

Start here for
Question Number: **6**

$$a) f(x) = (x+2)(x^2+4)$$

when $f'(x) = 0$ x stationary pts

$$f(x) = (x+2)(x^2+4)$$

$$f''(x) = x^3 + 4x + 2x^2 + 8$$

$$f'(x) = 3x^2 + 4x + 4$$

$$3x^2 + 4x + 4 = 0$$

$$P = 12$$

$$S = 4$$

ii) concavity ^{changes} ~~down~~ when $f''(x) = 0$

$$f''(x) = 6x + 4$$

$$\text{when } x = 0$$

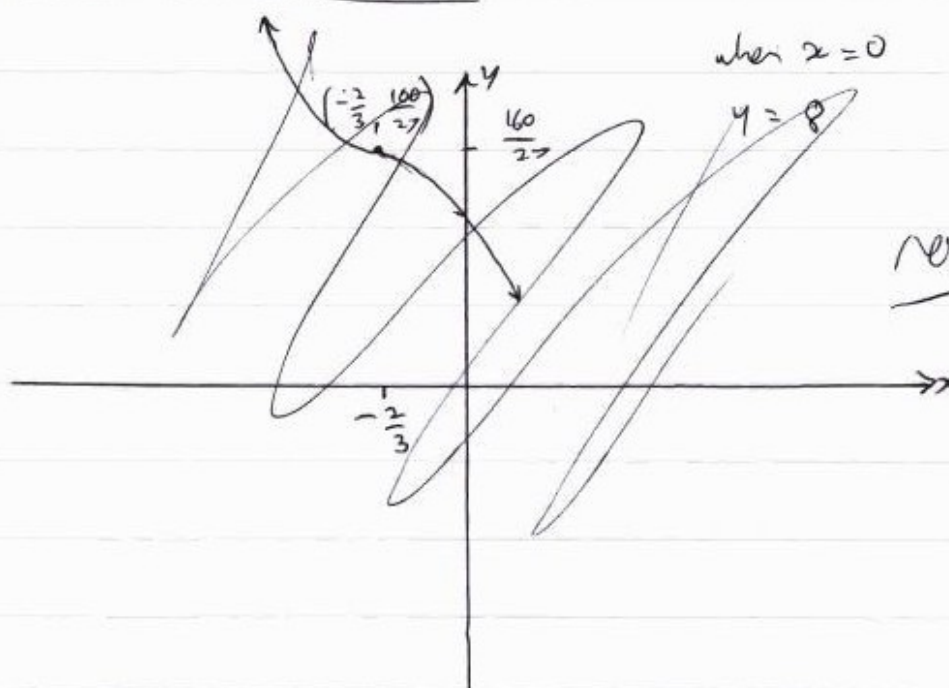
$$6x + 4 = 0$$

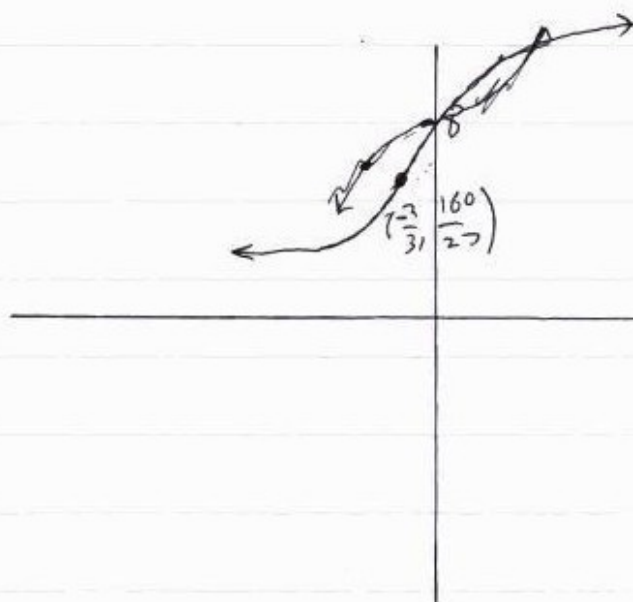
$$6x = -4$$

$$x = -\frac{2}{3} \quad \text{when } x = -\frac{2}{3}, y = \frac{160}{27}$$

~~when $x > -\frac{2}{3}$ concave down~~

ii)



when $x=0$

$$y = 8$$

when $y=0$

$$x =$$

b) $l = r\theta$

$$9 = 5 \times \theta$$

$$\theta = \frac{9}{5} \therefore \frac{9\pi}{100} = \frac{\pi}{100}$$

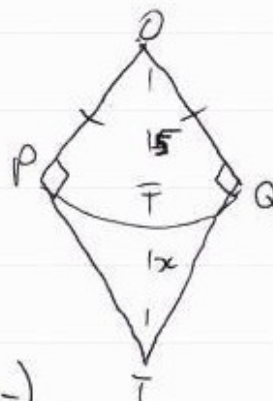
ii) in Δ s OPT and OQT

$$\angle OPT = \angle OQT \text{ (given)}$$

construct line OT is common

$$PO = OQ \text{ (equal radius = 5 cm)}$$

$$PT = QT \text{ (due to equal } L \text{ in } OPT \text{ and } OQT).$$

 $\therefore \Delta OPT$ is congruent to ΔOQT (SSS).

iii) since radius = 5 cm

$$OT = 5 + x$$

$$\therefore 5^2 + PT^2 = (5+x)^2$$

$$25 + PT^2 = 25 + x^2$$

$$PT^2 = x^2$$

$$PT = x$$

since $x = 4$

$$PT = 4 \text{ cm.}$$

Additional writing space on back page.

$$\begin{aligned}\text{shaded Area} &= \frac{1}{2} \times S \times QT - \frac{1}{2} ab \sin C - \frac{1}{2} r^2 \theta \\ &= \frac{1}{2} \times S \times OT - \frac{S}{2} \times \frac{\pi}{100} \\ &= \frac{S}{2} \times OT - \frac{S\pi}{200}\end{aligned}$$

