CIRCLE GEOMETRY ASSIGNMENT

① (a) $x = 24$ (∠ in alternate segment)
$\angle BED = 90° - 24° = 66°$ (adjacent ∠s) 3
$y = 66$ (∠ in alternate segment)

(b) $\theta = 105$ (exterior ∠ of cyclic quad)
$\angle MQP = 75°$ (straight ∠) 3
$\alpha = 85$ (∠ sum of quad.)

(c) $x = 28$ (∠ at centre is double ∠ at circumference on the same arc)
$OT = OS$ (radii of same circle) 3
$y = 76$ (base ∠ in isosceles Δ)

(d) $\angle F = \angle H = 90°$ (∠ in semi-circle)
$\angle JGH = 46°$ (∠ sum ΔGHJ)
$\angle FGE = 46°$ (vert. opp. ∠s) 4
$x = 44$ (∠ sum ΔEFG)

(e) $x = 58$ (∠ in alternate segment) 16
$\angle ABC = 21° + 58° = 79°$ (adj. ∠s)
$y = 43$ (∠ sum ΔABC) 3

② $CD^2 = CB \cdot CA$ (square on tangent result)
$= 3.1 \times (3.1 + 5.8)$
$= 3.1 \times 8.9$
$= 27.59$
$CD = 5.2526... \approx 5.3\text{ cm}$ (3)

③ $\angle AOB = 90°$ (∠ between radius and tangent)
$AO^2 = 7.2^2 - 3.4^2$ (Pyth. Th.)
$= 40.28$
$AO = 6.346... \approx 6.3$ (1 dec. pl.) (3)

④ (a) $\angle M = \angle Q$ (∠s in same segment)
$\angle N = \angle P$ (∠s in same segment)
[or $\angle MON = \angle QOP$ (vert. opp. ∠s)]
$\therefore \Delta MNO \,|||\, \Delta OPQ$ (equiangular) 3

(b) $\frac{QP}{9.5} = \frac{3.4}{8.1}$ (corresp. sides proportional)
$QP = 9.5 \times \frac{3.4}{8.1}$
$= 3.9876...$ 3 (6)
$\approx 4.0\text{ cm}$

⑤ (a) $\angle AOD = 2\theta$ (∠ at centre double ∠ at circumference on same arc) 1

(b) $\angle BCC = 2\theta$ (vert. opp. ∠s)

(c) $OC = OD$ (radii of same circle)
$\angle ODC = \theta$ (base ∠s in isosceles Δ)
$\therefore$ arc AD = arc BC (equal ∠s cut off equal arcs) 2 (4)

⑥ Reflex $\angle AOC = 270°$ (∠s at a point)
$\theta° = 135°$ (∠ at centre double ∠ at circumference on same arc) (2)

⑦ $NO = 5.3\text{ cm}$ (radius of circle)
$NP = 3.9\text{ cm}$ (perp. to chord bisects the chord)
$OP^2 = 5.3^2 - 3.9^2$ (Pyth. Th.)
$= 12.88$ (4)
$OP = 3.5888... \approx 3.59\text{ cm}$

⑧ (a) ∠C is common
$\angle DBC = \angle A$ (∠ in alt. segment)
$\therefore \Delta ABC \,|||\, \Delta BDC$ (equiangular) 3

(b) $\frac{BC}{AC} = \frac{DC}{BC}$ (sides are in same ratio)
$\therefore BC^2 = DC \cdot AC$ (cross multiply). 2 (5)

Alternative:
⑤ (c) $\angle BOC = \angle DOA$ (vert. opp. ∠s)
$\therefore$ arc AD = arc BC (equal arcs stand on equal ∠s at centre)