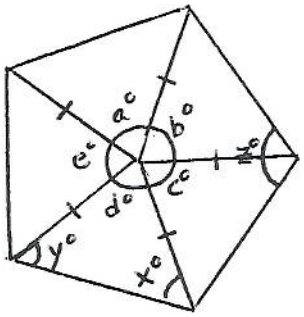
Alternative solution:

Mark angle y as shown




$y + 50 = 180$ $\angle$s on a line
$y = 130$
$\angle BAC = x^\circ$ base $\angle$s of isos $\Delta$
$x + x = y$ ext $\angle$ of $\Delta$
$2x = 130$
$\therefore x = 65$

## Problem 3




Mark angle x as shown

$a = b = c = d = e$ given

$a + b + c + d + e = 360$ ∠s at a point

$d + d + d + d + d = 360$

$5d = 360$

$\therefore d = 72$

$y = x$ base ∠s of isos Δ

$x + y + d = 180$ ∠ sum of Δ

$y + y + 72 = 180$

$2y = 108$

$\therefore y = 54$

By the same reasoning,

each base angle of each of the 5 isosceles triangles is $54^\circ$

$\therefore z = 2(54) = 108$

## Problem 5 (refers to NEM 1, Sec 10.3, pgs 268-270)

Prob 1: (a) $x = 62$ (b) $x = 45$ (c) $x = 180 - 60 = 120$

(d) $x + x + 68 = 180$

$2x = 112$

$\therefore x = 56$

(e) $58 + 58 + x = 180$

$116 + x = 180$

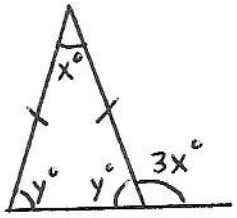
$\therefore x = 64$

(f) $60 = x + x$ ext ∠ of Δ

$2x = 60$

$\therefore x = 30$

Prob 2: (a)




Mark angles y as shown base ∠s of isos Δ

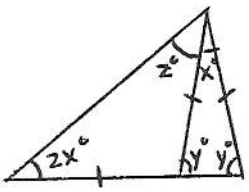
$3x = x + y$ ext ∠ of Δ

$\therefore y = 2x$

$3x + y = 180$ ∠s on a line

$3x + 2x = 180$

$5x = 180 \quad \therefore x = 36$

(b) 


Mark angles y as shown — base ∠s of isos Δ
Mark angle z as shown

$z = 2x$ — base ∠s of isos Δ

$y = 2x + z$ — ext ∠ of Δ

$y = 2x + 2x$

$\therefore y = 4x$

$x + y + y = 180$ — ∠ sum of Δ

$x + 4x + 4x = 180$

$9x = 180$

$\therefore x = 20$

Prob 3: RECALL all radii in a circle have the same length

(a) $x + 2x + 2x = 180$

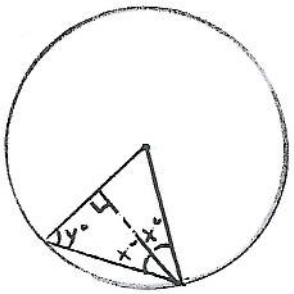
$5x = 180$

$\therefore x = 36$

(b) $42 + x + x = 180$

$2x = 138$

$x = 69$

(c) 


Mark angle y as shown

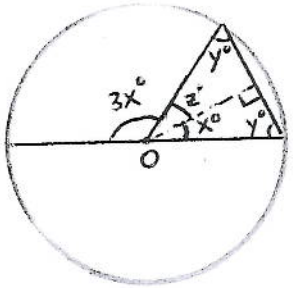
$x + y = 90$ — ∠ sum of rt Δ

$y = 2x$ — base ∠s of isos Δ

$x + 2x = 90$

$3x = 90$

$\therefore x = 30$

(d) 


Mark angles y as shown — base ∠s of isos Δ
Mark angle z as shown

$z = 90 - y$ — ∠ sum of rt Δ

$x = 90 - y$ — ∠ sum of rt Δ

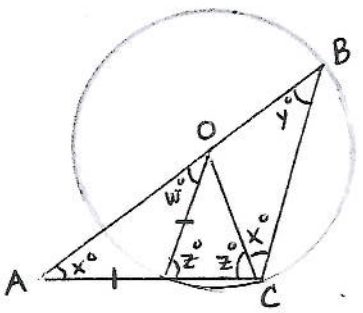
$\therefore x = z$

$x + x + 3x = 180$ — ∠s on a line

$5x = 180$

$\therefore x = 36$

(g)




Mark angles w and y as shown
Mark angles z as shown  base ∠s of isos Δ

$w = x$  base ∠s of isos Δ
$y = x$  base ∠s of isos Δ
$z = x + w$  ext ∠ of Δ
$z = x + x$
$\therefore z = 2x$

$x + y + z + x = 180$  ∠ sum of Δ (ΔABC) (and ∠s add)

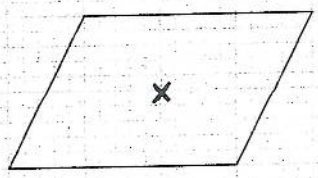
$x + x + 2x + x = 180$
$5x = 180$
$\therefore x = 36$

## Problem 6 (refers to NEM 1, Secs 11.1 and 11.2, pgs 290-298)

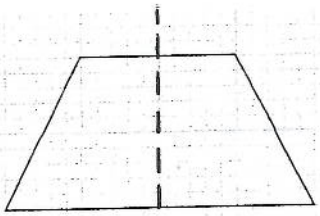
Prob 4 (pg 297)

(a) Draw all the lines of symmetry for each of them where possible.
(b) Mark with a cross (×) the centre of rotational symmetry where possible.

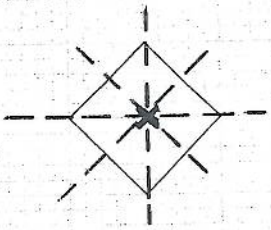
(i)



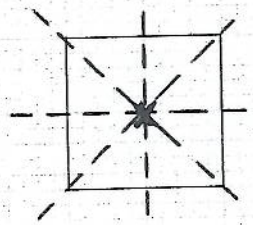
(ii)



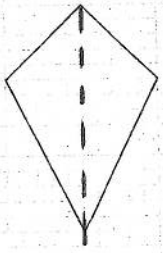
(iii)



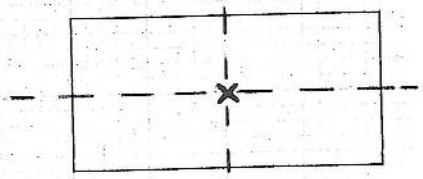
(iv)



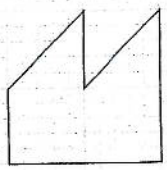
(v)



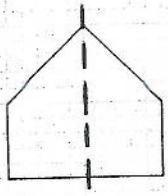
(vi)



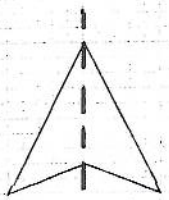
(vii)



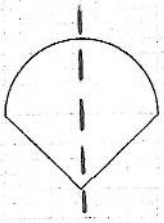
(viii)



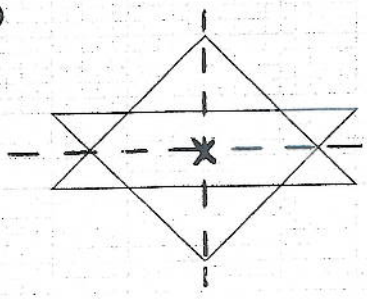
(ix)



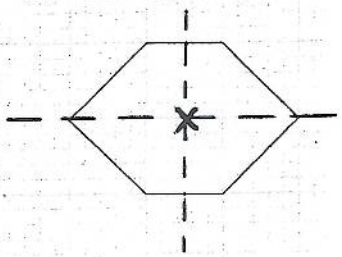
(x)



(xi)



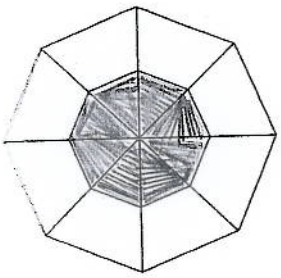
(xii)



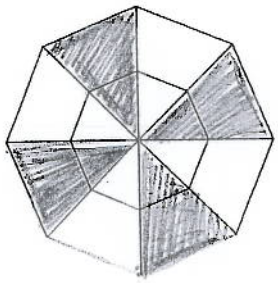
## Problem 7

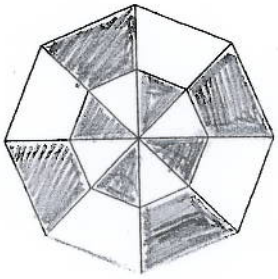
Prob 6 (NEM 1, pg 298) Several answers are possible

(a) rotational symmetry of order 8 for ex



(b) rotational symmetry of order 4 for ex





(c) rotational symmetry of order 2 for ex