

ST PETER'S COLLEGE



MATHEMATICS PRELIMINARY EXAMINATION 2021 GRADE 12: PAPER 2

EXAMINER: N Lindsay

TIME: 3 hours

MODERATORS: B De Beer, S Dzingwa, L Reddy

MARKS: 150

SESSION: 1

DATE: 06 SEP 2021

NAME:

MATH TEACHER:

Read the following instructions carefully.

1. This paper consists of 24 pages and an Information Sheet of 2 pages. Please check that your paper is complete.
2. Read the questions carefully.
3. Answer all questions and in the spaces provided.
4. You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.
5. Clearly show **ALL** calculations, diagrams, graphs, etc. that you have used in determining your answers.

Answers only will NOT necessarily be awarded full marks.

6. Diagrams are not necessarily drawn to scale.
7. If necessary, round off answers to **ONE** decimal place, unless otherwise stated.
8. It is in your own interest to write legibly and to present your work neatly.

DO NOT WRITE IN THE GRIDS BELOW

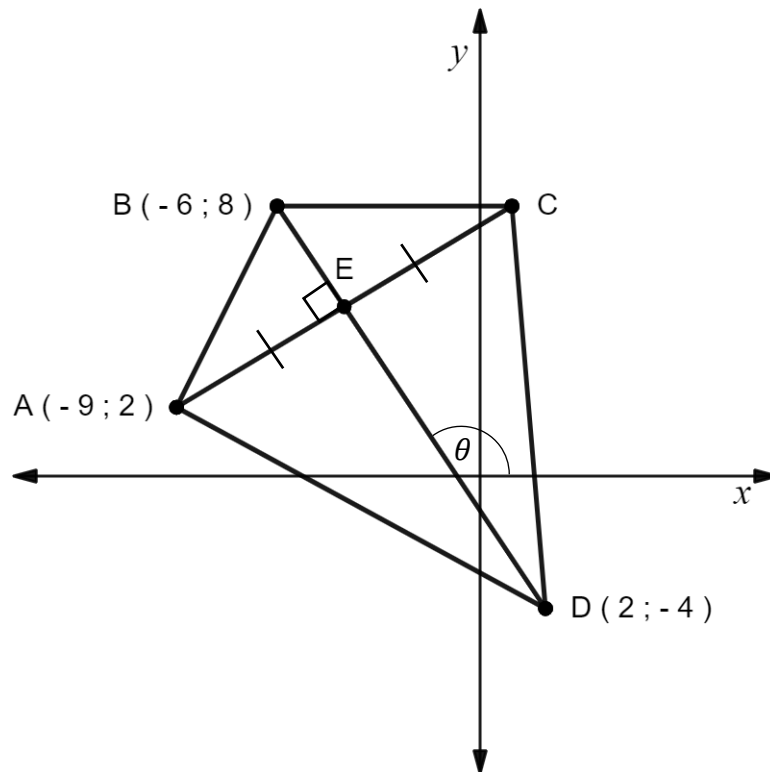
	Section A						Section B								
Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Actual Mark															
Possible Mark	19	12	15	8	11	11	10	9	8	10	10	8	14	5	150
Marker's Signature															

SECTION A

Question 1

19 Marks

Quadrilateral ABCD, a kite, is given with $AE = EC$ and $AC \perp BD$. $A(-9; 2)$, $B(-6; 8)$, C and $D(2; -4)$ are the vertices of the quadrilateral.



- (a) Calculate the length of BD and give your answer in simplest surd form. (2)(K)

$BD = \sqrt{(-6 - 2)^2 + (8 + 4)^2}$ $BD = \sqrt{208}$ $BD = 4\sqrt{13}$	✓ Formula (m) ✓ Answer (a)
--	--

- (b) Determine the equation of BD. (4)(K)

$m_{BD} = \frac{8 + 4}{-6 - 2}$ $m_{BD} = -\frac{3}{2}$ $y - 8 = -\frac{3}{2}(x + 6)$ $y = -\frac{3}{2}x - 1$	✓ Formula (m) ✓ Gradient (a) ✓ Substituting B or D (a) ✓ Final equation (ca)
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- (c) Determine the equation of AC. (3)(R)

$m_{AC} = \frac{2}{3}$ $y - 2 = \frac{2}{3}(x + 9)$ $y = \frac{2}{3}x + 8$	✓ Gradient (ca from (b)) ✓ Substituting A (a) ✓ Final equation (ca)
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- (d) Show that the coordinates of E are $\left(-\frac{54}{13}; \frac{68}{13}\right)$. (3)(R)

$-\frac{3}{2}x - 1 = \frac{2}{3}x + 8$ $-9x - 6 = 4x + 48$ $-13x = 54$ $x = -\frac{54}{13}$ $y = \frac{2}{3}\left(-\frac{54}{13}\right) + 8$ $y = \frac{68}{13}$ $E\left(-\frac{54}{13}; \frac{68}{13}\right)$	✓ Equating BD and AC (m) ✓ Simplifying (ca) ✓ Substitution (a)
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- (e) Determine the coordinates of C. (3)(R)

$\frac{x_C - 9}{2} = -\frac{54}{13}$ $x_C = \frac{9}{13}$ $\frac{y_C + 2}{2} = \frac{68}{13}$ $y_C = \frac{110}{13}$ $C\left(\frac{68}{13}; \frac{110}{13}\right)$	✓ method/formula (a) ✓ x coordinate (ca) ✓ y coordinate (ca) -1 if not written as coordinate
--	---

- (f) Calculate θ , the angle of inclination of line BD. (2)(K)

$\tan\theta = -\frac{3}{2}$ $\theta = 123,7^\circ$	✓ Formula (m) ✓ Answer (ca from (b))
---	---

- (g) Write down the coordinates of F such that ABDF is a parallelogram. (2)(C)

$F(-1; -10)$	✓ x coordinate (a) ✓ y coordinate (a)
--------------	--

Below is a graph representing the ages of the 50 Richest People in 2021.



- (a) Complete the cumulative frequency table: (2)(K)

Age	Frequency	Cumulative Frequency
$30 \leq x < 40$	3	3
$40 \leq x < 50$	6	9
$50 \leq x < 60$	10	19
$60 \leq x < 70$	8	27
$70 \leq x < 80$	12	39
$80 \leq x < 90$	8	47
$90 \leq x < 100$	3	50
	✓ Values (a)	✓ Values (a)

- (b) Determine the estimated mean age for this group. (1)(K)

$\bar{x} = 66,2$	✓ Answer (a)
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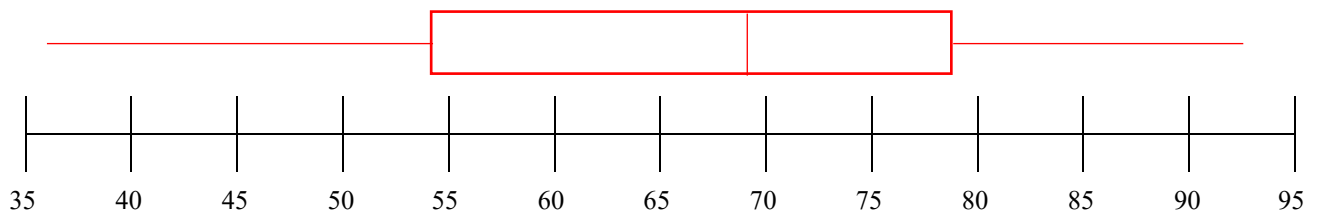
- (c) In which interval will the 90th percentile lie? (2)(K)

$\frac{90(n+1)}{100} = 45,9\text{th position}$ 90 th percentile would be in the $80 \leq x < 90$ interval	✓ Determining position (m) ✓ Interval (a)
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(d) Below is the cumulative frequency graph for the given data:



(1) If the minimum age is 36 and the maximum age is 93, use the graph above to plot a box-and-whisker diagram. Label your points clearly. (4)(R)



- ✓ median value (a)
- ✓✓ quartile values (a)
- ✓ box and whisker diagram (ca)

(2) How many people are above the age of 75? (1)(R)

$$50 - 34 = 16$$

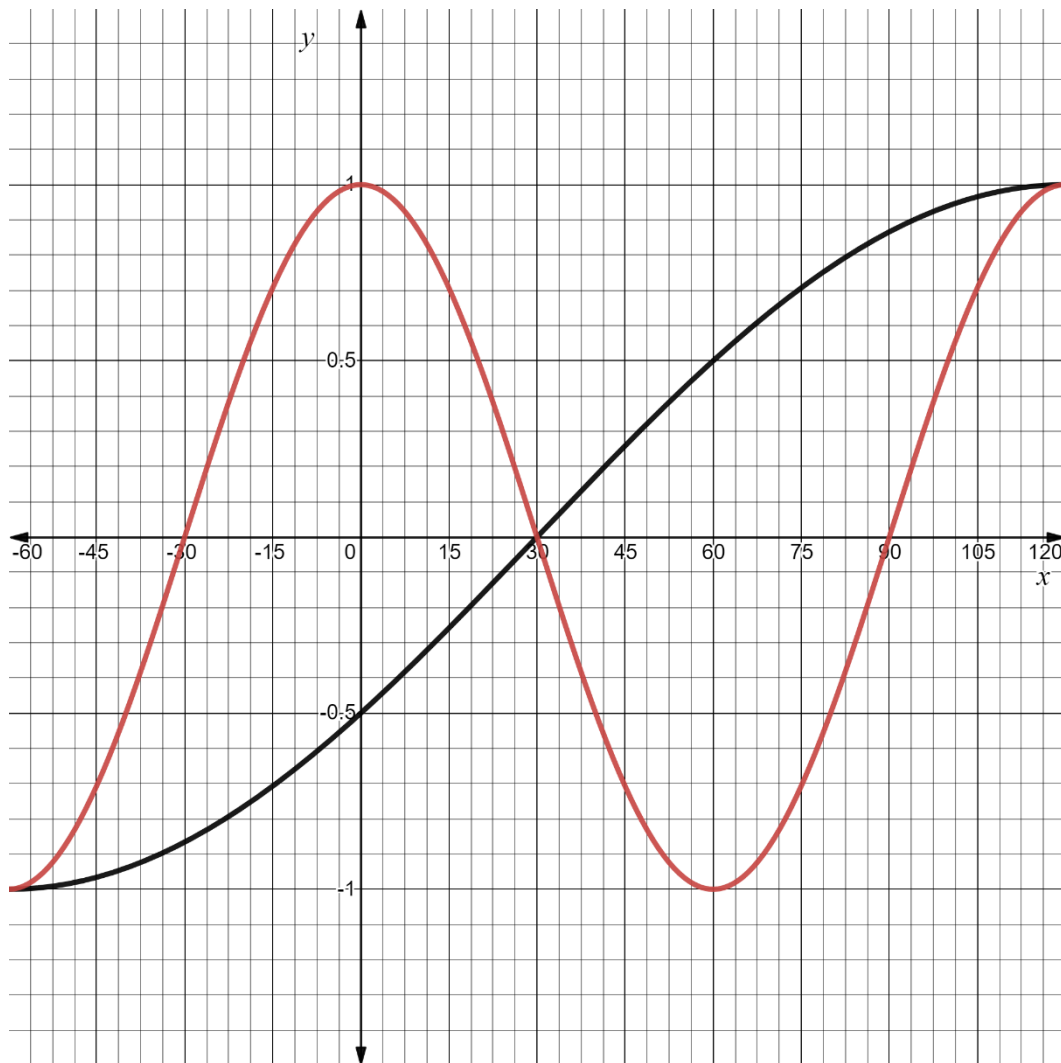
✓ Answer (ca)

(e) Discuss the skewness of this data. Give a reason for your answer. (2)(R)

*Data is skewed left or negatively skewed.
mean < median or data is more spread on the left*

- ✓ Correct skewness (ca)
- ✓ Any correct reason (ca)

Given below is the graph of $f(x) = \sin(x - 30^\circ)$ for $x \in [-60^\circ; 120^\circ]$.



- (a) On the same set of axes above, sketch the graph of $g(x) = \cos(3x)$. Clearly show all intercepts with the axes. (3)(R)

✓ x intercepts (a) ✓ y intercept (a) ✓ shape (a)

- (b) Use the graphs to determine:

- (1) for which value(s) of x is $f(x) - g(x) = 1,5$? (1)(K)

$x = 60^\circ$

✓ answer (ca)
No mark if 0 is included in the answer

- (2) for which value(s) of x is $f(x) \cdot g(x) > 0$. (3)(C)

$x \in (-60^\circ; -30^\circ) \cup (90^\circ; 120^\circ)$

✓✓ one per correct interval (ca)
✓ correct brackets (a)

- (c) What is the range of $h(x) = 2f(x) - 1$? (2)(C)

$y \in [-3; 1]$	✓✓ one per boundary value (a) -1 if incorrect brackets/inequality sign
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- (d) Determine algebraically the value(s) of x for which

$$\sin(x - 30^\circ) = \cos(3x),$$

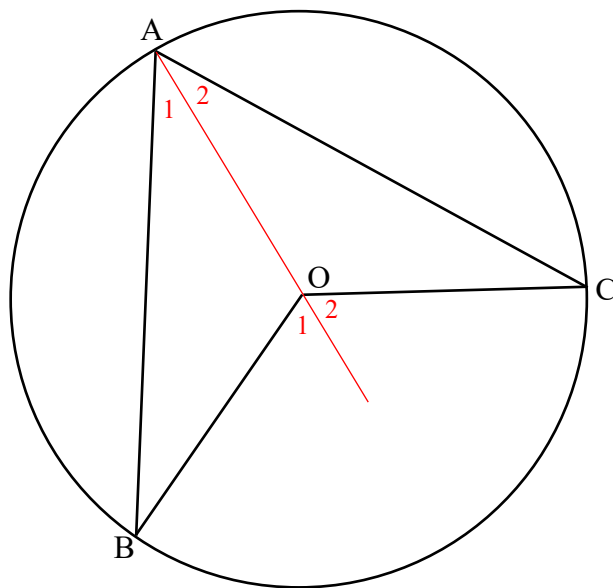
where $x \in [-60^\circ; 120^\circ]$. (6)(R)

$\sin(x - 30^\circ) = \sin(90^\circ - 3x)$ $x - 30^\circ = 90^\circ - 3x + k.360^\circ$ $4x = 120^\circ + k.360^\circ$ $x = 30^\circ + k.90^\circ$ OR $x - 30^\circ = 180^\circ - (90^\circ - 3x) + k.360^\circ$ $x - 30^\circ = 180^\circ - 90^\circ + 3x + k.360^\circ$ $-2x = 120^\circ + k.360^\circ$ $x = -60^\circ + k.180^\circ$ $x \in \{-60^\circ; 30^\circ; 120^\circ\}$	✓ converting to same ratio (a) ✓ setting up 1 st quadrant equation (ca) ✓ solving 1 st quadrant equation (ca) ✓ setting up 2 nd quadrant equation (ca) ✓ solving 2 nd quadrant equation (ca) ✓ listing solutions (ca)
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Question 4

8 Marks

- (a) Using the diagram below, prove the theorem that states the angle at the centre of circle O is double the angle at the circumference. (5)(K)



Construct AO and extend

$$\hat{A}_1 = \hat{B} \quad (\angle s \text{ opp} = \text{sides})$$

$$\hat{A}_1 + \hat{B} = \hat{O}_1 \quad (\text{ext } \angle \text{ of } \triangle)$$

$$2\hat{A}_1 = \hat{O}_1$$

$$\text{Similarly, } 2\hat{A}_2 = \hat{O}_2$$

$$\hat{BOC} = 2\hat{BAC}$$

✓ Construction (a)

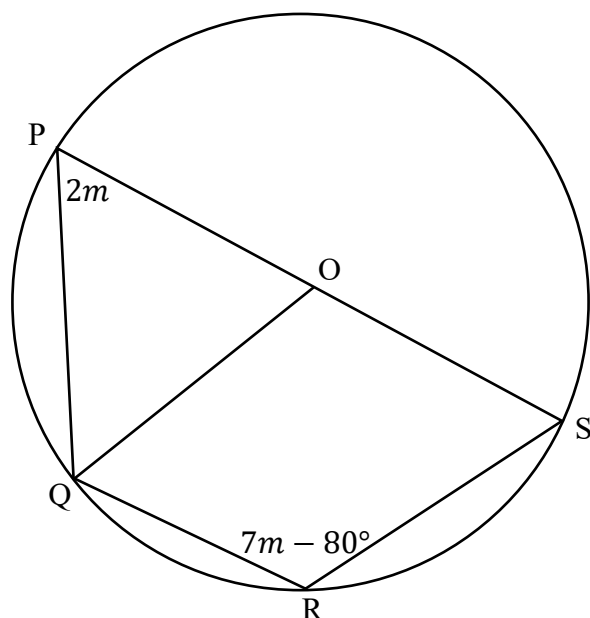
✓ equal angles (a)

✓ exterior angle (a)

✓ deduction (a)

✓ Similarly and Conclusion (a)

- (b) In the diagram below, O is the centre of the circle passing through points P, Q, R and S.



Without any reasons:

- (1) Give the size of the reflex angle $\widehat{QOS}$ in terms of m . (1)(K)

$14m - 160^\circ$	✓ (a)
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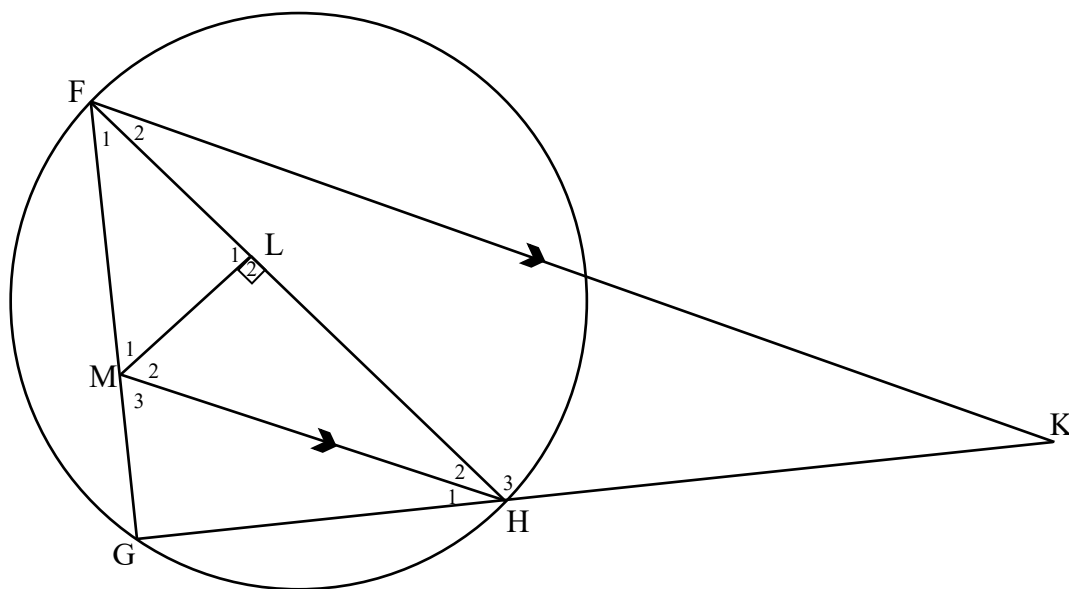
- (2) Calculate the numerical value of m . (2)(R)

$2m + 7m - 80^\circ = 180^\circ$ $9m = 260^\circ$ $m = 28,9$	✓ Statement (a) ✓ Answer (a)
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Question 5

11 Marks

In the diagram below, FH is a diameter of circle FGH. HM bisects $\widehat{FHG}$ and $LM \perp FH$.
 $HM \parallel KF$.



(a) Prove the following:

(1) $\triangle FHK$ is isosceles

(4)(C)

$\widehat{F}_2 = \widehat{H}_2$ (alt $\angle$ s; $FK \parallel MH$) $\widehat{H}_2 = \widehat{H}_1$ (given HM bisects $\widehat{FHG}$) $\widehat{H}_1 = \widehat{K}$ (corresp $\angle$ s; $FK \parallel MH$) $\widehat{F}_2 = \widehat{K}$ $HF = HK$ (sides opp = $\angle$ s)	✓ statement (a) ✓ statement (a) ✓ statement (a) -1 for any incorrect/missing reason ✓ conclusion (a)
--	--

$$(2) \quad \frac{GH}{FH} = \frac{GM}{MF} \quad (3)$$

$\frac{GH}{HK} = \frac{GM}{MF}$ (line $\parallel$ one side of $\triangle$) $HK = HF$ (proven above) $\frac{GH}{HF} = \frac{GM}{MF}$	✓ statement (a) ✓ reason (a) ✓ statement (a)
--	--

(b) If $GH = 12$ units, and the radius of the circle is 10 units, calculate:

$$(1) \quad FG \quad (2)$$

$\widehat{G} = 90^\circ$ ($\angle$ in semi circle) $FG^2 = 20^2 - 12^2$ (pythag) $FG = 16$ units	✓ statement (a) ✓ answer (a)
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$$(2) \quad FM \quad (2)$$

$\frac{FM}{FG} = \frac{HK}{GK}$ (line $\parallel$ one side $\triangle$) $\frac{FM}{16} = \frac{20}{32}$ $FM = 10$ units	✓ substitution (a) ✓ answer (ca)
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(a) Prove the following:

$$\frac{\tan \alpha \cos \alpha + \sin(90^\circ - 2\alpha) - 1}{\cos \alpha - \sin 2\alpha} = \tan(180^\circ + \alpha) \quad (7)$$

$\begin{aligned} & \left(\frac{\sin \alpha}{\cos \alpha} \right) (\cos \alpha) + \cos 2\alpha - 1 \\ & \frac{\cos \alpha - 2\sin \alpha \cos \alpha}{\cos \alpha - \sin 2\alpha} \\ & = \frac{\sin \alpha + 1 - 2\sin^2 \alpha - 1}{\cos \alpha (1 - 2\sin \alpha)} \\ & = \frac{\sin \alpha (1 - 2\sin \alpha)}{\cos \alpha (1 - 2\sin \alpha)} \\ & = \tan \alpha \\ & \tan(180^\circ + \alpha) = \tan \alpha \\ & LHS = RHS \end{aligned}$	✓ tan identity (a) ✓ cofunction (a) ✓ cos double angle expansion (a) ✓ sin double angle expansion (a) ✓ factorising numerator (ca) ✓ factorising denominator (ca) ✓ tan reduction (a)
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(b) Evaluate, without the use of a calculator:

$$\cos 75^\circ + \cos 15^\circ \quad (4)$$

$\begin{aligned} & = \cos(45^\circ + 30^\circ) + \cos(45^\circ - 30^\circ) \\ & = \cos 45^\circ \cos 30^\circ - \sin 45^\circ \sin 30^\circ + \cos 45^\circ \cos 30^\circ + \sin 45^\circ \sin 30^\circ \\ & = 2\cos 45^\circ \cos 30^\circ \\ & = 2 \left(\frac{\sqrt{2}}{2} \right) \left(\frac{\sqrt{3}}{2} \right) \\ & = \frac{\sqrt{6}}{2} \end{aligned}$	✓ Rewriting angles in terms of special angles (a) ✓ Expanding compound angles (ca) ✓ Substituting special angles (ca) ✓ Answer (ca)
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[SECTION A: 76]

SECTION B

Question 7

10 Marks

The Comrades Marathon is an ultramarathon of approximately 89 kilometres which is run annually in the KwaZulu-Natal province of South Africa between the cities of Durban and Pietermaritzburg.

It is the world's largest and oldest ultramarathon race.



Below is a table showing the average finishing times based on age.

Age (Avg)	25	35	45	55	65	75
Time (hrs)	9,8	10	10,4	10,75	11	11,5

- (a) Determine the equation of the least squares regression line. Give your answer correct to 4 decimal digits. (2)

$$\hat{y} = 8,8821 + 0,0339x$$

- ✓ both values (a)
- ✓ correct decimals (a)

- (b) Estimate how long it would take a 40-year-old person to complete the race. (2)

$$\hat{y} = 8,8821 + 0,0339(40)$$

$$\hat{y} = 10,2381 \text{ hours}$$

- ✓ substitution of x (a)
- ✓ answer (ca)

- (c) Would it be accurate to use the line of best fit to estimate the finishing time of an 18-year-old? Explain your answer. State whether this would be interpolation or extrapolation. (3)

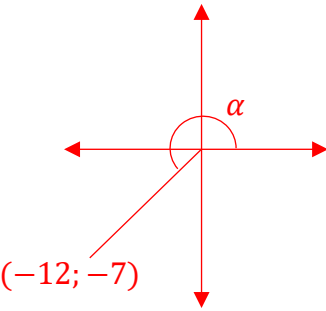
- ✓ no (a)
- ✓ any valid reason (a)
- ✓ extrapolation (a)

- (d) Calculate the correlation coefficient, to 4 decimal digits, and comment on the strength of the relationship between age and finishing time. (3)

- ✓ $r = 0,9944$ (a)
- ✓ strong or very strong (ca)
- ✓ positive (ca)

Question 8
10 Marks

- (a) If $12 \tan \alpha - 7 = 0$ and $\alpha \in (180^\circ ; 360^\circ)$, determine without the use of a calculator and with the aid of a diagram the value of $\sin 2\alpha$. (5)

$\tan \alpha = \frac{7}{12}$	
	✓ diagram in 3 rd quadrant (a) Or indicate x and y are negative
$r^2 = (-12)^2 + (-7)^2$ $r = \sqrt{193}$ $\sin 2\alpha = 2 \sin \alpha \cos \alpha$ $\sin 2\alpha = 2 \left(-\frac{7}{\sqrt{193}} \right) \left(-\frac{12}{\sqrt{193}} \right)$ $\sin 2\alpha = \frac{168}{193}$	✓ determining r (a) ✓ expanding double angle (a) ✓ substituting ((ca) for x and y, (ca) for r) ✓ answer (ca)

- (b) If $\cos 32^\circ = t$, determine the following in terms of t without using a calculator:

- (1) $\cos 64^\circ$ (2)

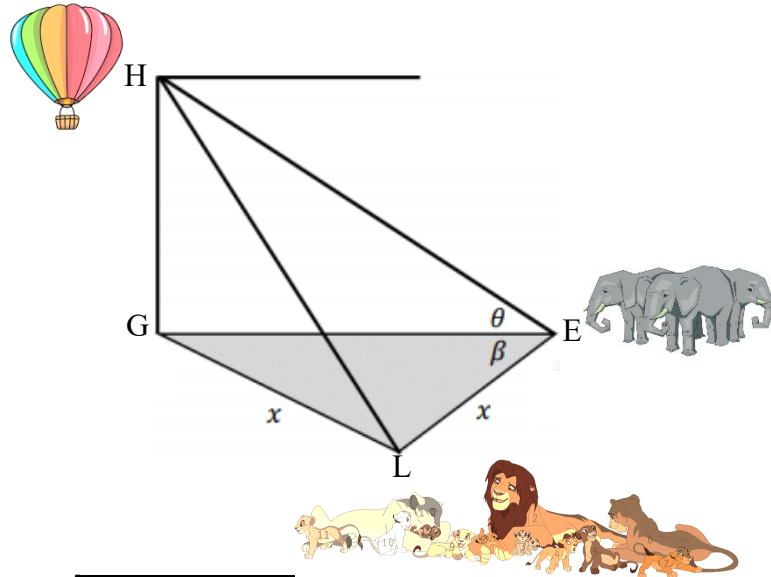
$\cos 64^\circ = 1 - 2 \cos^2 32^\circ$ $\cos 64^\circ = 1 - 2t^2$	✓ double angle expansion (a) ✓ substitution (a)
---	--

- (2) $\cos 58^\circ$ (2)

$\cos 58^\circ = \sin 32^\circ$ $y = \sqrt{1 - t^2}$ $\sin 32^\circ = \sqrt{1 - t^2}$	✓ applying cofunctions (a) ✓ solution (a)
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A hot-air balloon (H) is flying through the Masai Mara Game Reserve and the passengers can spot a pride of lions (L) and a herd of Elephants (E) on the ground. The angle of elevation of H from E is θ . The pride of lions is equidistant from the herd of elephants and the point G on the ground directly below the hot-air balloon.

$$GL = EL = x \text{ and } \angle LGE = \beta.$$



- (a) Show that $GE = x\sqrt{2(1 + \cos 2\beta)}$. (4)

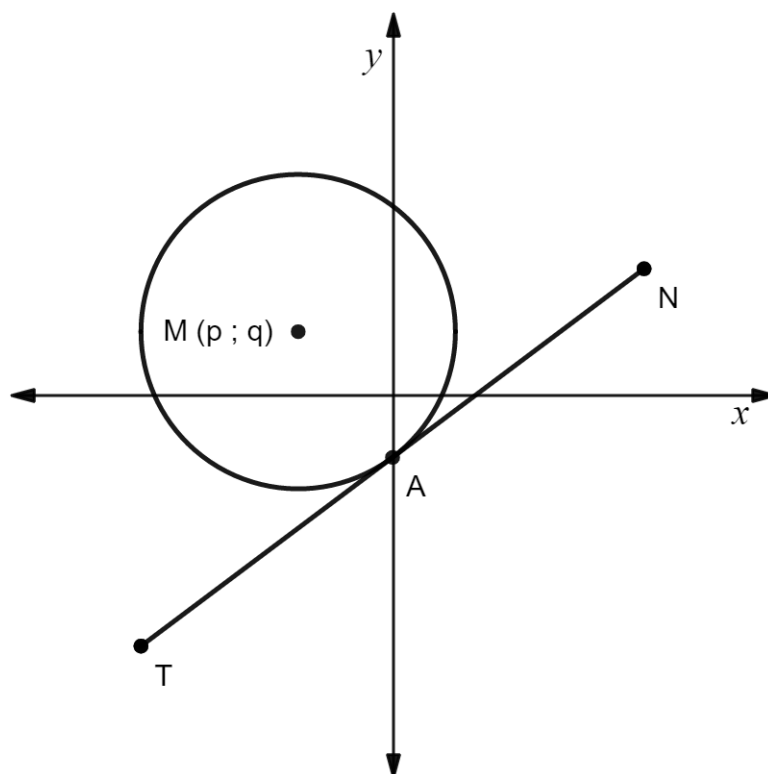
$\angle LGE = \beta$ ($\angle s$ opp = sides) $\angle GLE = 180^\circ - 2\beta$ ($\angle s$ in $\triangle$) $GE^2 = x^2 + x^2 - 2 \cdot x \cdot x \cdot \cos(180^\circ - 2\beta)$ $GE^2 = 2x^2 + 2x^2 \cos 2\beta$ $GE = \sqrt{2x^2 + 2x^2 \cos 2\beta}$ $GE = \sqrt{2x^2(1 + \cos 2\beta)}$ $GE = x\sqrt{2(1 + \cos 2\beta)}$	✓ determining angle L (a) ✓ applying cos rule (a) ✓ reduction of angle (ca) ✓ factorisation (ca)
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- (b) Prove that $HG = 2x \cos \beta \tan \theta$. (4)

$GE = \sqrt{2x^2(1 + 2\cos^2 \beta - 1)}$ $GE = \sqrt{4x^2 \cos^2 \beta}$ $GE = 2x \cos \beta$ $\tan \theta = \frac{HG}{GE}$ $HG = GE \tan \theta$ $HG = 2x \cos \beta \tan \theta$	✓ expanding the double angle (m) ✓ simplifying GE (ca) ✓ correct trig ratio (a) ✓ substitution/manipulation (ca)
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Question 10
10 Marks

In the diagram below, circle with centre M is given. TAN is a tangent to the circle at A and has an equation $4y - 3x + 8 = 0$. Circle M has an equation $(x - p)^2 + (y - q)^2 = 25$.



(a) Determine the equation for the radius MA.

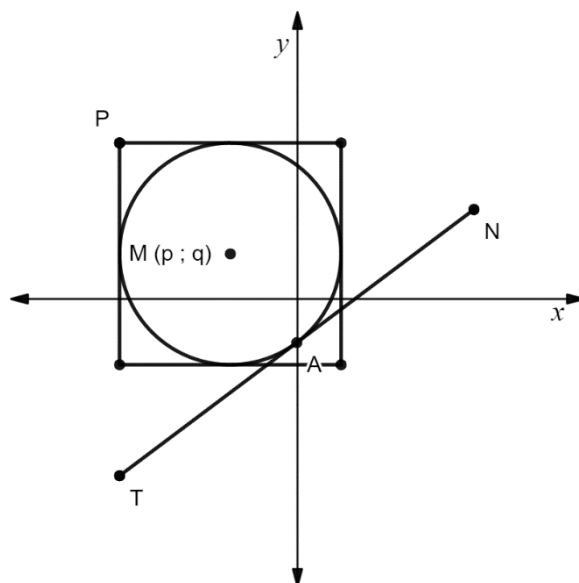
(3)

$4y = 3x - 8$ $y = \frac{3}{4}x - 2$ $m_{tan} = \frac{3}{4}$ $m_{rad} = -\frac{4}{3}$ $y = -\frac{4}{3}x - 2$	✓ standard form for TAN (a) ✓ gradient of rad (ca) ✓ equation of rad (ca)
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(b) Hence, or otherwise, determine the values of p and q . (5)

$(0 - p)^2 + (-2 - q)^2 = 25$ $p^2 + 4 + 4q + q^2 = 25$ <i>But</i> $q = -\frac{4}{3}p - 2$ $p^2 + 4 + 4\left(-\frac{4}{3}p - 2\right) + \left(-\frac{4}{3}p - 2\right)^2 = 25$ $p^2 + 4 - \frac{16}{3}p - 8 + \frac{16}{9}p^2 + \frac{16}{3}p + 4 = 25$ $\frac{25}{9}p^2 = 25$ $p^2 = 9$ $p = -3$ $q = 2$	✓ subbing A (a) ✓ subbing q (or p) (a) ✓ multiplying out/simplifying (ca) ✓ solving for p (ca) ✓ solving for q (ca)
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(c) A square is drawn around circle M such that each side is a tangent. (2)



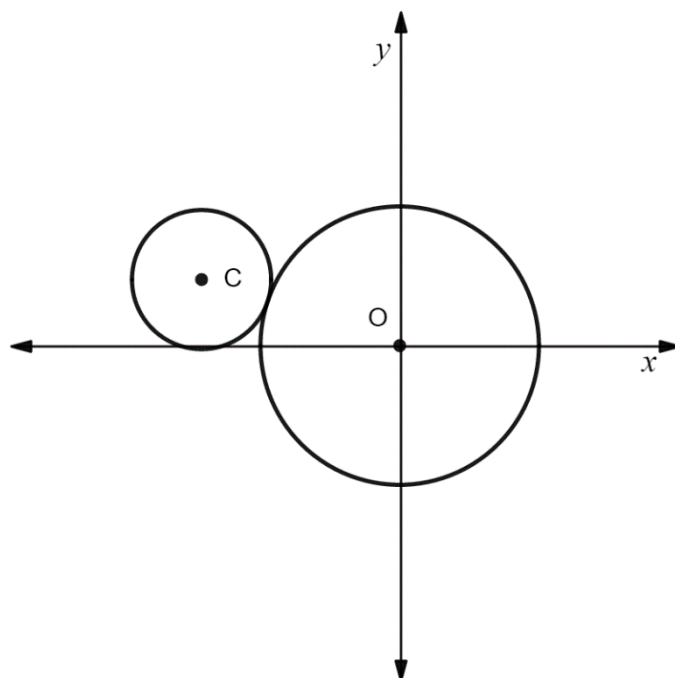
Write down the coordinates of P, the upper left-hand vertex of the square. (2)

$P(-8; 7)$	✓ subtracting 5 from p (m) ✓ adding 5 to q (m)
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- (a) In the diagram below, two circles are drawn. Circle O touches circle centre C externally with C in the second quadrant.

The equation of circle O with centre the origin is given by $x^2 + y^2 = 40$.

The equation of circle centre C is given by $(x + 3d)^2 + (y - d)^2 = 10$.



Determine the value of d .

(5)

$$OC = \sqrt{(-3d)^2 + (d)^2}$$

$$OC = \sqrt{10}d$$

$$\sqrt{10}d = \sqrt{40} + \sqrt{10}$$

$$\sqrt{10}d = 2\sqrt{10} + \sqrt{10}$$

$$\sqrt{10}d = 3\sqrt{10}$$

$$10d^2 = 90$$

$$d^2 = 9$$

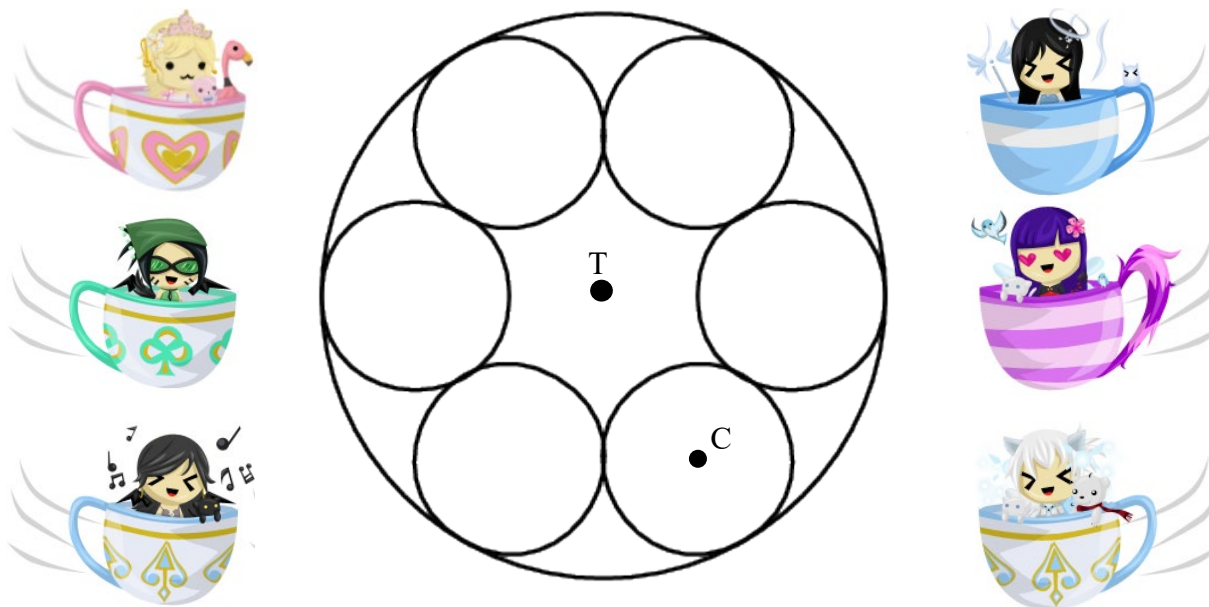
$$d = \pm 3$$

$$d = 3$$

- ✓ distance formula (m)
- ✓ calculating length of OC (a)
- ✓ equating OC to sum of radii (m)
- ✓ rooting the 40 and 10 (a)

- ✓ correct d value (ca)

- (b) The “Spinning Teacups” is a popular carnival ride where oversized teacups spin around atop a turntable-like floor. The figure below shows the aerial view of this ride where the smaller circles represent the teacups and the larger circle, centre T, represents the turntable. The equation of circle T is $x^2 + y^2 + 3x - 6y = 9$.

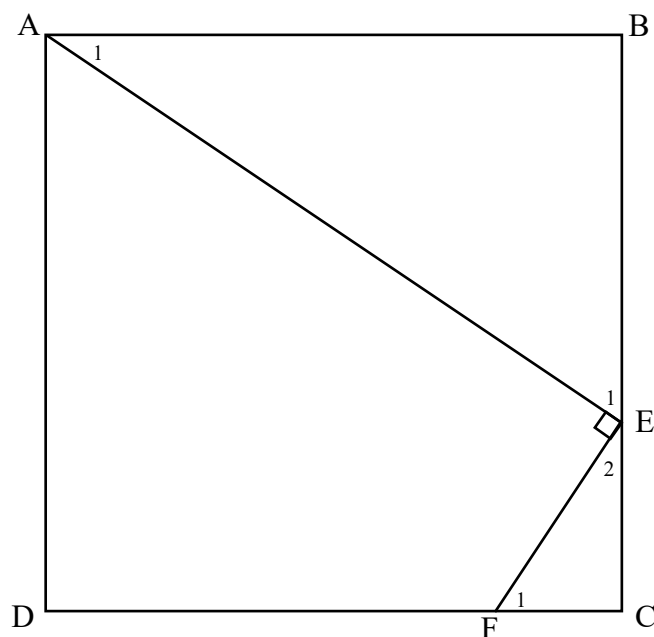


C is the centre of one of the teacups, each of which has a diameter of 2 units.

Find the equation which best describes the path of C as it travels around the turntable.
Write your answer in the form $(x - a)^2 + (y - b)^2 = r^2$. (5)

<i>Big circle centre T:</i> $\left(x + \frac{3}{2}\right)^2 + (y - 3)^2 = 9 + \frac{9}{4} + 9$ $\left(x + \frac{3}{2}\right)^2 + (y - 3)^2 = \frac{81}{4}$ $R = \frac{9}{2}$ <i>Small circle centre T (path of C):</i> $r = \frac{9}{2} - 1$ $r = \frac{7}{2}$ $\left(x + \frac{3}{2}\right)^2 + (y - 3)^2 = \frac{49}{4}$	✓ completing the square for x (a) ✓ completing the square for y (a) ✓ determining R (ca) ✓ subtracting 1 for new r (m) ✓ final equation (ca)
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ABCD is a square with side length of 9 cm. $AE \perp EF$.



(a) Prove that $\triangle ABE \sim \triangle ECF$

(4)

In $\triangle ABE$ and $\triangle ECF$:

1. $\hat{B} = \hat{C} = 90^\circ$ (angles of a square)

$\hat{A}_1 = 90^\circ - \hat{E}_1$ ($\angle$ s in $\triangle$)

$\hat{E}_2 = 90^\circ - \hat{E}_1$ ($\angle$ s on a straight line)

2. $\hat{A}_1 = \hat{E}_2$

3. $\hat{E}_1 = \hat{F}_1$ (3rd $\angle$ in $\triangle$)

$\therefore \triangle ABE \sim \triangle ECF$ (AAA)

✓ statement (a)

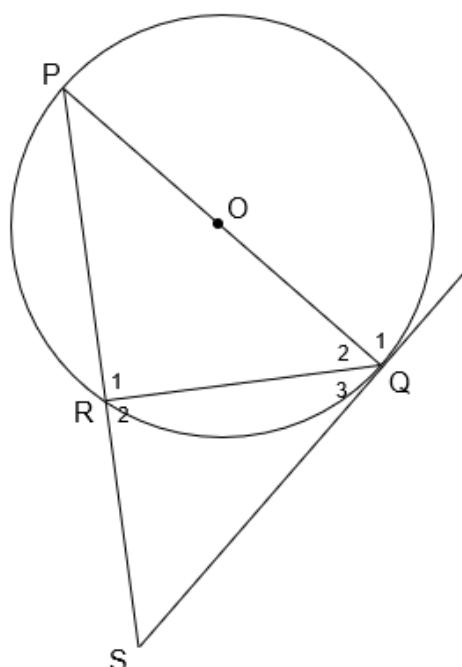
✓ statement (a)

✓ statement (a)

-1 for incorrect/missing reason(s)

✓ reason (a)

- (a) POQ is a diameter of the circle PQR. SQ is a tangent at Q. PRS is a straight line.
 $OQ = 1,5 t$ and $QR = 2 t$.



Prove the following:

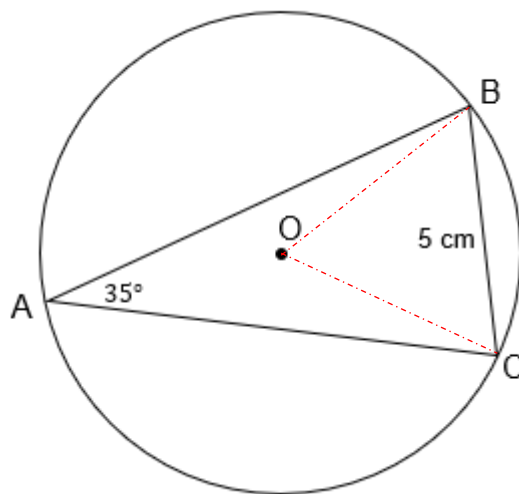
- (1) $PR = \sqrt{5} t$ (3)

$\widehat{R}_1 = 90^\circ$ ($\angle$ in semi circle) $PQ = 3t$ (diameter) $PR^2 = (3t)^2 - (2t)^2$ $PR^2 = 5t^2$ $PR = \sqrt{5} t$	$\checkmark$ 90° statement and reason (a) $\checkmark$ $3t$ (a) $\checkmark$ Pythag (ca)
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- (2) $PR:RS = 5:4$ (5)

$\widehat{Q}_2 + \widehat{Q}_3 = 90^\circ$ ($\tan \perp \text{rad}$) $QR^2 = PR \cdot RS$ ($\perp$ from right vertex) $4t^2 = \sqrt{5} t \cdot RS$ $RS = \frac{4t}{\sqrt{5}}$ $PR:RS = \sqrt{5} t : \frac{4t}{\sqrt{5}}$ $PR:RS = 5:4$	$\checkmark$ 90° statement and reason (a) $\checkmark \checkmark$ statement and reason (a) $\checkmark$ Simplifying RS (ca) $\checkmark$ Substitution (ca)
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- (b) O is the centre of the circle and $\triangle ABC$ is inscribed in the circle. $\hat{A} = 35^\circ$ and $BC = 5\text{ cm}$. Calculate the length of the diameter. (6)



$$\begin{aligned}\hat{O} &= 70^\circ \\ (\angle \text{ at centre} &= 2\angle \text{ at circumference}) \\ \hat{B} &= \hat{C} = 55^\circ \quad (\angle s \text{ opp} = \text{sides}) \\ \frac{r}{\sin 55^\circ} &= \frac{5}{\sin 70^\circ} \\ r &= 4,4 \\ \text{diameter} &= 8,7\text{ cm}\end{aligned}$$

- ✓ construction (m)
- ✓ angle O (a)
- ✓ angle B or C (ca)
- ✓ substitution into sine rule (m)
- ✓ determining r (a)
- ✓ determining diameter (ca)

STOP signs are regular octagons that are laser cut from circular sheets of metal. Given the area of the octagon to be $4\,968\text{ cm}^2$, determine the area of the circular sheet metal.



Area of each of the 8 segments:

$$\frac{4968}{8} = 621$$

Angle for each of the 8 segments:

$$\frac{360^\circ}{8} = 45^\circ$$

$$\frac{1}{2}r^2 \sin 45^\circ = 621$$

$$r = 41,9$$

$$\text{Area of circle} = \pi(41,9)^2$$

$$\text{Area of circle} = 5518,1\text{cm}^2$$

✓✓ dividing both area and angle by 8 (a)

✓ substituting into area formula (ca)

✓ calculating r (ca)

✓ area of the circle (ca)

[SECTION B: 74]

[TOTAL: 150]

	Statistics	Analytical Geometry	Trigonometry	Euclidean Geometry
Q1		19		
Q2	13			
Q3			14	
Q4				9
Q5				11
Q6			11	
Q7	10			
Q8			10	
Q9			8	
Q10		10		
Q11		11		
Q12				12
Q13				9
Q14			4	
Total	23 (20)	40 (40)	47 (50)	41 (40)

	Knowledge	Routine	Complex	Problem Solving
Q1	8	9	2	
Q2	5	8		
Q3	1	9	4	
Q4	6	3		
Q5				
Q6				
Q7				
Q8				
Q9				
Q10				
Q11				
Q12				
Q13				
Q14				
Total	(30)	(45)	(52,5)	(22,5)