



eduresourceza.com



Grade 12

Core Mathematics: Paper 2

September 2021

Time: 3 hours

Marks: 150

Please read the following instructions carefully:

1. This question paper consists of 20 pages and an Information sheet. Please check that your question paper is complete.
2. Answer all the questions on the question paper.
3. You may use an approved non-programmable and non-graphical calculator.
4. All necessary working details must be clearly shown.
5. Round off answers to **1 decimal place** where necessary, unless otherwise stated.
6. Ensure that your calculator is in **DEGREE** mode.
7. Diagrams may not be drawn to scale.
8. A mark is not necessarily allocated to the correct answer but rather the working. Show all working.

	SECTION A					SECTION B				
	Analytical Geom.	Analytical Geom.	Statistics	Geometry	Trigonometry	Statistics	Trigonometry	Geometry	Analytical Geom.	Trig/measure
Question	1	2	3	4	5	6	7	8	9	10
Mark	12	9	9	22	22	9	29	14	15	9
Total										
Total										
							150			
Percentage										
							100			

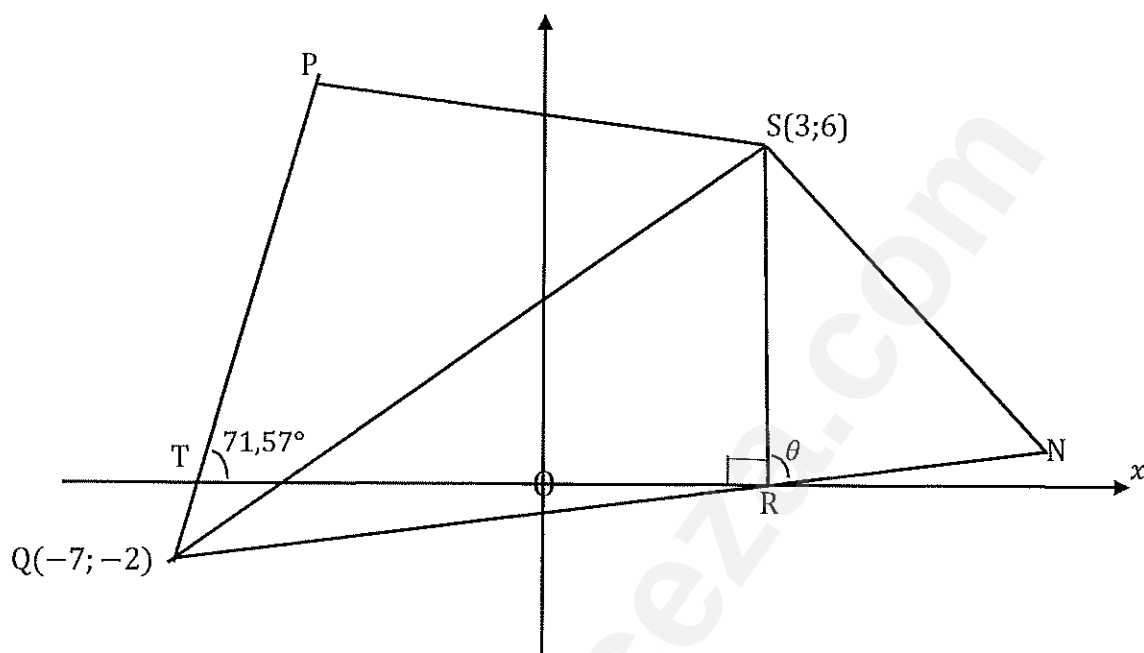
IEB exam number: _____

Name: _____

Teacher: _____

QUESTION 1

In the diagram, P, Q(-7; -2), R and S(3; 6) are vertices of a quadrilateral. R is a point on the x -axis. QR is produced to N. SN is drawn. $\widehat{PTO} = 71,57^\circ$ and $\widehat{SRN} = \theta$. SR is **perpendicular** to the x -axis.



Determine:

- (a) the equation of SR.

(1)

$$x = 3 \checkmark$$

- (b) the gradient of QP correct to the nearest integer.

(2)

$$m_{QP} = \tan 71,57^\circ$$

$$= 3 \checkmark$$

- (c) the equation of QP in the form $y = mx + c$.

(2)

$$m = 3 \text{ and point } Q(-7; -2)$$

$$\therefore \text{Eqn. QP: } y - (-2) = 3(x - (-7))$$

$$y = 3x + 19 \checkmark$$

(d) the length of QR. Leave your answer in simplest surd form.

(2)

$$\begin{aligned}
 QR &= \sqrt{(-7-3)^2 + (-2-0)^2} \\
 &= \sqrt{(-10)^2 + (-2)^2} \\
 &= \sqrt{100 + 4} \\
 &= \sqrt{104} \\
 &= 2\sqrt{26}
 \end{aligned}$$

(e) (1) the angle of inclination of QN, β , correct to one decimal place.

(3)

$$\begin{aligned}
 m_{QN} &= \frac{-2-0}{-7-3} = \frac{-2}{-10} = \frac{1}{5} \\
 \therefore \text{Inclination: } \tan \beta &= \frac{1}{5}
 \end{aligned}$$

$$\beta = 11,3^\circ$$

(2) Hence, determine the value of θ .

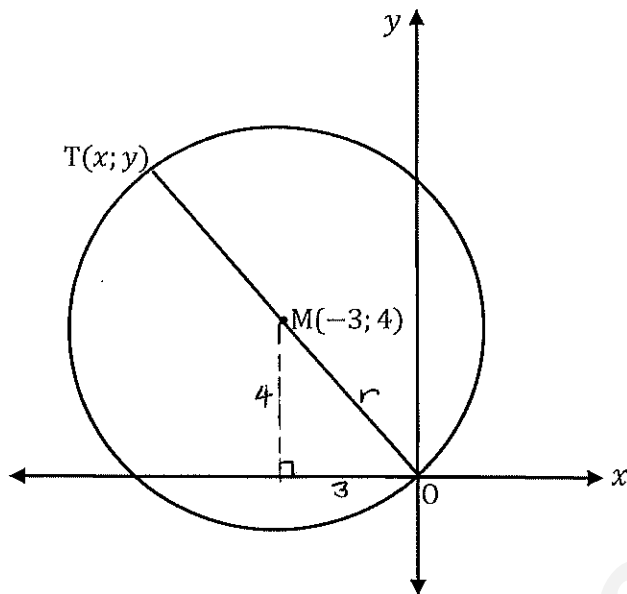
(2)

$$\begin{aligned}
 \therefore \theta &= 90^\circ - 11,3 \\
 \theta &= 78,7^\circ
 \end{aligned}$$

[12]

QUESTION 2

In the diagram below, the circle has centre $M(-3; 4)$ and passes through the origin.



- (a) Determine the length of the radius of the circle.

(1)

$$r^2 = 3^2 + 4^2 \quad (\text{Pythag})$$

$$\therefore r = 5$$

- (b) Write down the equation of the circle.

(2)

$$(x + 3)^2 + (y - 4)^2 = 25$$

- (c) Show that the coordinate of $T(x; y)$, the endpoint of diameter OT, is $(-6; 8)$.

(2)

$$\frac{x + 0}{2} = -3 \quad \text{and} \quad \frac{y + 0}{2} = 4$$

$$x = -6 \quad \text{and} \quad y = 8$$

- (d) Determine the equation of the tangent to the circle at T.

(4)

$$m \text{ of radius} = \frac{4 - 8}{-3 - (-6)} = -\frac{4}{3}$$

$$\therefore m \text{ of tangent} = \frac{3}{4} \quad \left(-\frac{4}{3} \times \frac{3}{4} = -1 \text{ rad } \perp \text{ tang} \right)$$

$$\therefore \text{Eqn. of tangent} : y - 8 = \frac{3}{4}(x - (-6))$$

$$y = \frac{3}{4}x + \frac{25}{2}$$

[9]

QUESTION 3

The following table shows the frequency distribution of the daily travelling time (in minutes) from home to work for the teachers at St. Annes.

Daily travelling time(x) in minutes	Number of teachers
$0 \leq x < 10$	20
$10 \leq x < 20$	35
$20 \leq x < 30$	30
$30 \leq x < 40$	10
$40 \leq x < 50$	5

(a) Circle the correct answer to the following questions:

(1) The estimated mean time, in minutes, taken by the teachers is:

A: 14,5

B: 19,5 ✓✓

C: 16,7

D: 24,5

(2)

(2) The estimated standard deviation for the time, in minutes, is:

A: 10,57

B: 14,14

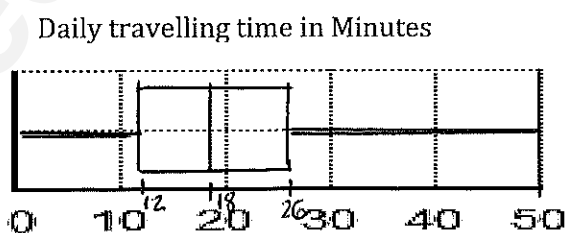
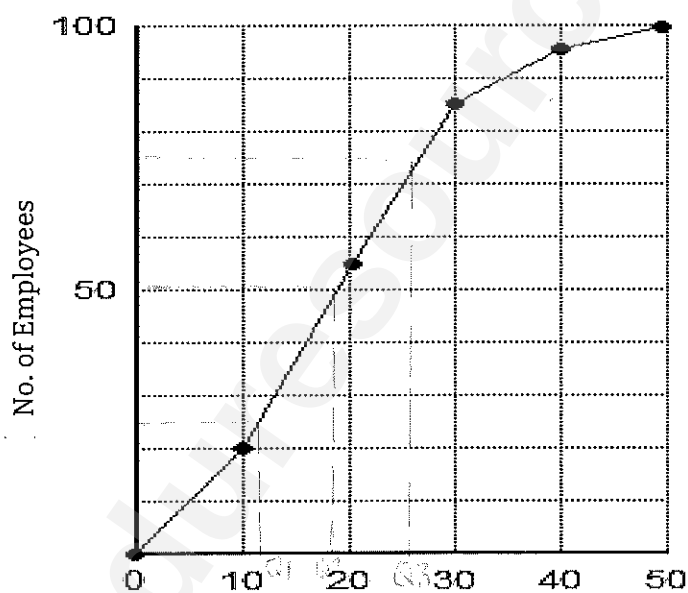
C: 114,75

D: 10,71

(2)

(b) An ogive was constructed from the given data.

(1) Construct a box-and-whisker plot on the scaled axes below the ogive to summarise the data. Show on the ogive (by means of dotted lines), where you have read off the data required for the box-and-whisker. (3)



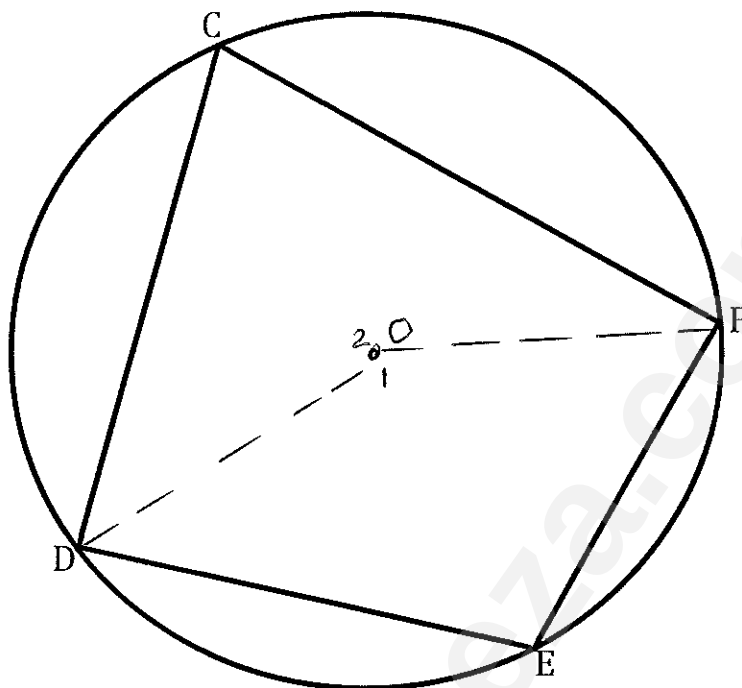
(2) State whether the following statements are TRUE or FALSE:

(i) The inter-quartile range for this data is 25. False ✓ (1)

(ii) Only 35 teachers take less than 20 minutes to travel to school False ✓ (1)

QUESTION 4

- (a) Prove the theorem that states "The opposite angles of a cyclic quadrilateral are supplementary". (4)



RTP: $\hat{C} + \hat{E} = 180^\circ$

Construction: Draw radii OD and OF.

Proof:

$$\hat{O}_1 = 2\hat{C} \quad \text{(L at centre thm)}$$

$$\text{and } \hat{O}_2 = 2\hat{E} \quad \text{(L at centre thm)}$$

$$\text{But } \hat{O}_1 + \hat{O}_2 = 360^\circ \quad \text{(L's round a point)}$$

$$\therefore 2\hat{C} + 2\hat{E} = 360^\circ$$

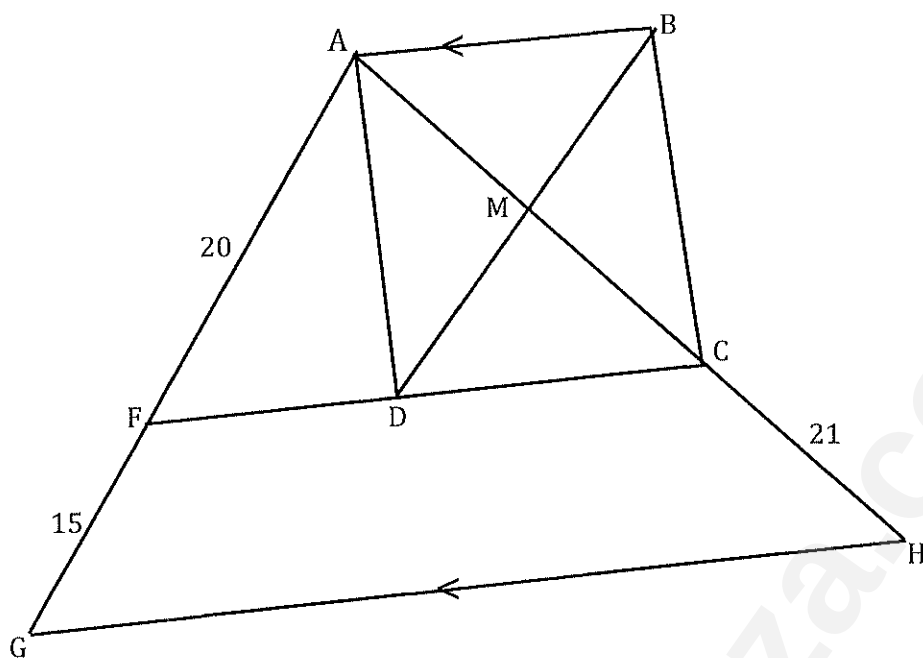
$$2(\hat{C} + \hat{E}) = 360^\circ$$

$$\hat{C} + \hat{E} = 180^\circ \quad \checkmark$$

Similarly, by joining C to O and E to O we can prove that $\hat{D} + \hat{F} = 180^\circ$

$\therefore$ The opposite angles of a cyclic quad are suppl.

- (c) In the diagram, $\triangle AGH$ is drawn. F and C are points on AG and AH respectively such that $AF = 20$ units, $FG = 15$ units and $CH = 21$ units. D is a point on FC such that $ABCD$ is a rectangle. AB is parallel to GH . The diagonals, AC and BD , of $ABCD$ intersect at M , a point on AH .



(1) Explain why $FC \parallel GH$.

(2)

$AB \parallel DC$ (opp. sides of rectangle are $\parallel$)
 But $GH \parallel AB$ (given)
 $\therefore FC \parallel GH$ (both $\parallel$ to AB)

(2) Calculate, with reasons, the length of DM .

(5)

In $\triangle AGH$: $\frac{AF}{FG} = \frac{AC}{CH}$ (prop. int thm, $FC \parallel GH$)
 $\therefore \frac{20}{15} = \frac{AC}{21}$
 $\therefore AC = 28$
 $\therefore DB = 28$ (diags of rect. eq. in length)
 $\therefore DM = 14$ (diags of rect. bisect)

[22]

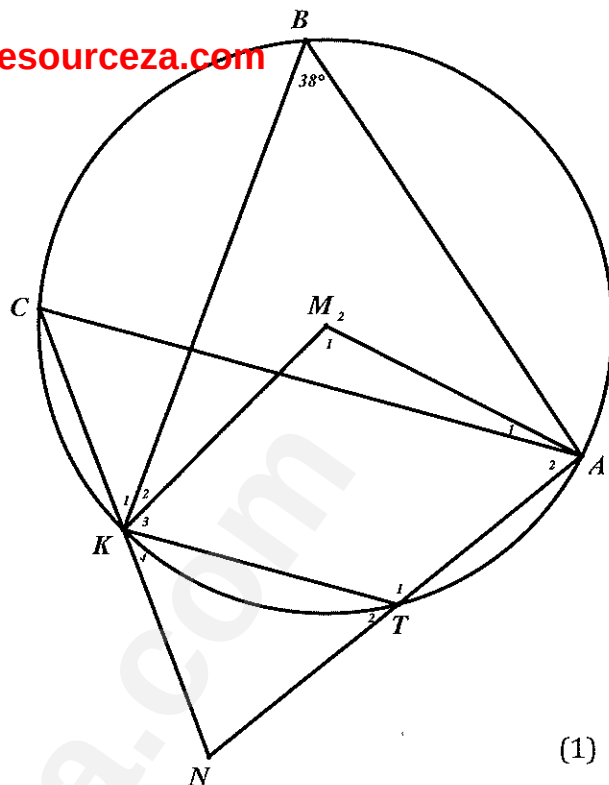
(b) Refer to the diagram (not drawn to scale).

A, B, C, K and T lie on the circle.

AT produced and CK produced meet in N.

M is the centre of the circle.

$NA = NC$ and $\hat{B} = 38^\circ$.



(1) Calculate, with reasons, the size of the following angles:

(i) $\hat{M}_1$ (1)

$$= 76^\circ \text{ (Lat centre thm)}$$

(ii) $\hat{T}_2$

$$= 38^\circ \text{ (ext. L of cyclic quad TABK)} \quad (1)$$

(iii) $\hat{C}$

$$= 38^\circ \text{ (L's in same segment OR Lat centre thm OR ext L cyclic quad CKTA)} \quad (1)$$

(iv) $\hat{K}_4$

$$\hat{C} = \hat{A}_2 \text{ (isos } \Delta CNA)$$

$$\therefore \hat{K}_4 = \hat{A}_2 = 38^\circ \text{ (ext L of cyclic quad CKTA)} \quad (2)$$

(2) Give a reason why $NK = NT$.

$$\hat{K}_4 = \hat{T}_2 \text{ (proved)} \therefore \text{isos. } \Delta \quad (1)$$

(3) Give a reason why $KT \parallel AC$.

$$\hat{C} = \hat{K}_4 = 38^\circ \text{ (proved)} \therefore \text{corresp. L's are equal} \quad (1)$$

(4) Prove that AMKN is a cyclic quadrilateral.

$$\hat{K}_4 = \hat{T}_2 = 38^\circ \text{ (proved)}$$

$$\therefore \hat{N} = 104^\circ \text{ (L sum of } \Delta NKT)$$

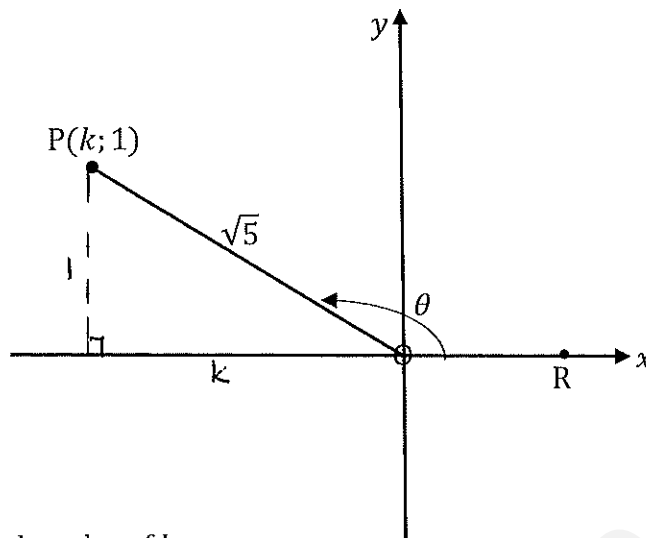
$$\text{and } \hat{M}_1 = 76^\circ \text{ (proved)}$$

$$\therefore \hat{N} + \hat{M}_1 = 180^\circ$$

$$\therefore \text{MANK is cyclic (1 pr. opp L's suppl.)}$$

QUESTION 5

- (a) In the diagram, $P(k; 1)$ is a point in the 2nd quadrant and is $\sqrt{5}$ units from the origin. R is a point on the positive x -axis and obtuse $\widehat{ROP} = \theta$.



- (1) Calculate the value of k .

(2)

$$k^2 = (\sqrt{5})^2 - (1)^2 \quad \text{Pythag}$$

$$k^2 = 4$$

$$k = -2 \quad (\text{Quad 2})$$

- (2) Without using a calculator, find the value of :

- (i) $\tan \theta$

(1)

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

- (ii) $\sin(\theta + 60^\circ)$

(3)

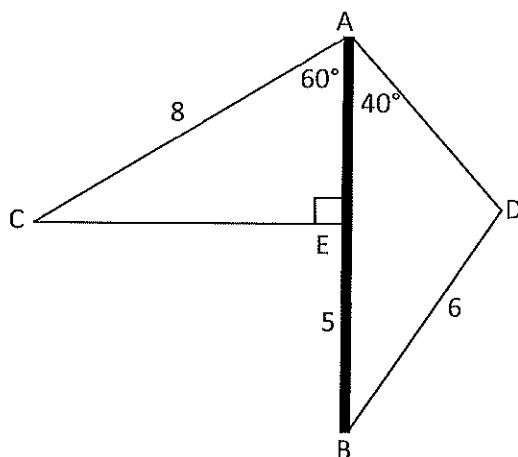
$$= \sin \theta \cdot \cos 60^\circ + \cos \theta \cdot \sin 60^\circ$$

$$= \left(\frac{1}{\sqrt{5}}\right)\left(\frac{1}{2}\right) + \left(-\frac{2}{\sqrt{5}}\right)\left(\frac{\sqrt{3}}{2}\right)$$

$$= \frac{1}{2\sqrt{5}} - \frac{2\sqrt{3}}{2\sqrt{5}}$$

$$= \frac{1 - 2\sqrt{3}}{2\sqrt{5}}$$

(b)



A design for a sail is shown. Two sails, $\triangle ACE$ and $\triangle ADB$, are joined to a centre mast AB. $CE \perp AB$, $AC = 8$ metres, $BD = 6$ metres and $EB = 5$ metres. $\widehat{CAE} = 60^\circ$; $\widehat{BAD} = 40^\circ$.

(1) Show that the total height of the mast is 9 metres.

(3)

$$\text{In } \triangle ACE: \cos 60^\circ = \frac{AE}{8}$$

$$\therefore AE = 8 \times \cos 60^\circ$$

$$= 8 \times \frac{1}{2}$$

$$AE = 4 \text{ m}$$

$$\therefore \text{Mast} = \overline{AE + EB} = 9 \text{ m}$$

(2) Assuming the $\widehat{D}$ is acute, calculate the area of the larger sail ABD, correct to 1 decimal place.

(5)

$$\text{In } \triangle ABD: \frac{\sin \widehat{D}}{9} = \frac{\sin 40^\circ}{6}$$

$$\therefore \sin \widehat{D} = 0,96418 \dots$$

$$\therefore \widehat{D} = 74,6^\circ$$

$$\therefore \widehat{B} = 180^\circ - (40^\circ + 74,6^\circ) \quad (\text{Sum of } \triangle ABD)$$

$$\widehat{B} = 65,4^\circ$$

$$\therefore \text{Area } \triangle ABD = \frac{1}{2} (9 \times 6 \times \sin 65,4^\circ)$$

$$= 24,5$$

(c) (1) Prove that $\tan(180^\circ + x) - \frac{\cos(x)}{\sin(360^\circ - x)} = \frac{2}{\sin 2x}$

(5)

$$\text{LHS: } \tan x - \frac{(\cos x)}{(-\sin x)}$$

$$= \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}$$

$$= \frac{\sin^2 x + \cos^2 x}{\cos x \sin x}$$

$$= \frac{1}{\sin 2x}$$

$$= \frac{1}{\frac{1}{2}(2 \sin x \cos x)}$$

$$= \frac{2}{\sin 2x}$$

$$= \text{RHS}$$

OR using RHS

$$\frac{2}{2 \sin x \cos x}$$

$$= \frac{1}{\sin x \cos x}$$

$$= \text{LHS}$$

(2) For what value(s) of x is the above identity not valid?

(3)

$$\text{if } \sin 2x = 0$$

$$\text{OR } \sin x = 0$$

$$\text{OR } \tan \text{ undefined}$$

$$\therefore 2x = 0^\circ + k180^\circ$$

$$x = k180^\circ$$

$$x = 90^\circ + k180^\circ$$

$$x = k \cdot 90^\circ$$

$$(k \in \mathbb{Z})$$

$$\text{SOLN: } x = k \cdot 90^\circ$$

[22]

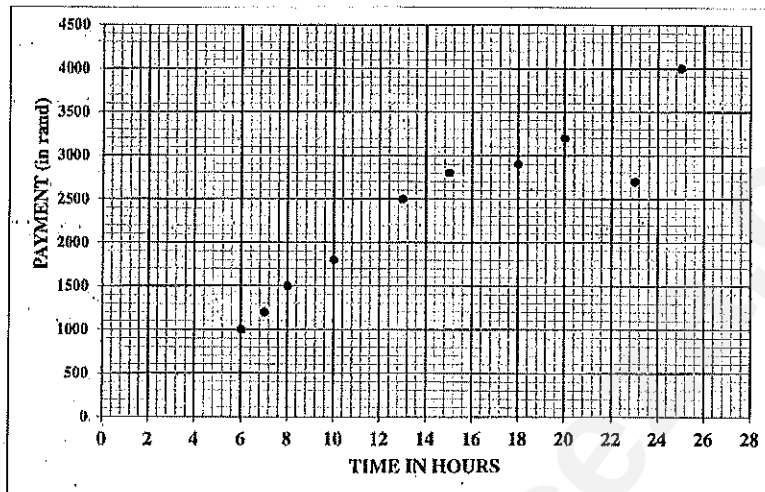
74 marks for SECTION A

SECTION B

QUESTION 6

A group of students did some part-time work for a company. The number of hours that the students worked and the payment (in rand) received for the work done is shown in the table below. The scatter plot is drawn for the data.

Number of hours worked	6	7	8	10	13	15	18	20	23	25
Payment (in rand)	1000	1200	1500	1800	2500	2800	2900	3200	2700	4000



(a) Using all the data in the table:

(1) calculate the standard deviation of the hours worked.

(1)

$$\text{std. deviation} = 6,5 \text{ hours}$$

(2) determine the minimum number of hours that a student needed to work (to the nearest whole number) in order to receive a payment that was more than one standard deviation above the mean.

(2)

$$\bar{x} = 14,5 \therefore 14,5 + 6,5 = 21 \text{ hrs}$$

(3) determine the equation of the line of best fit of the data (correct to 3 decimal places).

(2)

$$a = 454,385 \quad \therefore \text{Eqn: } y = 454,385 + 131,422x$$

$$b = 131,422$$

(b) Jo, who worked for 11,5 hours, was omitted from the original data. Calculate the possible amount that the company had to pay Jo.

(2)

$$y = 454,385 + 131,422(11,5)$$

$$= R1965,74 \quad \text{OR } R1965,73 \text{ (if plug into calculator)}$$

(c) Identify an outlier and describe what effect this would have on the gradient of the line of best fit if it were omitted from the data set.

(2)

$$(23; 2700)$$

The gradient would become steeper $\therefore$ value of gradient would increase

QUESTION 7

(a) Given $f(x) = 2 \sin x$ and $g(x) = \cos(x + 30^\circ)$

(1) Show that the equation $2 \sin x = \cos(x + 30^\circ)$ can also be expressed as $\tan x = \frac{\sqrt{3}}{5}$ (4)

$$2 \sin x = \cos x \cos 30^\circ - \sin x \sin 30^\circ$$

$$2 \sin x = \cos x \left(\frac{\sqrt{3}}{2}\right) - \sin x \left(\frac{1}{2}\right)$$

$$\therefore 2 \sin x + \frac{1}{2} \sin x = \frac{\sqrt{3}}{2} \cos x$$

$$\frac{5}{2} \sin x = \frac{\sqrt{3}}{2} \cos x$$

$$\therefore 5 \sin x = \sqrt{3} \cos x$$

$$\therefore \frac{\sin x}{\cos x} = \frac{\sqrt{3}}{5}$$

$$\therefore \tan x = \frac{\sqrt{3}}{5}$$

(2) Hence, determine the value(s) of $x \in [0^\circ; 270^\circ]$, rounded to one decimal digit, where $f(x) = g(x)$. (4)

$$\tan x = \frac{\sqrt{3}}{5}$$

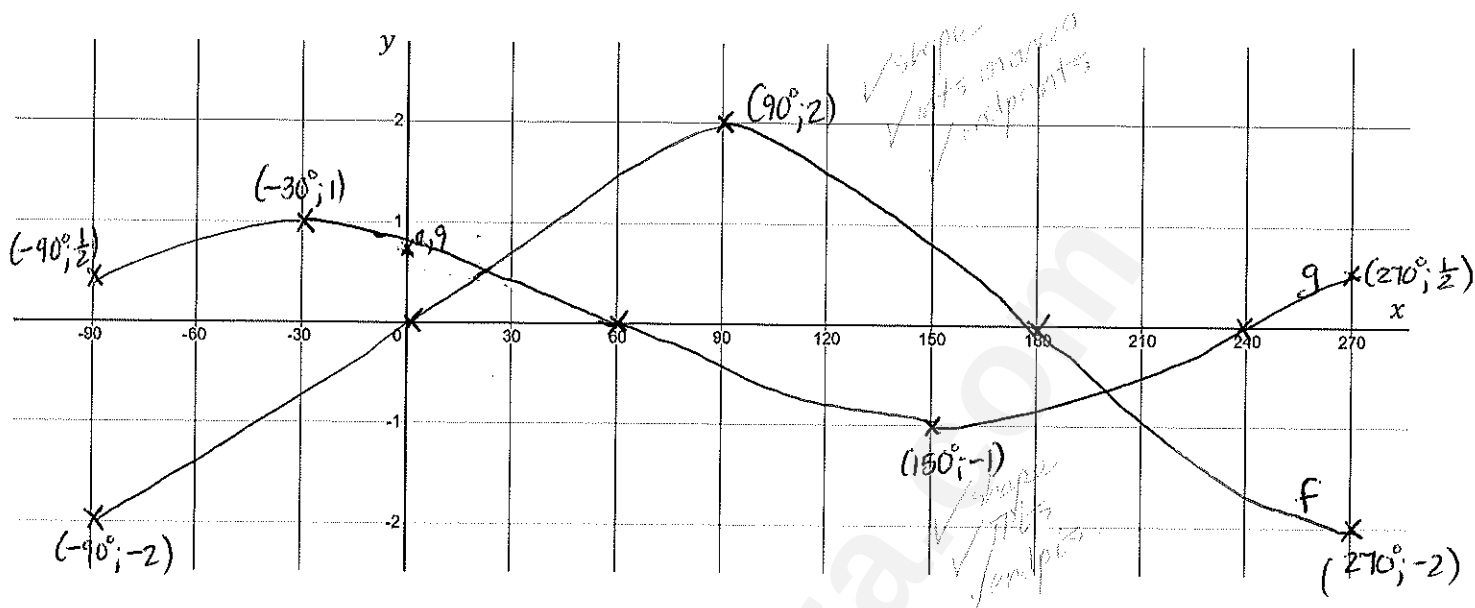
$$\therefore \text{Key } L: 19,1^\circ$$

$$Q1: x = 19,1^\circ + k180^\circ \quad (k \in \mathbb{Z})$$

$$\text{SOLNS: } k=0: x = 19,1^\circ$$

$$k=1: x = 199,1^\circ$$

- (3) (i) Draw sketch graphs of the curves of f and g for $x \in [-90^\circ; 270^\circ]$, clearly showing all intercepts, turning points and endpoints. (6)



- (ii) For which values of x is $f(x)$ increasing and negative? (1)

$$x \in (-90^\circ; 0^\circ) \quad \text{OR} \quad -90^\circ < x < 0^\circ$$

- (iii) For which values of x is $f(x) > g(x)$? (2)

$$19,1^\circ < x < 199,1^\circ$$

- (b) If $\sin 22^\circ = a$, express the following in terms of a :

$$\cos(-26^\circ) \cdot \sin 318^\circ + \cos 402^\circ \cdot \sin(-154^\circ)$$

$$= \cos 26^\circ \cdot (-\sin 42^\circ) + \cos 42^\circ \cdot (-\sin 26^\circ)$$

$$= -(\sin 42^\circ \cdot \cos 26^\circ + \cos 42^\circ \cdot \sin 26^\circ)$$

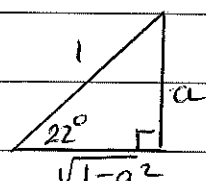
$$= -(\sin(42^\circ + 26^\circ))$$

$$= -\sin 68^\circ$$

$$= -\sin(90^\circ - 22^\circ)$$

$$= -\cos 22^\circ$$

$$= -\sqrt{1-a^2}$$



(c) Given: $\cos \theta = y$

(1) For what values of y is $\cos \theta$ defined?

(1)

$$-1 \leq y \leq 1 \checkmark^A$$

(2) Determine the general solution for θ if $\cos \theta = \frac{1}{\cos \theta} + \frac{5}{6}$

(6)

$$6 \cos^2 \theta = 6 + 5 \cos \theta \quad \checkmark^m \left(\frac{x^2}{1} \right)$$

$$6 \cos^2 \theta - 5 \cos \theta - 6 = 0$$

$$(3 \cos \theta + 2)(2 \cos \theta - 3) = 0 \quad \checkmark^f$$

$$\cos \theta = -\frac{2}{3} \quad \text{OR} \quad \cos \theta = \frac{3}{2} \checkmark^A$$

$$\text{Key 1: } 48, 2^\circ \checkmark^A$$

No solution

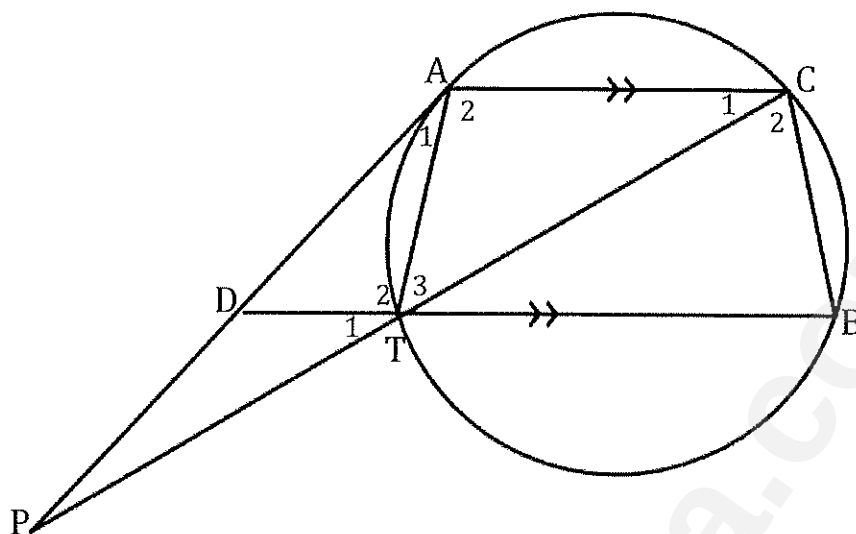
$$\checkmark^A \left. \begin{array}{l} Q2: \theta = 131,8^\circ + k \cdot 360^\circ \quad (k \in \mathbb{Z}) \\ Q3: \theta = 228,2^\circ + k \cdot 360^\circ \end{array} \right\} \quad \checkmark^m \left(\frac{x^2}{1} \right)$$

$$\theta = 228,2^\circ + k \cdot 360^\circ$$

[29]

QUESTION 8

- (a) In the diagram below, ACBT is a cyclic quadrilateral having $AC \parallel TB$.
CT is produced to P such that tangent PA meets the circle at A. BT produced meets PA at D.



- (1) Prove that $\triangle PAT \sim \triangle PCA$.

(3)

In $\triangle PAT$ and $\triangle PCA$

$$1. \hat{A} = \hat{C} \quad (\text{tan-chord thm})$$

$$2. \hat{P} = \hat{P} \quad (\text{common } \angle)$$

$$3. \hat{PTA} = \hat{PCA} \quad (\angle \text{ sum of } \Delta)$$

$$\therefore \triangle PAT \sim \triangle PCA \quad (AAA)$$

(order NB)

- (2) If $PA = 6$, $TC = 5$ and $PT = x$,

- (i) Show that $PT = 4$.

(4)

$$\frac{PA}{PC} = \frac{PT}{PA} = \frac{AT}{CA} \quad (\text{III } \Delta's)$$

$$\frac{6}{x+5} = \frac{4}{6}$$

$$\therefore 36 = 4(x+5)$$

$$4x = 16 \quad \therefore x = 4$$

(ii) Calculate the length of PD.

(2)

$$\frac{PD}{PA} = \frac{PT}{PC} \quad (\text{prop. int. thm, } DT \parallel AC)$$

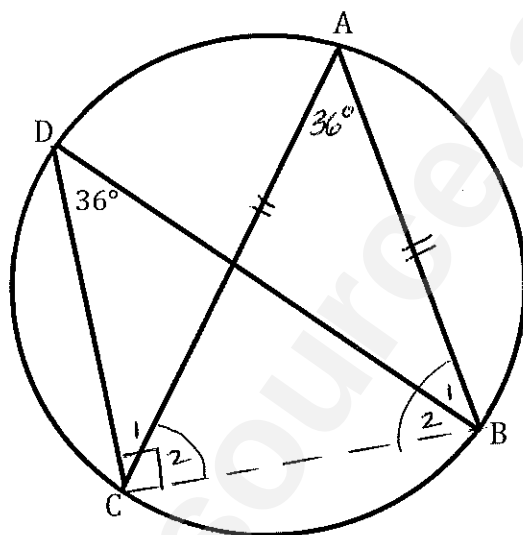
$$= \frac{4}{9}$$

$$\therefore PD = 6 \times \frac{4}{9}$$

$$= \frac{24}{9} \text{ u}$$

(b) In the figure below, BD is the diameter of the circle ABCD. If $AB = AC$ and $\hat{D} = 36^\circ$, determine the size of $\hat{ABD}$.

(5)



Constr: Join B to C

$$\hat{C} = 90^\circ \quad (\text{L in semicircle})$$

$$\hat{A} = 36^\circ \quad (\text{L's in same segm})$$

$$\therefore \hat{C}_2 = \hat{B} \quad (\text{isos } \Delta)$$

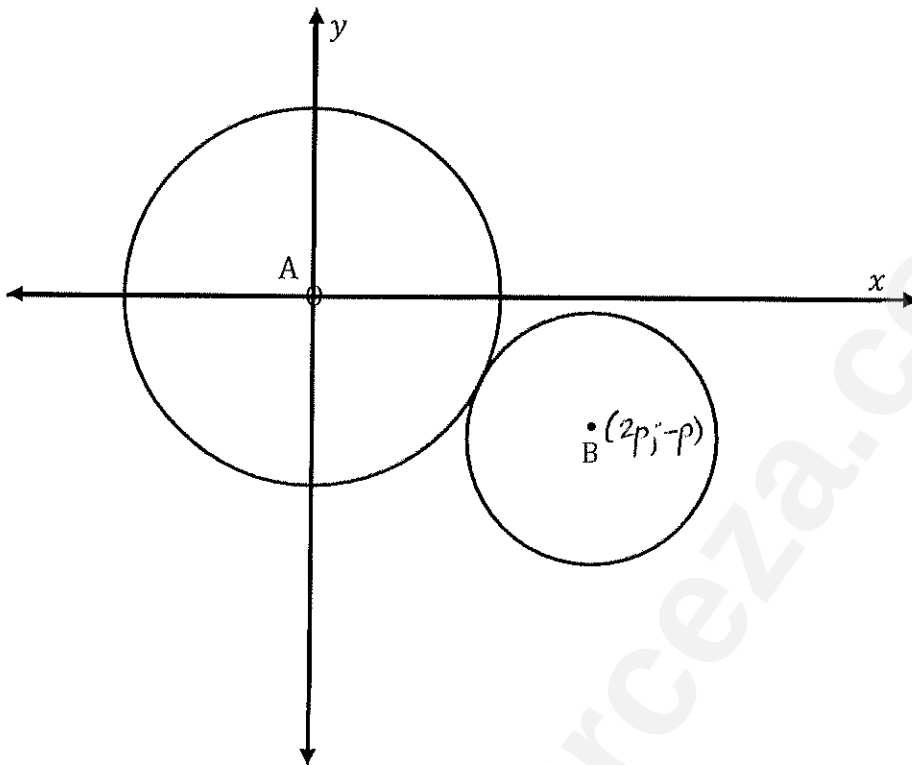
$$= 72^\circ \quad (\text{L sum } \Delta)$$

$$\therefore \hat{C}_1 = 18^\circ \quad (\text{compl. L's})$$

$$\therefore \hat{B}_1 = 18^\circ \quad (\text{L's in same segm})$$

[14]

- (a) In the diagram, two circles are drawn. Circle A intersects with circle centre B **externally**.
 The equation of circle A with centre the origin is given by $x^2 + y^2 = 45$.
 The equation of the circle centre B is given by $(x - 2p)^2 + (y + p)^2 = 20$.



- (1) If two circles **touch externally**, describe the relationship between their radii and the distance between their centres.

(1)

The sum of the radii is equal to the distance btm their centres.

- (2) Determine the value of p and hence, the co-ordinates of B.

(6)

Centre A: $(0;0)$ Radius = $\sqrt{45}$

Centre B: $(2p; -p)$ Radius = $\sqrt{20}$

$$\therefore \text{Sum of radii} = 3\sqrt{5} + 2\sqrt{5} = 5\sqrt{5}$$

$$\begin{aligned} \text{Distance btm centres} &= \sqrt{(2p-0)^2 + (-p-0)^2} \\ &= \sqrt{5p^2} \end{aligned}$$

$$\therefore 5\sqrt{5} = \sqrt{5p^2} \quad \text{✓(equate)}$$

$$125 = 5p^2$$

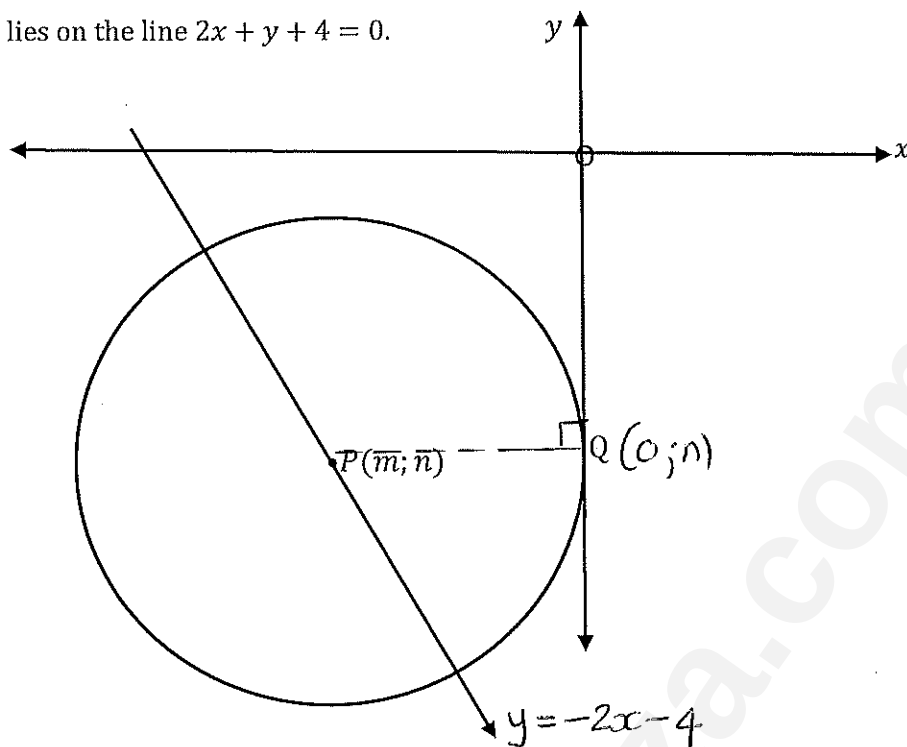
$$p^2 = 25 \quad \therefore p = \pm 5$$

$$\text{Quad 4: } p = -5$$

$$\therefore B(10; -5) \quad \text{✓(CA)}$$

- (b) A circle with centre $P(m, n)$ touches the y -axis at point Q and passes through the point $R(-1; -1)$.

Point P lies on the line $2x + y + 4 = 0$.



- (1) Show that $n = -2m - 4$.

(1)

Subst (m, n) into line: $n = -2m - 4$

- (2) Write down the coordinates of Q , in terms of n .

(1)

$Q(0; n)$

- (3) Determine the coordinates of point P .

(6)

Circle eqn: $(x - m)^2 + (y - n)^2 = m^2$ (Radius = m)

Subst $(-1; -1)$ and $n = -2m - 4$

$$(-1 - m)^2 + (-1 - (-2m - 4))^2 = m^2$$

$$1 + 2m + m^2 + (3 + 2m)^2 = m^2$$

$$1 + 2m + m^2 + 9 + 12m + 4m^2 - m^2 = 0$$

$$4m^2 + 14m + 10 = 0$$

$$2m^2 + 7m + 5 = 0$$

$$(2m + 5)(m + 1) = 0$$

$$m = -5/2 \text{ OR } m = -1$$

$$\therefore n = -2(-1) - 4$$

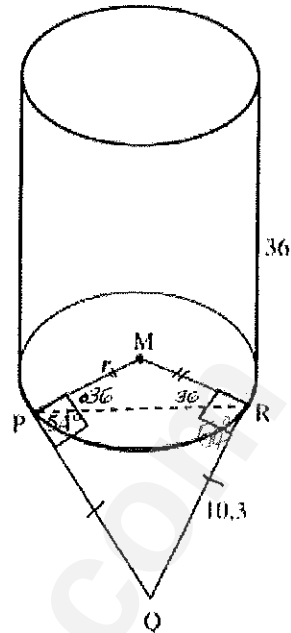
$$n = -2$$

$$\therefore P(-1; -2)$$

[15]

QUESTION 10

The diagram below represents a right cylindrical silo.
M is the centre of the circular base.
PQ and RQ are tangents to the base at P and R.
M, P, Q and R lie in the same horizontal plane.
The vertical height of the cylinder is 36 metres.
QR = 10,3 m and $\widehat{RPQ} = 54^\circ$.



(a) Show that $\widehat{Q} = 72^\circ$. (2)

$$PQ = QR \text{ (tangents from same pt.)}$$

$$\therefore \widehat{QRP} = 54^\circ \text{ (isos } \Delta)$$

$$\therefore \widehat{Q} = 72^\circ \text{ (L sum of } \Delta PRQ)$$

(b) Calculate the length of PR. (2)

$$\frac{PR}{\sin 72^\circ} = \frac{10,3}{\sin 54^\circ} \text{ (sine rule)}$$

$$\therefore PR = 12,1 \text{ m}$$

(c) Calculate the volume of the cylindrical section of the silo. (5)

$$\text{In } \Delta MPR: \widehat{MPR} = \widehat{MRP} = 36^\circ \text{ (compl. L's)}$$

$$\therefore \widehat{M} = 108^\circ \text{ (L sum of } \Delta MPR)$$

$$\therefore MP = \frac{12,1}{\sin 36^\circ} = \frac{12,1}{\sin 108^\circ} \text{ (sine rule)}$$

$$MP = 7,5 \text{ m (radius)}$$

$$r = 7,478$$

$$\therefore \text{Volume} = \pi r^2 h$$

$$= \pi (7,5)^2 \cdot 36$$

$$= 6361,7 \text{ m}^3$$

$$\text{then area} = 6324,5 \text{ m}^2$$

$$V = \frac{12,1 \cdot \sin 36^\circ}{\sin 108^\circ}$$

$$\text{then } V = 6324,8 \text{ m}^3$$

[9]

76 MARKS FOR SECTION B

$$r = 7,48$$

$$\text{then } V = 6327,84 \text{ m}^3$$