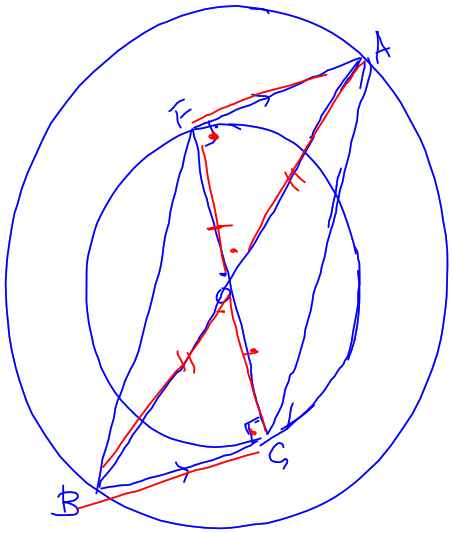
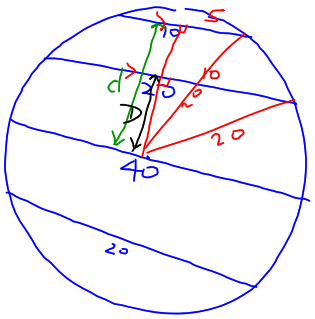
le)



9



$d^2 = 20^2 - 5^2$

$= 375$

$d = 5\sqrt{15}$

$D^2 = 20^2 - 10^2$

$= 300$

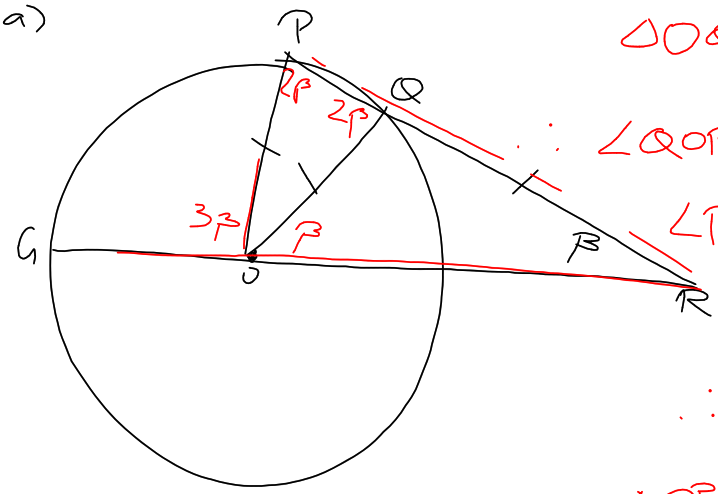
$D = 10\sqrt{3}$

distance between $= 5\sqrt{15} - 10\sqrt{3}$

OR

$= 5\sqrt{15} + 10\sqrt{3}$

10a)



$\triangle OQR$ is isosceles ($OR = QR$, given)

$\therefore \angle QOR = \angle QRO = \beta$ (base $\angle$'s isosceles $\triangle OQR$)

$\angle PQO = \angle QOR + \angle QRO$ (exterior $\angle$, $\triangle QRO$)

$\therefore \angle PQO = \beta + \beta$

$= 2\beta$

$\triangle OPQ$ is isosceles ($OP = OQ$, both radii)

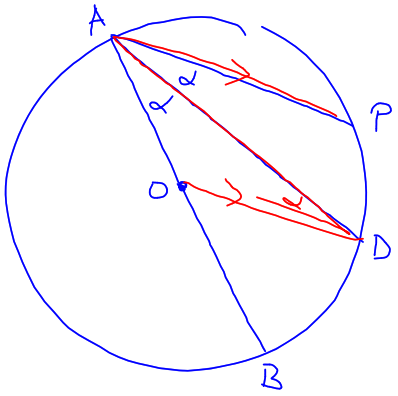
$\therefore \angle OPQ = \angle PQO = 2\beta$ (base $\angle$'s isosceles $\triangle OPQ$)

$\angle POG = \angle OPR + \angle ORP$ (exterior $\angle$ $\triangle OPR$)

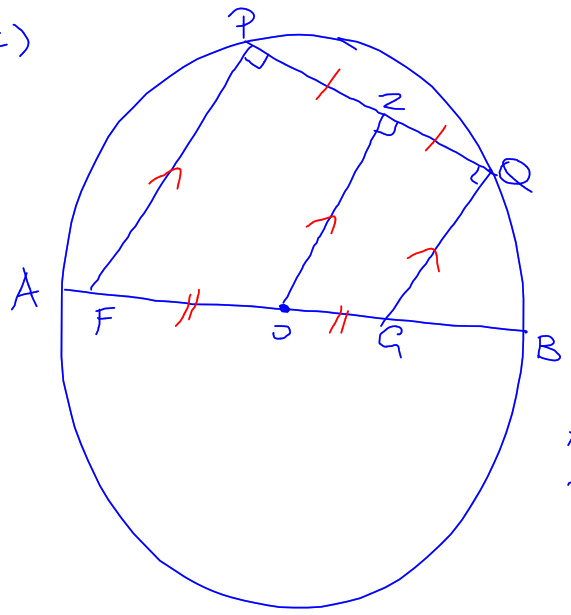
$= 2\beta + \beta$

$= 3\beta$

10c)



11 c)



$PZ = QZ$ ($\perp$ centre bisects chord)

$\angle FPZ = \angle OZQ = \angle GQZ = 90$ (given)

$\therefore FP // OZ // GQ$ (corresponding $\angle$'s =)

$\therefore FO = OG$ (ratio of intercepts of // lines)

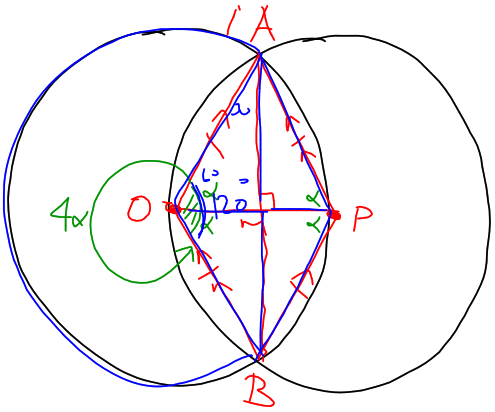
$AF = AO - FO$

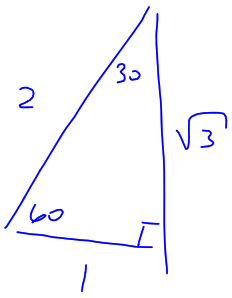
$BG = BO - GO$

$AO = BO$ ($= radii$)

$\therefore AF = BG$

14

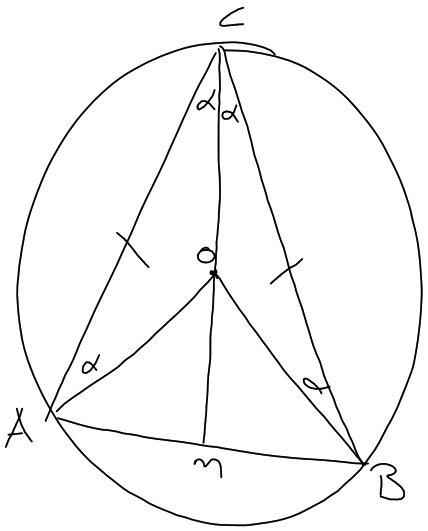




AB : OP

= √3 : 1

15



$AC = BC$ (given)

$\angle ACM = \angle BCM$ (proven in (i))

$MC = MC$ (common side)

$\triangle ACM \equiv \triangle BCM$ (SAS)

$\therefore \angle CMA = \angle CMB$ (matching sides in $\equiv \triangle$'s)

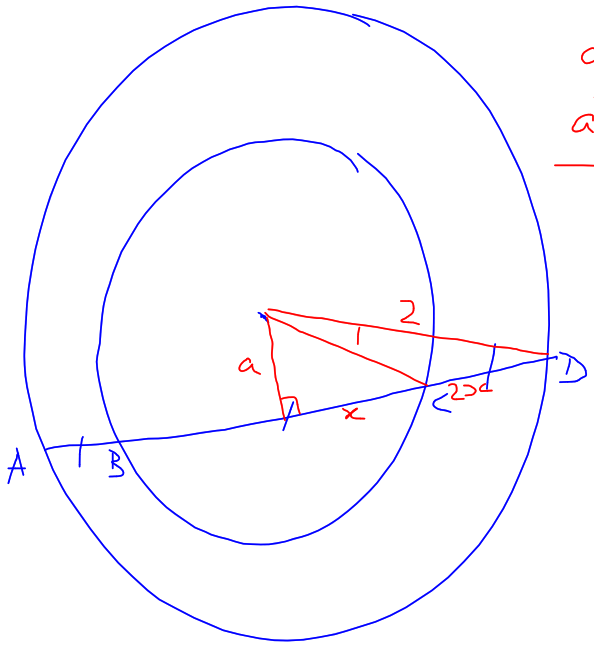
$\angle CMA + \angle CMB = 180$ (straight $\angle AMB$)

$2\angle CMA = 180$

$\angle CMA = 90$

$\therefore CM \perp AB$

16



$a^2 + x^2 = 1$

$a^2 + 9x^2 = 4$

$8x^2 = 3$

$x^2 = \frac{3}{8}$

$x = \frac{\sqrt{3}}{2\sqrt{2}}$

$= \frac{\sqrt{6}}{4}$

$AD = 6x$

$= \frac{3\sqrt{6}}{2}$

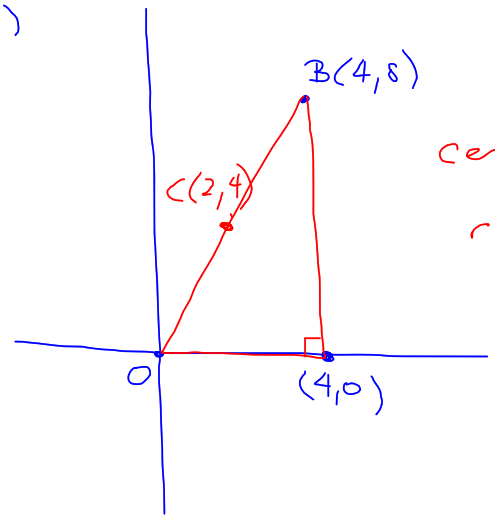
$a^2 + \frac{6}{16} = 1$

$a^2 = \frac{10}{16}$

$a = \frac{\sqrt{5}}{2\sqrt{2}}$

$= \frac{\sqrt{10}}{4}$

18a)

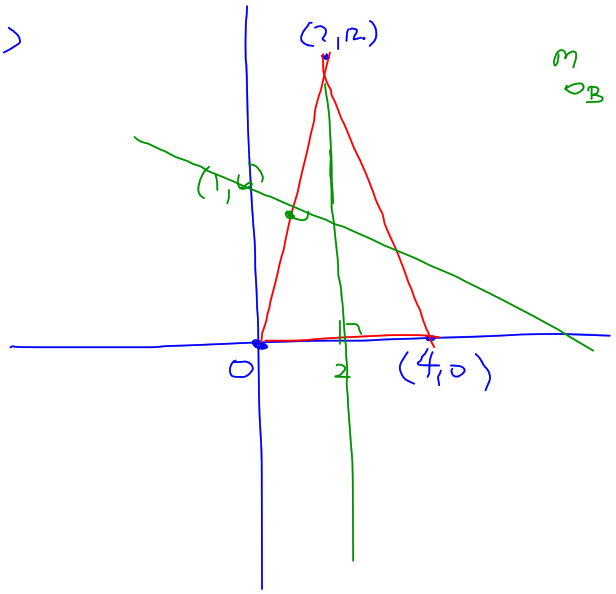


centre (2,4)

radius = $\sqrt{20}$

$= 2\sqrt{5}$

18b)



$m_{OB} = 6$

$y - 6 = -\frac{1}{6}(x-1)$

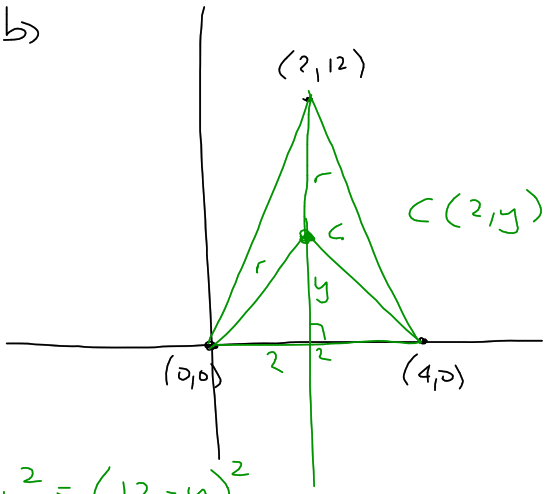
$x = 2$

$y - 6 = -\frac{1}{6}(2-1)$

$y = 5\frac{5}{6}$

OR

b)



$2^2 + y^2 = (12-y)^2$

$= 144 - 24y + y^2$

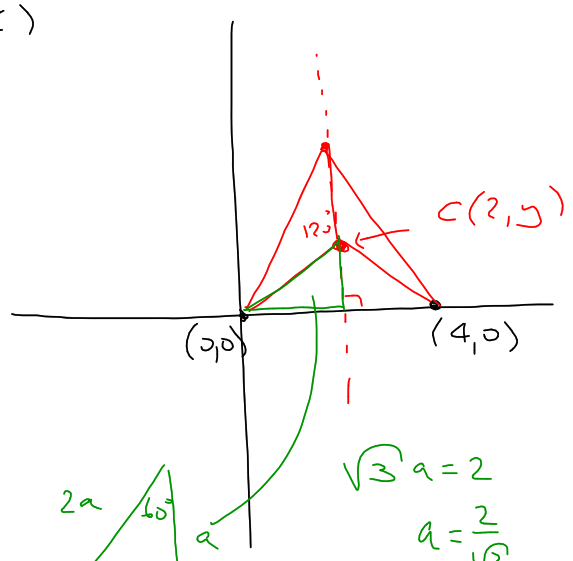
$24y = 140$

$y = \frac{35}{6}$

centre $(2, \frac{35}{6})$

radius $= \frac{37}{6}$.

c)



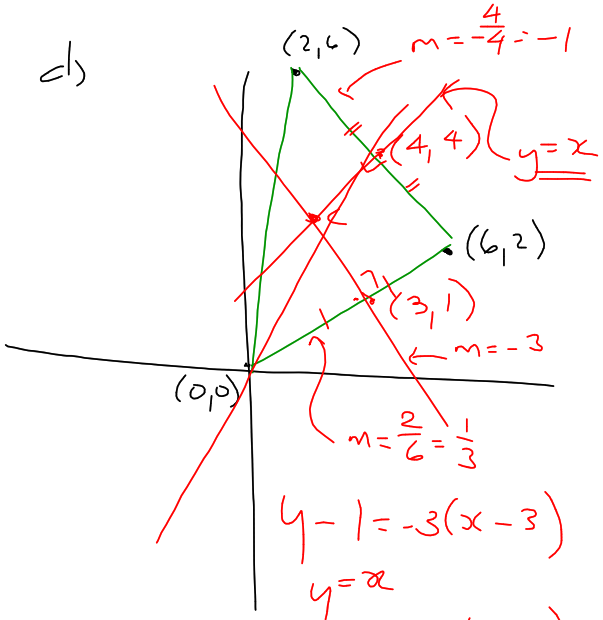
$\sqrt{3}a = 2$

$a = \frac{2}{\sqrt{3}}$

$\text{centre} = \left(2, 1+\frac{2}{\sqrt{3}}\right)$

$\text{radius} = \frac{4}{\sqrt{3}}$

d)



$y - 1 = -3(x - 3)$

$y = x$

$x - 1 = -3(x - 3)$

$4x = 10$

$x = \frac{5}{2}$

$\text{centre} \left(\frac{5}{2}, \frac{5}{2}\right)$

$\text{radius} = \frac{5\sqrt{2}}{2}$