

July Exam - PAPER 2
MEMO - GRADE 12

QUESTION 1:

a) $y = \frac{4}{3}x - 4$ (3)

b) 1. $\frac{-1+a}{2} = 1$
 $a = 3$ (4)

$\frac{-4+b}{2} = 0$
 $b = 4$

2. $m_{PQ} = \frac{0+4}{1+1} = 2$

$m_{\perp} = -\frac{1}{2}$ (4)

$\therefore y = -\frac{1}{2}x + c$

$y = -\frac{1}{2}x + \frac{1}{2}$

c) $qy = -px - 2$
 $y = \frac{-p}{q}x - \frac{2}{q}$

$\tan(135^\circ) = -1$ (5)

$y = -x + c$ (2; -1)

$y = -x + 1$

$-\frac{2}{q} = 1$ $-\frac{p}{q} = -1$
 $q = -2$ $p = 2$

d) midpoint (AB) = $\left(\frac{-2+1}{2}, \frac{1-3}{2}\right)$
 $= \left(-\frac{1}{2}, -1\right)$ ✓

$(a+1)^2 + (-3+\frac{1}{2})^2 = 5^2$ ✓

$(a+1)^2 = \frac{5\sqrt{3}}{2}$ ✓ (6)

$a = -1 \pm$
 $= 3.33$ or -5.33

QUESTION 2

a) $\hat{O}_1 = 106^\circ$ (angle at centre = 2 \times at circum)

$\hat{O}_2 = 74^\circ$ (Ls on straight line = 180°) (4)

b) $\hat{C} = 65^\circ$ (opp Ls at equal sides are equal) (4)
 $BC = AB$

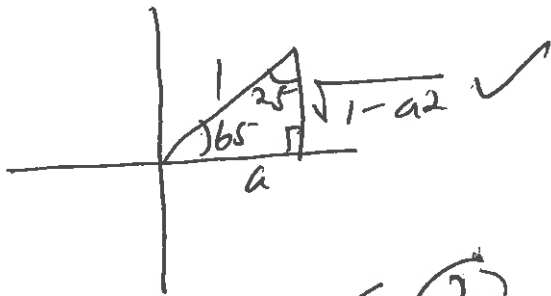
$\therefore \hat{F} = 65^\circ$ (angles in the same segment)

2) $\hat{D} = 115^\circ$ (opp Ls at cyclic quad are supp)

(2)

QUESTION 3

a) $\cos 65 = \frac{a}{r} = \frac{\text{adj}}{\text{hyp}}$



1) $\sin 25 = a \checkmark$ (2)

2) $\sin 40$
 $= \sin 50 \checkmark$
 $= 2 \sin 25 \cos 25 \checkmark$
 $= 2 \cdot a \cdot \sqrt{1-a^2}$ (3)
 $= \underline{\underline{2a\sqrt{1-a^2}}}$ \checkmark

3) $\cos 130 = \cos 2(65)$
 $= -(2 \cos^2 65 - 1) \checkmark$
 $= -(2a^2 - 1) \checkmark$ (4)

b) $\frac{\sin(90-x) \sin(180-x) \tan(x-360)}{\cos(90-x) \cos 240 \cdot \tan 225}$
 $= \frac{\cos x \cdot \sin x \cdot \tan x}{\sin x \cdot (-\cos 60) \cdot \tan 45}$
 $= \frac{\cos x \cdot \frac{\sin x}{\cos x}}{-\frac{1}{2} \cdot 1}$ (6)
 $= \underline{\underline{-2 \sin x}}$

c) $f(\theta) = \frac{1}{4} (3 + \cos 4\theta)$

Greatest value of

$f(\theta) = 1$ at $\theta = 0$

least value \checkmark (3)
 at $f(\theta) = \frac{1}{2}$ at $\theta = 45$

QUESTION 4

1. a. $r = 0,0 \checkmark$ (-0,2 < x < 0,2) (2)
 b. $r = -0,8 \checkmark$ (0,9 < r < -0,6) (2)
 c. $r = -0,8 \checkmark$ (-0,9 < r < -0,6) (2)

b) 1. $r = 0,9793 \checkmark \checkmark$ (2)

2. $y = 18,5000 + 0,5640x$ (4)

3) i) $Z = \text{time available} - \text{time take}$
 $= (100 - x) - (a + bx) \checkmark \checkmark$ (3)
 $= (100 - a) - (1 + b)x$

ii) $\frac{a = 18,5 \quad b = 0,564}{Z = 81,5 - 1,564x} \checkmark$

$Z = 0$
 $x = 52 \checkmark$ (3)

\therefore Latest time $\underline{\underline{7:52 \text{ AM}}}$

46.) 1. $160 \checkmark$ (1)

2)

	freq	mid	
0-6	40	3	
6-12	55	9	
12-18	29	15	
18-24	20	21	✓
24-30	11	27	✓
30-36	5	33	
	160		(6)

estimated mean length
 $= 12,075 \checkmark \checkmark$

standard deviation $= 8,0215 \checkmark \checkmark$

QUESTION 5

a). $N(1; -3)$

$(1)^2 + 4(1) + (-3)^2 + 2(-3) - 8$
 $= 0 \checkmark \checkmark$ (2)

2) $(x+2)^2 + (y+1)^2 = 8 + 4 + 1$
 $(x+2)^2 + (y+1)^2 = 13$ (3)
 Centre $(-2; -1) \checkmark$
 radius $= \sqrt{13} \checkmark$

3. $\text{grad}(ON) = \frac{-3+1}{1+2} = -\frac{2}{3}$
 $\therefore m \perp = \frac{3}{2} \checkmark$ (4)

tangent: $y = \frac{3}{2}x + c$
 $y = \frac{3}{2}x - \frac{9}{2} \checkmark \checkmark$

d) $y = 2x + 3$ (tangent)
 $x^2 + y^2 = r^2$

grad (radius) $= -\frac{1}{2} \checkmark$

\therefore Equation: $y = -\frac{1}{2}x \checkmark$

$2x + 3 = -\frac{1}{2}x$

$\frac{5}{2}x = -3$

$x = -\frac{6}{5} \checkmark$

$y = \frac{6}{10} \checkmark$ (5)

$(-\frac{6}{5})^2 + (\frac{6}{10})^2 = r^2$

$\therefore r = \frac{3\sqrt{5}}{5} \checkmark$

c) $2x + y - 4 = 0$
 $y = -2x + 4$
 $x - y - 3 = 0$
 $y = x - 3$

Angle $= \tan^{-1}(1) - \tan^{-1}(-2)$
 $= 108,4 \checkmark \checkmark$

\therefore Acute $= 71,6 \checkmark$

Point of intersection: $-2x + 4 = x - 3$
 $\frac{7}{3} = x$
 $y = -\frac{2}{3} \checkmark$ (6)

Bisector of angle $= 35,8^\circ$
 $m = \tan^{-1}(-\frac{1}{2})$
 $= -6,17 \checkmark$
 $y = -6,17x + 13,7 \checkmark \checkmark$

QUESTION 6

$$w) \frac{\sin(2B+B) - \sin(2B-B)}{(\cos B - \sin B)(\cos B + \sin B)} = 2\sin B$$

$$LHS = \frac{\sin 2B \cos B + \cos 2B \sin B - \sin 2B \cos B + \cos 2B \sin B}{\cos^2 B - \sin^2 B}$$

$$\frac{2\cos 2B \sin B}{\cos^2 B - \sin^2 B}$$

$$= \frac{2\cos 2B \sin B}{\cos 2B} \quad (5)$$

$$= 2\sin B = RHS$$

$$b) \frac{a=20}{b=60} \quad (3)$$

$$2) \sin 2x = \cos(x+60)$$

$$90-2x = x+60 + 360k$$

$$-3x = -30 + 360k$$

$$x = 10 - 120k \quad k \in \mathbb{Z}$$

$$-x = -150 + 360k$$

$$x = 150 + 360k \quad (6)$$

$$A(10; y) \quad B(130; y)$$

$$C(150; y) \quad D(250; y)$$

$$3) \text{ Ans } > 90$$

$$180 \leq x < 250 \quad (2)$$

QUESTION 7

$$a) \hat{CDB} = 20^\circ \quad (\text{Opp } \angle \text{ or } = \text{ sides arc } =)$$

$$\hat{DBA} = 20^\circ \quad (\text{Alternate } \angle \text{ s } AB \parallel CD)$$

$$\hat{DAB} = 110^\circ \quad (\Delta = 180) \quad (6)$$

$$\text{Reflex } \hat{DCB} = 220^\circ \quad (\text{revolution})$$

$$= 2(\hat{DAB})$$

Angle at centre is twice angle at circumference

$\therefore C$ is the centre of the circle ABD .

$$b) 1. \hat{Q}_1 = x \quad (\text{Alternate } \angle \text{ s } TR \parallel PQ) \quad (4)$$

$$\hat{R}_2 = x \quad (\text{tan chord thm})$$

$$2) \hat{T} = \hat{R}_2 = x \quad (\text{para above})$$

$$\hat{S}_1 = \hat{Q}_2 \quad (\text{Opp Int } \angle \text{ of a cycl. quad } = \text{ext } \angle)$$

$$\hat{V}_1 = \hat{V}_3 \quad (\text{3rd } \angle \text{ of } \Delta) \quad (3)$$

$$\therefore \Delta TSV \parallel \Delta RQV \quad (AAA)$$

$$3. \hat{T} = \hat{Q} \quad (\text{common } \angle) \quad (5)$$

$$\hat{S}_1 = \hat{Q}_2 \quad (\text{Opp } \angle = \text{ext } \angle \text{ of cycl. quad})$$

$$\hat{V}_1 = \hat{R}_1 + \hat{R}_2 \quad (\parallel)$$

$$\therefore \Delta TSV \parallel \Delta TRQ \quad (AAA) \quad (5)$$

$$\therefore \frac{TS}{TR} = \frac{TV}{TR} \quad \checkmark$$

$$\therefore TS \cdot TR = TV \cdot TR$$

