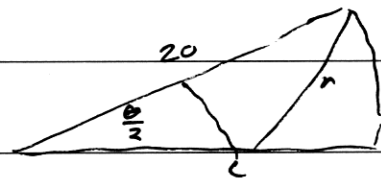
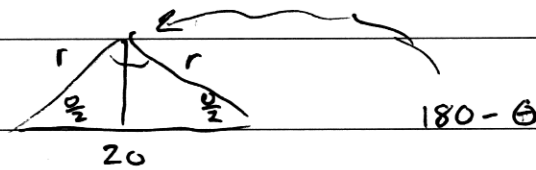
Q.10. a. I.



$r = 10 \sec \frac{\theta}{2}$



$$\frac{20}{\sin(180-\theta)} = \frac{r}{\sin\frac{\theta}{2}}$$

$$\sin(180-\theta)$$
$$= \sin 180\cos\theta - \cos 180\sin\theta$$
$$= \sin\theta$$

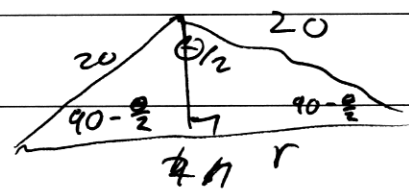
$$\frac{20\left(\sin\frac{\theta}{2}\right)}{\sin\theta} = r$$

$$r = \frac{10}{\cos\frac{\theta}{2}}$$

$$= 10 \sec\frac{\theta}{2}$$

$90 - \frac{\theta}{2} + 90 - \frac{\theta}{2}$
$180 - \theta + 180 - \theta$

II.



$$\frac{20}{\sin\theta} = \frac{r}{\sin 90 - \frac{\theta}{2}}$$

$$r = \frac{10\sin\theta}{\cos\frac{\theta}{2}}$$

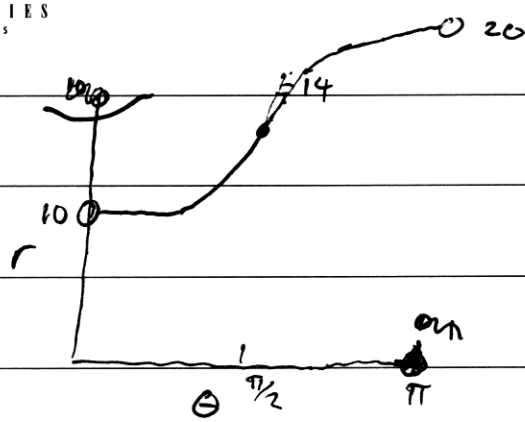
$$\sin 90 - \frac{\theta}{2}$$
$$\sin 90\cos\frac{\theta}{2} - \cos 90\sin\frac{\theta}{2}$$
$$\cos\frac{\theta}{2}$$

$$\frac{20}{\sin 90} = \frac{r}{\sin\frac{\theta}{2}}$$

$$20\sin\frac{\theta}{2} = r$$

BOARD OF STUDIES
NEW SOUTH WALES

III



b. $I = \dfrac{1}{b^2+(x+8)^2} + \dfrac{1}{b^2+(x-8)^2}$

$u = 1 \quad v = b^2+(x+8)^2$

$u = 0 \quad v' = 2(x+8)$

$$\frac{dI}{dx} = \frac{-2(x+8)}{b^2+(x+8)^2} - \frac{2(x-8)}{b^2+(x-8)^2}$$

$$RHS = \frac{-2\left[(x+8)(b^2+(x-8)^2)^2 + (x-8)(b^2+(x+8)^2)^2\right]}{(b^2+(x+8)^2)^2(b^2+(x-8)^2)^2}$$

$$= \frac{-2(x+8)}{b^2+(x+8)^2} - \frac{2(x-8)}{b^2+(x-8)^2}$$

$\therefore$ LHS = RHS.

II. B = 15

$P = 2x(x^2 + 561)(x^2 + 17)$

$= (2x^3 + 1122x)(x^2 + 17)$

$= 2x^5 + 1122x^3 + 34x^3 + 19074x$

$P' = 10x^4 + 3468x^2 + 19074$

$5x^4 + 1734x^2 + 9537$