

# ASSIGNMENT TEST 7 SOLUTIONS.

1.  $x = 3t^2$   $y = 6t$

$$y = x - 72$$

$$6t = 3t^2 - 72$$

$$t^2 - 2t - 24 = 0.$$

$$(t - 6)(t + 4) = 0$$

$$t = 6 \Rightarrow A (108, 36)$$

$$t = -4 \Rightarrow B (48, -24)$$

$$AB = \sqrt{(60^2 + 60^2)}$$

$$= 60\sqrt{2}.$$



2.  $a^2 = 4$   $a = 2$   $a > 0.$   
 $36 = 4b$   $b = 9.$

$P (1, 2)$  and  $Q (9, 6)$

midpoint of  $PQ$  is  $(5, 4)$   
 gradient of  $PQ$  is  $\frac{4}{8}$

gradient of normal (to bisector) is  $-2.$

Equ of  $\perp$  bisector

$$\frac{y-4}{x-5} = -2.$$

$$y-4 = -2(x-5)$$

$$y-4 = -2x+10$$

$$y = -2x+14.$$

Meets curve.

$$(-2x+14)^2 = 4x.$$

$$4x^2 - 60x + 196 = 0$$

$$x^2 - 15x + 49 = 0$$

$$x = \frac{15 \pm \sqrt{(225-196)}}{2}.$$

$$x = \frac{15}{2} \pm \frac{1}{2}\sqrt{29}$$

$$d = \frac{15}{2}, \quad \mu = \frac{1}{2}$$

3. a)  $y^2 = 16x$  focus S (4, 0)

P (16, 16)

b) eqn line SP :  $\frac{16}{12} = \frac{y-0}{x-4}$

$$\frac{4}{3} = \frac{y}{x-4}$$

$$4x - 16 = 3y$$

$$4x - 3y - 16 = 0$$

c) pts of intersection

$$4\left(\frac{y^2}{16}\right) - 3y - 16 = 0$$

$$y^2 - 12y - 64 = 0$$

$$(y-16)(y+4) = 0$$

when  $y = -4$   $x = 1$

so Q is (1, -4)

k.  $y^2 = 20x$  so focus  $S(5, 0)$ .

Eqn of  $l$ :  $\frac{4}{3} = \frac{y}{x-5}$

$$4x - 20 = 3y.$$

intersect at  $P$ .

$$\rightarrow \frac{y^2}{20} - 20 = 3y$$

$$\frac{y^2}{5} - 20 = 3y$$

$$y^2 - 100 = 15y$$

$$y^2 - 15y - 100 = 0$$

$$(y - 20)(y + 5) = 0.$$

$$y = 20 \quad y > 0.$$

$$x = 20.$$

$$P(20, 20)$$

$$\text{Shaded area} = \int_0^{20} \sqrt{20x} \, dx - \text{Area of } \Delta$$

$$= \int_0^{20} 2\sqrt{5} x^{1/2} \, dx - \frac{1}{2} \times 15 \times 20$$

$$= \left[ 2\sqrt{5} \times \frac{2x^{3/2}}{3} \right]_0^{20} - 150.$$

$$= \frac{4\sqrt{5}}{3} \times (\sqrt{20})^3$$

$$= \frac{4\sqrt{5} \times 2\sqrt{5} \times 20}{3} - 150$$

$$= \frac{350}{3} \text{ sq units}$$