11.6

	1	2	3	4	5	6	7	8	9	10
m∠AOB	30	45	120	240	180	270	40	320	108	192
radius	12	4	3	3	1.5	0.8	$\frac{9}{2}$	$1\frac{1}{5}$	$5\sqrt{2}$	$3\sqrt{3}$

(1)

$\overset{\frown}{AB}$: $\frac{30}{360} \cdot 24\pi$ → 2π

Area: $\frac{30}{360} \cdot 144\pi$ → 12π

(2)

$\overset{\frown}{AB}$: $\frac{45}{360} \cdot 8\pi$ → π

Area: $\frac{45}{360} \cdot 16\pi$ → 2π

(3)

$\overset{\frown}{AB}$: $\frac{120}{360} \cdot 6\pi$ → 2π

Area: $\frac{120}{360} \cdot 9\pi$ → 3π

(4)

$\overset{\frown}{AB}$: $\frac{240}{360} \cdot 6\pi$ → 4π

Area: $\frac{240}{360} \cdot 9\pi$ → 6π

(5)

$\overset{\frown}{AB}$: $\frac{180}{360} \cdot 3\pi$ → $\frac{3\pi}{2}$

Area: $\frac{180}{360} \cdot 2.25\pi$ → $\frac{9\pi}{8}$

(6)

$\overset{\frown}{AB}$: $\frac{270}{360} \cdot 1.6\pi$ → 1.2π

Area: $\frac{270}{360} \cdot 1.6^2\pi$ → 1.48π

(7)

$\overset{\frown}{AB}$: $\frac{40}{360} \cdot \frac{18}{2}\pi$ → π

Area: $\frac{40}{360} \cdot \frac{81}{4}\pi$ → $\frac{9\pi}{4}$

(8)

$\overset{\frown}{AB}$: $\frac{320}{360} \cdot \frac{12}{5}\pi$ → $\frac{32\pi}{15}$

Area: $\frac{320}{360} \cdot \frac{36}{25}\pi$ → $\frac{32\pi}{25}$

(9)

$\overset{\frown}{AB}$: $\frac{108}{360} \cdot 10\sqrt{2}\pi$ → $3\pi\sqrt{2}$

Area: $\frac{108}{360} \cdot 50\pi$ → 15π

(10)

$\overset{\frown}{AB}$: $\frac{192}{360} \cdot 6\sqrt{3}\pi$ → $\frac{16\pi\sqrt{3}}{5}$

Area: $\frac{192}{360} \cdot 27\pi$ → $\frac{72\pi}{5}$

(11) $A = 10\pi$

$m\angle AOB = 100$

$r = ?$

$10\pi = \frac{100}{360} \cdot \pi r^2$

$10 = \frac{5}{18} r^2$

$36 = r^2$

$\boxed{6 = r}$

(12) $A = \frac{7\pi}{2}$

$m\angle AOB = 315$

$r = ?$

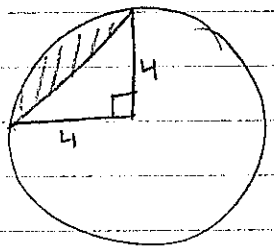
$\frac{7\pi}{2} = \frac{315}{360} \cdot \pi r^2$

$\frac{7}{2} = \frac{7}{8} r^2$

$4 = r^2$

$\boxed{2 = r}$

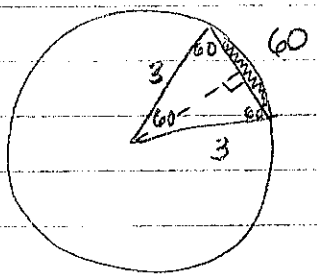
(13)



$A = \frac{90}{360} \cdot \pi \cdot 16 - \frac{1}{2}(4 \cdot 4)$

$\boxed{A = 4\pi - 8}$

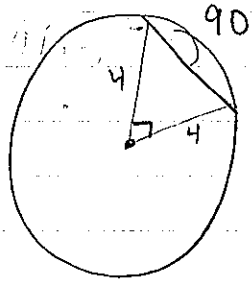
(14)



$A = \frac{60}{360} \cdot \pi \cdot 9 - \frac{1}{2}\left(3 \cdot \frac{3\sqrt{3}}{2}\right)$

$A = \frac{3\pi}{2} - \frac{9\sqrt{3}}{4} = \boxed{\frac{6\pi - 9\sqrt{3}}{4}}$

(15)



$A_{sector} = \frac{90}{360} \cdot \pi \cdot 4^2 = 4\pi$

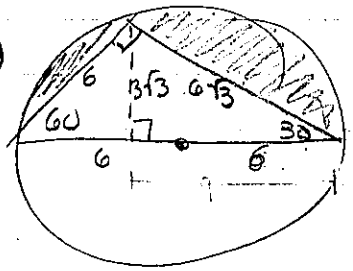
$A_{\Delta} = \frac{1}{2}(4 \cdot 4) = 8$

$A_{unshaded} = 4\pi - 8$

$A_{circle} = 16\pi \longrightarrow 16\pi - (4\pi - 8)$

$\boxed{12\pi + 8}$

(16)

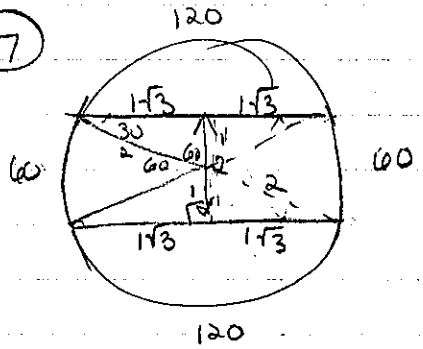


$A_{semi.} = \frac{1}{2}(\pi \cdot 6^2)$ $\quad A_{\Delta} = \frac{1}{2}(12 \cdot 3\sqrt{3})$

$A_{semi} = 18\pi$ $\quad A_{\Delta} = 18\sqrt{3}$

$A = \boxed{18\pi - 18\sqrt{3}}$

(17)



$A_{2\Delta^s} = 2 \cdot \left(\frac{1}{2}(1 \cdot 2\sqrt{3})\right) = 2\sqrt{3}$

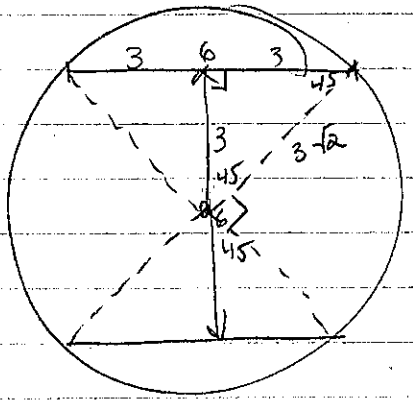
$A_{2sectors} = 2 \cdot \left(\frac{60}{360} \cdot \pi \cdot 4^1\right)$

$\frac{4\pi}{3}$

$A = 2\sqrt{3} + \frac{4\pi}{3} = \frac{6\sqrt{3}}{3} + \frac{4\pi}{3}$

$= \boxed{\frac{6\sqrt{3} + 4\pi}{3}}$

(18)



$A_{2\Delta s} = 2 \cdot \left(\frac{1}{2} \cdot 6 \cdot 3\right) = 18$

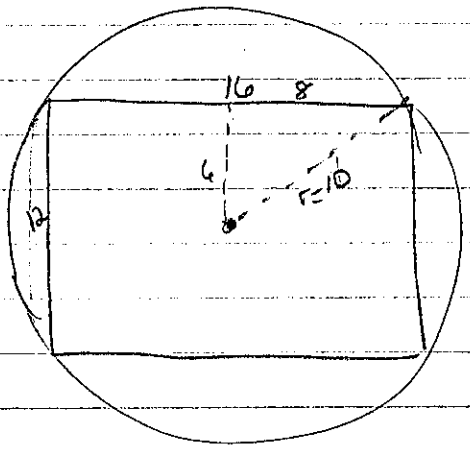
$A_{2sectors} = 2 \cdot \left(\frac{90}{360} \cdot \pi \cdot (3\sqrt{2})^2\right)$

$2 \cdot \left(\frac{1}{4} \cdot \pi \cdot 18\right)$

9π

$A = \boxed{18 + 9\pi}$

(19)



$8^2 + 6^2 = r^2$

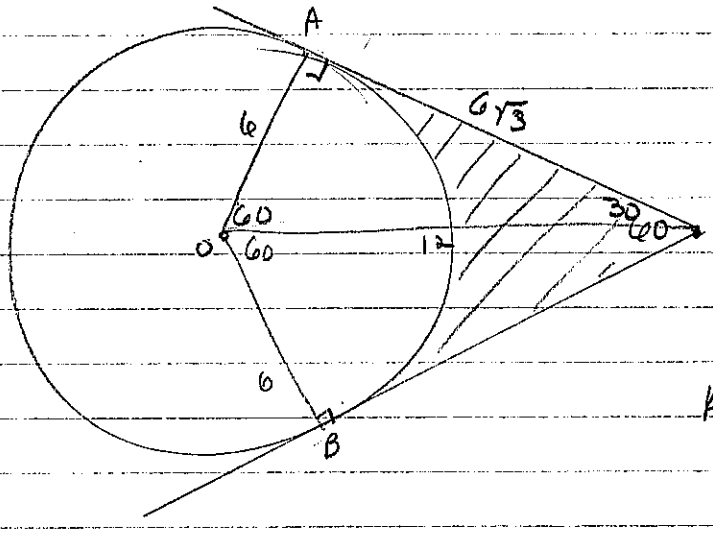
$10 = r$

$A_{\odot} = \pi \cdot 10^2 = 100\pi$

$A_{Rect} = 16 \cdot 12 = 192$

$A = \boxed{100\pi - 192}$

(20)



$A_{\Delta AOP} = \frac{1}{2} \cdot 6 \cdot 6\sqrt{3} = 18\sqrt{3}$

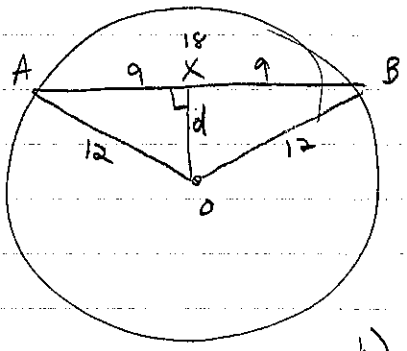
$A_{AOBP} = 2 \cdot 18\sqrt{3} = 36\sqrt{3}$

$A_{2sectors} = 2 \cdot \left(\frac{120}{360} \cdot \pi \cdot 36\right)$

$A_{2sectors} = 12\pi$

$A = \boxed{36\sqrt{3} - 12\pi}$

(21)



a) $\sin m\angle AOX = \frac{9}{12}$

$m\angle AOX = \boxed{48.6}$

$m\angle AOB = 2 \cdot 48.6 = \boxed{97.2}$

b) $A = \frac{97.2}{360} \cdot \pi \cdot 12^2 - A_\Delta$

$9^2 + d^2 = 12^2$

$d = \sqrt{63} = 3\sqrt{7}$

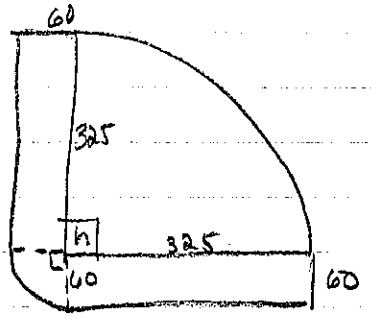
$= 7.938$

$A = 38.9\pi - \frac{1}{2}(18 \cdot 7.938)$

$122.15 - 71.44$

$\boxed{A = 50.704}$

(22)



$A_{shaded} = \frac{90}{360} \cdot \pi \cdot 325^2$

$A_{shaded} = 82916$

$A_{unshaded} = 2 \cdot 60 \cdot 325 = 39000$

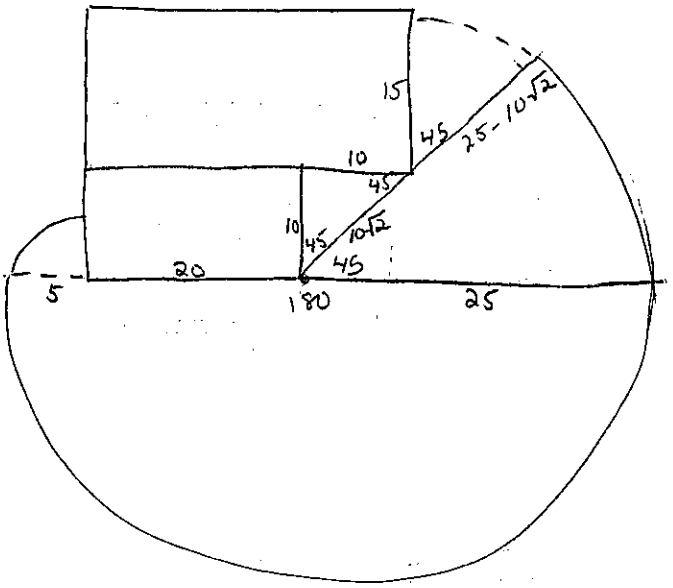
$+$

$\frac{90}{360} \cdot \pi \cdot 60^2 = 2826$

41826

$\text{Ratio} = \frac{82916}{41826} \approx \frac{80000}{40000} \approx 2:1$

(23)



Semicircle + Sector:

$$A = \frac{(180+45)}{360} \cdot \pi \cdot 25^2 = \frac{5}{8} \cdot 625\pi \approx \underline{1227}$$

Triangle:

$$A = \frac{1}{2}(10^2) = \underline{50}$$

Sector:

$$A = \frac{45}{360} \cdot \pi \left(25 - 10\sqrt{2}\right)^2$$

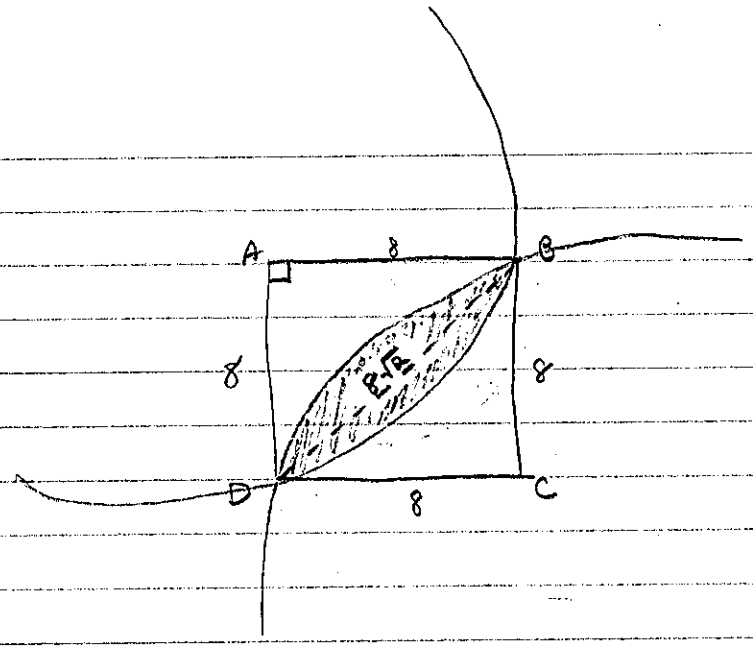
$$\frac{1}{8} \cdot \pi \cdot \left(625 - 500\sqrt{2} + 200\right) \approx \underline{46}$$

Small ¼-circle:

$$A = \frac{1}{4}(\pi \cdot 5^2) \approx \underline{20}$$

$$1227 + 50 + 46 + 20 = \boxed{1343\ m^2}$$

(24)



$A_{sector} = \frac{90}{360} \cdot \pi(8^2) = 16\pi$

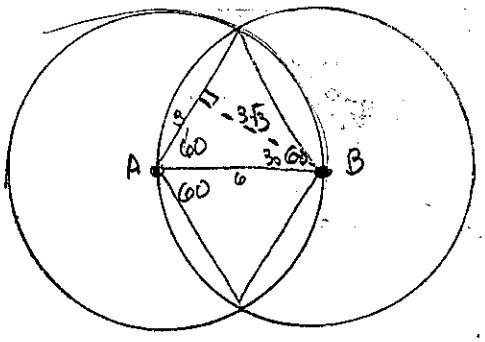
$A_{\triangle} = \frac{1}{2}(8^2) = 32$

Area of Segment of $\odot A = 16\pi - 32$

Area of Segment of A = Area of Segment of B

$2(16\pi - 32) = \boxed{32\pi - 64 \text{ cm}^2}$

(25)



Area of sector of $\odot A$:

$$A = \frac{120}{360} \cdot \pi \cdot 6^2 = \underline{12\pi}$$

Area of 2 segments of $\odot B$:

$$A \text{ of } 1 \text{ segment} = \frac{60}{360} \cdot \pi \cdot 6^2 - \frac{1}{2}(6)(3\sqrt{3})$$

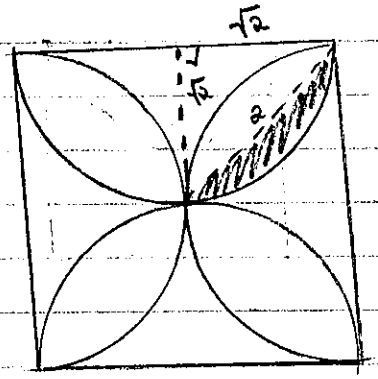
$$A = 6\pi - 9\sqrt{3}$$

$$A \text{ of } 2 \text{ segments} = 2(6\pi - 9\sqrt{3}) = \underline{12\pi - 18\sqrt{3}}$$

$$\text{Total Area} = 12\pi + (12\pi - 18\sqrt{3})$$

$$= \boxed{24\pi - 18\sqrt{3} \text{ cm}^2}$$

26

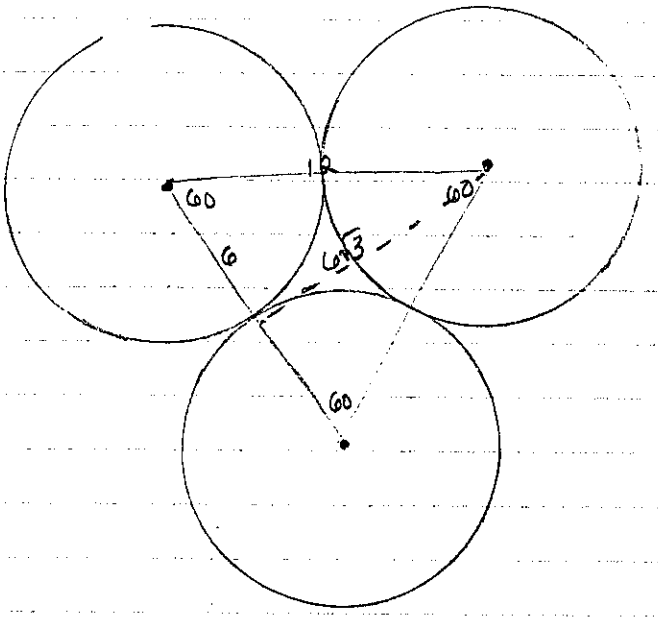


$$A_{shaded} = \frac{90}{360}\left(\pi \cdot \sqrt{2}^2\right) - \frac{1}{2}\left(\sqrt{2}\right)^2$$

$$\frac{1}{4} \cdot 2\pi - 1 = \frac{\pi}{2} - 1$$

$$8 \times \left(\frac{\pi}{2} - 1\right) = \boxed{4\pi - 8 \text{ u}^2}$$

(28)



Area of $\Delta = \frac{1}{2}(12)(6\sqrt{3}) = 36\sqrt{3}$

Area of 3 sectors $= 3\left[\frac{60}{360} \cdot \pi \cdot 6^2\right]$

$= 18\pi$

Area between circles = $\boxed{36\sqrt{3} - 18\pi}$