



Province of the
EASTERN CAPE
EDUCATION



**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

JUNE 2023

MATHEMATICS P2

MARKS: 150

TIME: 3 hours



This question paper consists of 12 pages and an answer book of 22 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 10 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Write neatly and legibly. Diagrams are NOT necessarily drawn to scale.
8. An information sheet with formulae is included at the end of the question paper.
9. Write neatly and legibly.



QUESTION 1

Between 05:00 and 06:00 on New Year’s Day, 11 minibus taxis were stopped at a roadblock between King William’s Town and East London. The following data set represents the number of passengers per minibus taxi.

18	26	25	18	16	12	10	8	18	17	8
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- 1.1 Calculate the mean number of passengers per taxi. (2)
- 1.2 Calculate the standard deviation for this data set. (2)
- 1.3 Taxis having a number of passengers with one standard deviation above the mean could be regarded as overloaded. How many taxis were overloaded? (2)
- 1.4 If the number of passengers in a taxi is one standard deviation below the mean, the trip could be regarded as uneconomical. Calculate the percentage of taxis that are in this category. (2)

[8]

QUESTION 2

Working dads help working moms with housework.

The table below represents the number of hours spent per week in doing household work.

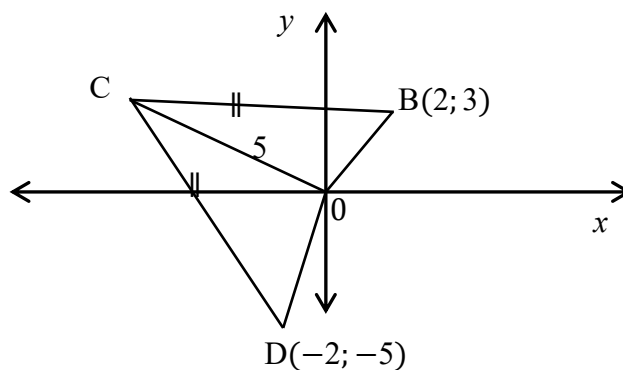
Hours	Number of dads
$0 < x \leq 5$	1
$5 < x \leq 10$	18
$10 < x \leq 15$	24
$15 < x \leq 20$	25
$20 < x \leq 25$	18
$25 < x \leq 30$	12
$30 < x \leq 35$	1
$35 < x \leq 40$	1

- 2.1 Complete the frequency table in the SPECIAL ANSWER BOOK and draw an ogive of the data on the grid provided. (4)
- 2.2 Use the graph to find an approximate median value. (2)
- 2.3 Write down the modal class. (1)
- 2.4 Calculate the approximate mean. (2)
- 2.5 Compare the mean, median and mode values. Explain what this means for the set of data. (3)

[12]

QUESTION 3

- 3.1 The straight-line $y = 3x - 3$ is perpendicular to the straight line which cuts the y -axis at $(0; 10)$ and passes through the point $(4; \frac{p}{2})$. Determine the value of p . (3)
- 3.2 The distance between the origin and point $P(-2; p - 1)$ is $2p$ units. Calculate the value of p . (5)
- 3.3 The diagram below shows quadrilateral OBCD with vertices $O(0; 0)$, $B(2; 3)$, C and $D(-2; -5)$. The length of OC is 5 units and $BC = DC$.

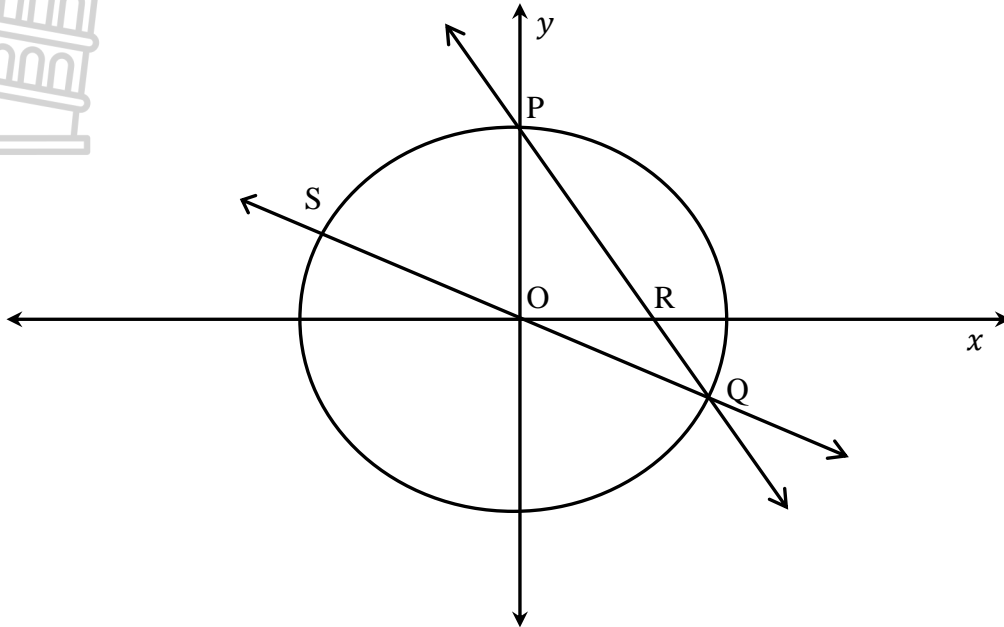
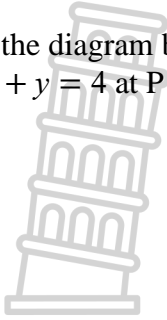


- 3.3.1 Determine the gradient of BD. (2)
- 3.3.2 Determine the equation of the perpendicular bisector from C to BD in the form $y = mx + c$. (3)
- 3.3.3 Determine the equation of the circle centred at O and passing through C. (2)
- 3.3.4 Determine the y -coordinate of point C. (6)

[21]

QUESTION 4

In the diagram below, circle $x^2 + y^2 = 16$ intersects the straight-line PQ, which is defined by $2x + y = 4$ at P and Q. R is the x-intercept of PQ.



- 4.1 Show that the coordinates of P and Q are $(0 ; 4)$ and $(3,2 ; -2,4)$ respectively. (7)
- 4.2 QO produced cuts the circle at S. Determine the coordinates of S. (2)
- 4.3 Determine the equation of the circle with the centre at R and touches the y-axis. (4)
- 4.4 Determine the distance between the centres of the circles $x^2 + y^2 = 16$ and $(x - 6)^2 + y^2 - y = 12$. (5)

[18]



QUESTION 5

5.1 If $5 \cos \theta - 3 = 0$; $180^\circ < \theta < 360^\circ$ and $17 \sin \alpha = 8$; $90^\circ < \alpha < 270^\circ$, determine, without the use of a calculator, the value of $\tan \alpha + \tan \theta$. (6)

5.2 If $\cos 42^\circ = p$, determine each of the following in terms of p :

5.2.1 $\sin 48^\circ$ (2)

5.2.2 $\sin(-2202^\circ)$ (2)

5.2.3 $\cos 84^\circ$ (2)

5.3 Determine the value of the expression without the use of a calculator:

$$\frac{\tan 300^\circ + \cos(90^\circ + x)}{\sin(180^\circ - x) + 2 \cos(-30^\circ)} \quad (6)$$

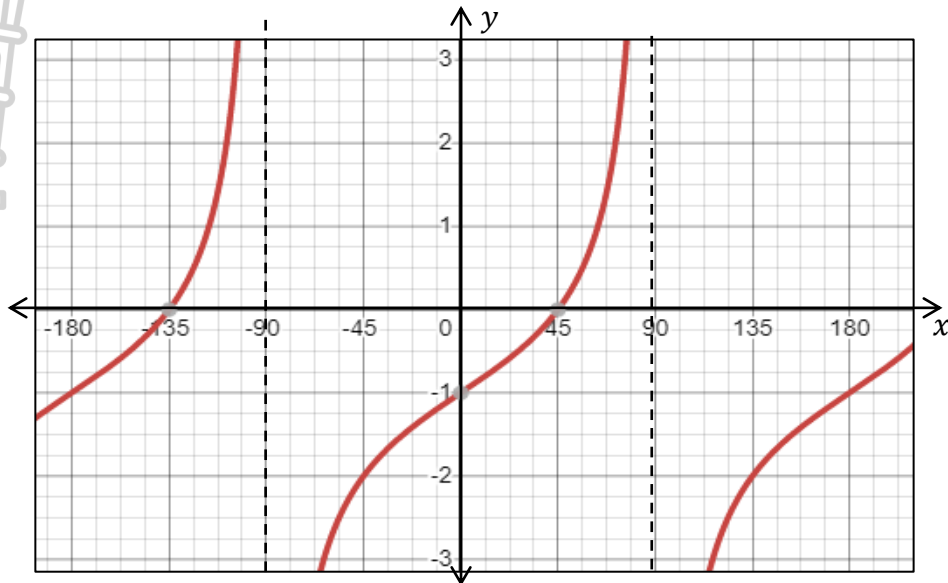
5.4 Prove the following identity: $\frac{1 - \sin 2x}{\cos 2x} = \frac{\cos x - \sin x}{\cos x + \sin x}$ (5)

5.5 Determine the general solution of $\cos x - \sin x = \sqrt{2}$. (5)
[28]



QUESTION 6

In the diagram below, the function $f(x) = \tan x - 1$ is drawn for the interval $[-180^\circ; 180^\circ]$.

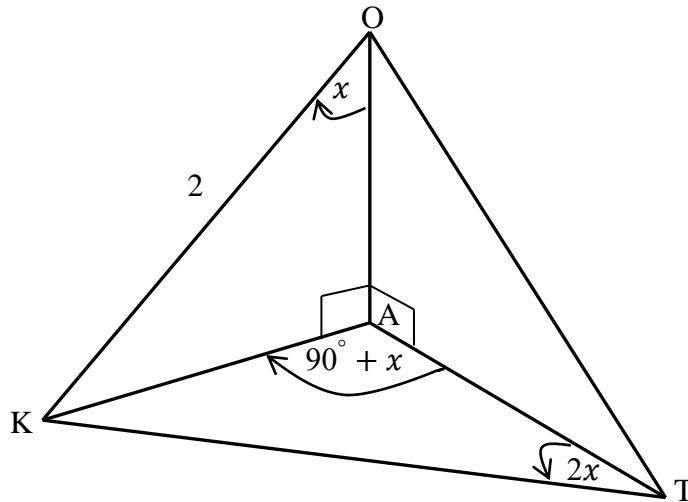
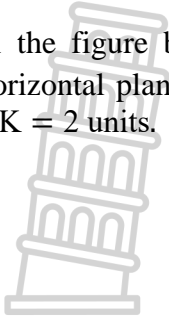


- 6.1 Draw the function $g(x) = \cos 2x$ in your SPECIAL ANSWER BOOK on the same set of axes. (3)
 - 6.2 Write down the period of g . (1)
 - 6.3 Write down the new equation in the form of $h(x) = \dots$ if f is moved 3 units up. (1)
 - 6.4 Use your graphs to determine the value(s) of x for which $\cos 2x \leq \tan x - 1$ for the interval $[-180^\circ; 0^\circ]$. (3)
 - 6.5 Use your graph to solve the following equation: $\cos B + 1 = \tan \frac{1}{2}B$. (4)
- [12]**



QUESTION 7

In the figure below, OA is a vertical tower and the points K and T are in the same horizontal plane as A, the foot of the tower. $\widehat{AOK} = x$, $\widehat{KAT} = 90^\circ + x$, $\widehat{KTA} = 2x$ and $OK = 2$ units.



7.1 Express AK in terms of a trigonometric function value of x in two different ways and hence or otherwise determine the length KT. (5)

7.2 Show that: $AT = \frac{\cos 3x}{\cos x}$ (2)

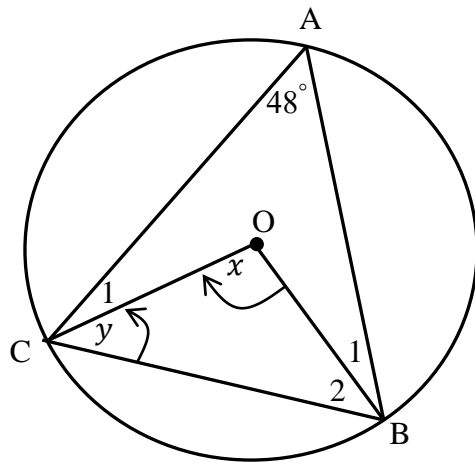
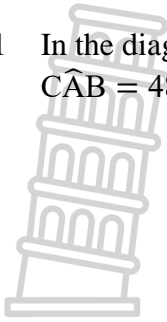
7.3 Simplify $\frac{\cos 3x}{\cos x}$ to a trigonometric function of $\sin x$. (4)

[11]



QUESTION 8

8.1 In the diagram below, O is the centre of the circle passing through A, B and C.
 $\widehat{CAB} = 48^\circ$, $\widehat{COB} = x$ and $\widehat{C}_2 = y$.

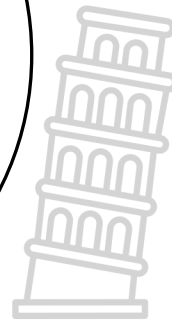
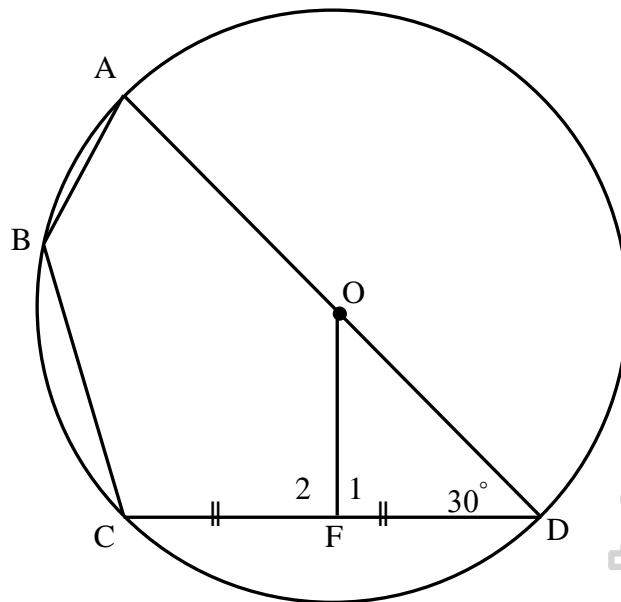


Determine, with reasons, the size of:

8.1.1 x (2)

8.1.2 y (2)

8.2 In the diagram below, O is the centre of the circle passing through A, B, C and D.
 AOD is a straight line and F is the midpoint of chord CD. $\widehat{ODF} = 30^\circ$.

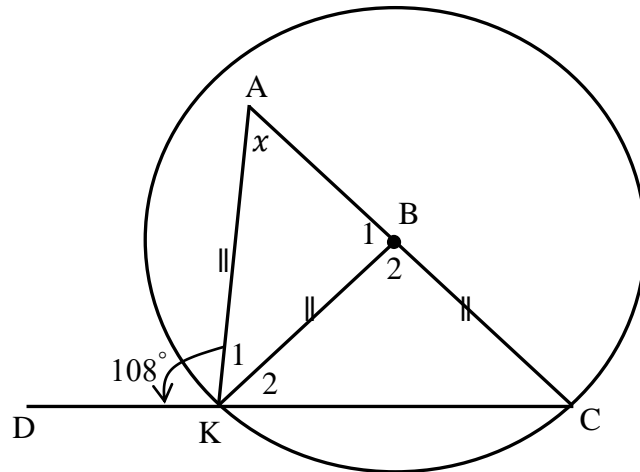


Determine, with reasons, the size of:

8.2.1 \widehat{F}_1 (2)

8.2.2 \widehat{ABC} (2)

8.3 In the diagram below, B is the centre of the circle. $AK = KB = BC$. $\widehat{AKD} = 108^\circ$ and $\widehat{A} = x$.



8.3.1 Express \widehat{B}_1 in terms of x . (2)

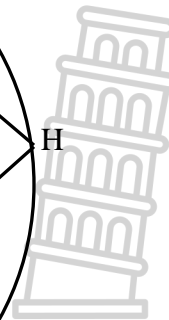
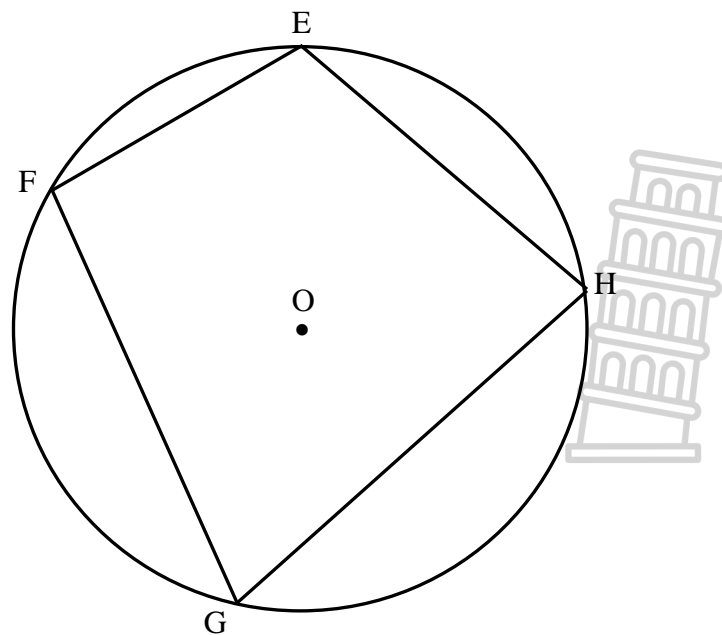
8.3.2 Show that $\widehat{C} = \frac{x}{2}$. (3)

8.3.3 Solve for x . (4)

[17]

QUESTION 9

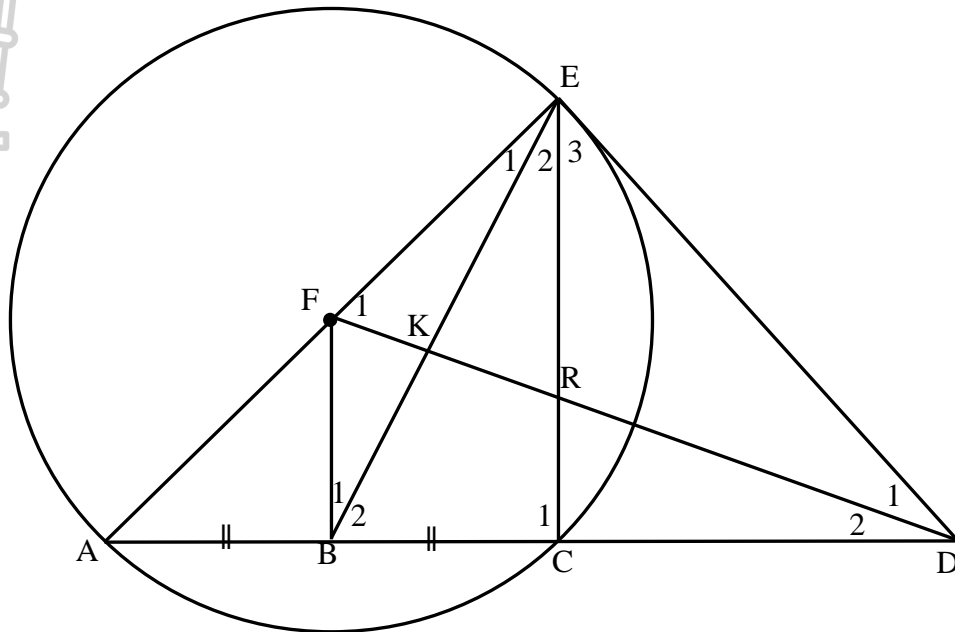
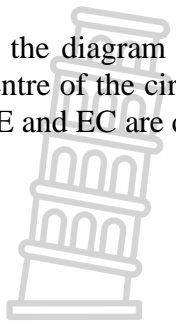
Refer to the diagram below. O is the centre of the circle. E, F, G and H are on the circumference of the circle. Prove the theorem that $\widehat{E} + \widehat{G} = 180^\circ$.



[6]

QUESTION 10

In the diagram below, ED is a tangent to the circle passing through A, C and E. F is the centre of the circle. AC is extended to meet ED at D and FB bisects AC. Straight-lines FD, BE and EC are drawn.



Prove, with reasons, that:

- 10.1 EFBD is a cyclic quadrilateral (4)
- 10.2 $\Delta BCE \sim \Delta FED$ (6)
- 10.3 $BC = \frac{FA \cdot CE}{ED}$ (3)
- 10.4 $BC = \frac{AC \cdot FE}{AE}$ (4)

[17]

TOTAL: 150



INFORMATION SHEET: MATHEMATICS

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$F = \frac{x \left[(1+i)^n - 1 \right]}{i}$$

$$P = \frac{x \left[1 - (1+i)^{-n} \right]}{i}$$

$$T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; \quad r \neq 1$$

$$S_\infty = \frac{a}{1 - r}; \quad -1 < r < 1$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M \left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2} \right)$$

$$y = mx + c \quad y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2} ab \cdot \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cdot \cos \beta + \cos \alpha \cdot \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cdot \cos \beta - \cos \alpha \cdot \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2\sin \alpha \cdot \cos \alpha$$

$$\bar{x} = \frac{\sum x}{n} \quad \sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$



LEARNER'S NAME: LEERDERNAAM:	
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GRADE 12 GRAAD 12	
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**NATIONAL/NASIONALE
SENIOR
CERTIFICATE/SERTIFIKAAT**

GRADE 12/GRAAD 12

JUNE/JUNIE 2023

**MATHEMATICS P2/WISKUNDE V2
SPECIAL ANSWER BOOK/SPEZIALE ANTWOORDEBOEK**

Marker/Merker			Moderator's Initial / Moderator se paraaf							
Question Vraag	Mark Punt	Initial Parafeer	Marks Punte	S M	Marks Punte	D M	Marks Punte	P M	Marks Punte	N M
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
TOTAL TOTAAL										

*SM = School Moderator *DM = District Moderator *PM = Provincial Moderator *NM = National Moderator
*SM = Skool Moderator *DM = Distrik Moderator *PM = Provinsiale Moderator *NM = Nasionale Moderator

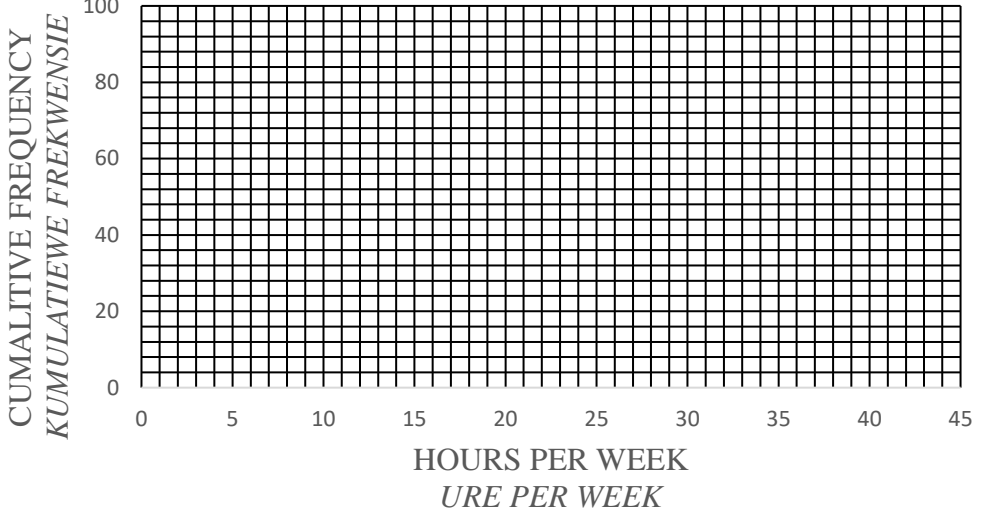
This special answer book consists of 22 pages.
Hierdie spesiale antwoordeboek bestaan uit 22 bladsye.

QUESTION 1/VRAAG 1

	Solution/Oplissing	Marks/ Punte
1.1		(2)
1.2		(2)
1.3		(2)
1.4		(2)
		[8]



QUESTION 2/VRAAG 2

	Solution/Oplissing	Marks/ Punte																											
2.1	<table border="1"> <thead> <tr> <th data-bbox="279 309 542 383">Hours / Ure</th> <th data-bbox="542 309 841 383">Number of dads <i>Aantal Pa's</i></th> <th data-bbox="841 309 1264 383">Cumulative frequency <i>Kumulatiewe frekwensie</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="279 383 542 421">$0 < x \leq 5$</td> <td data-bbox="542 383 841 421">1</td> <td data-bbox="841 383 1264 421"></td> </tr> <tr> <td data-bbox="279 421 542 459">$5 < x \leq 10$</td> <td data-bbox="542 421 841 459">18</td> <td data-bbox="841 421 1264 459"></td> </tr> <tr> <td data-bbox="279 459 542 497">$10 < x \leq 15$</td> <td data-bbox="542 459 841 497">24</td> <td data-bbox="841 459 1264 497"></td> </tr> <tr> <td data-bbox="279 497 542 535">$15 < x \leq 20$</td> <td data-bbox="542 497 841 535">25</td> <td data-bbox="841 497 1264 535"></td> </tr> <tr> <td data-bbox="279 535 542 573">$20 < x \leq 25$</td> <td data-bbox="542 535 841 573">18</td> <td data-bbox="841 535 1264 573"></td> </tr> <tr> <td data-bbox="279 573 542 611">$25 < x \leq 30$</td> <td data-bbox="542 573 841 611">12</td> <td data-bbox="841 573 1264 611"></td> </tr> <tr> <td data-bbox="279 611 542 649">$30 < x \leq 35$</td> <td data-bbox="542 611 841 649">1</td> <td data-bbox="841 611 1264 649"></td> </tr> <tr> <td data-bbox="279 649 542 687">$35 < x \leq 40$</td> <td data-bbox="542 649 841 687">1</td> <td data-bbox="841 649 1264 687"></td> </tr> </tbody> </table>	Hours / Ure	Number of dads <i>Aantal Pa's</i>	Cumulative frequency <i>Kumulatiewe frekwensie</i>	$0 < x \leq 5$	1		$5 < x \leq 10$	18		$10 < x \leq 15$	24		$15 < x \leq 20$	25		$20 < x \leq 25$	18		$25 < x \leq 30$	12		$30 < x \leq 35$	1		$35 < x \leq 40$	1		
Hours / Ure	Number of dads <i>Aantal Pa's</i>	Cumulative frequency <i>Kumulatiewe frekwensie</i>																											
$0 < x \leq 5$	1																												
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$30 < x \leq 35$	1																												
$35 < x \leq 40$	1																												
	<p data-bbox="523 741 1007 813" style="text-align: center;">Working dads help working moms. <i>Werkende pa's help werkende ma's</i></p> 	(4)																											



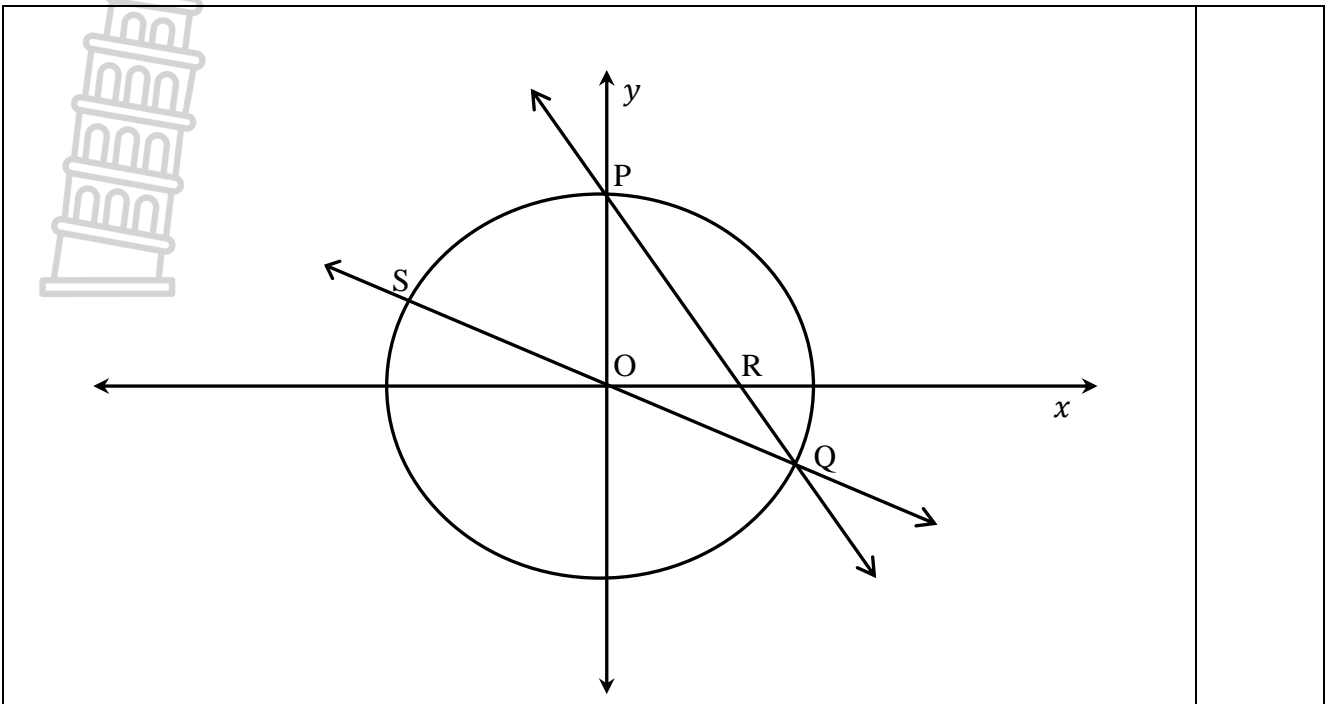
	Solution/Oplissing	Marks/ Punte
2.2		
		(2)
2.3		
		(1)
2.4		
		(2)
2.5		
		(3)
		[12]


QUESTION 3/VRAAG 3

	Solution/Oplissing	Marks/ Punte
3.1		
		(3)
3.2		
		(5)

	Solution/Oplissing	Marks/ Punte
3.3.1		(2)
3.3.2		(3)
3.3.3		(2)
3.3.4		(6)
		[21]

QUESTION 4/VRAAG 4



	Solution/Oplossing	Marks/ Punte
4.1	<div style="text-align: right; margin-right: 50px;">  </div>	(7)
4.2		(2)

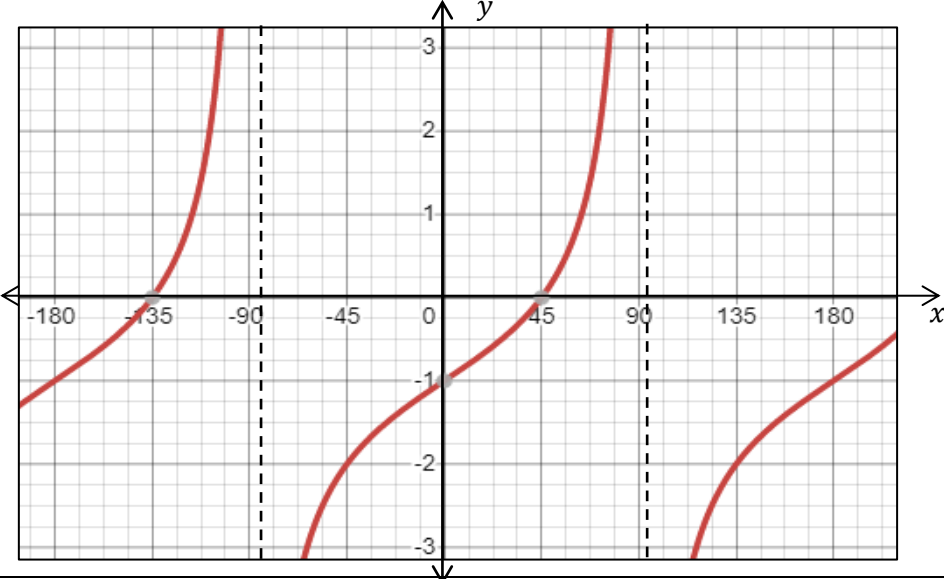
	Solution/Oplissing	Marks/ Punte
4.3		
	(4)	
4.4		
	(5)	
	[18]	

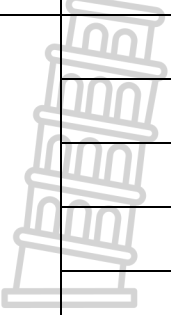
QUESTION 5/VRAAG 5

	Solution/Oplissing	Marks/ Punte
5.1		(6)
5.2.1		(2)
5.2.2		(2)
5.2.3		(2)

	Solution/Oplissing	Marks/ Punte
5.3		(6)
5.4		(5)
5.5		(5)
		[28]

QUESTION 6/VRAAG 6

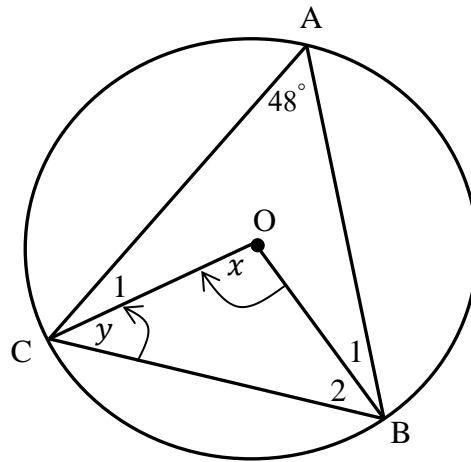
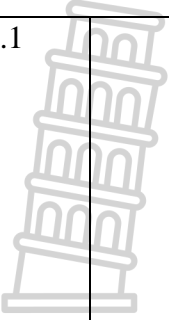
	Solution/Oplissing	Marks/ Punte
6.1		(3)
6.2		(1)
6.3		(1)
6.4		(3)
6.5		(4)
		[12]

	Solution/Oplissing	Marks/ Punte
7.2		(2)
7.3		(4)
		[11]



QUESTION 8/VRAAG 8

8.1



Solution/Oplissing

**Marks/
Punte**

8.1.1

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(2)

8.1.2

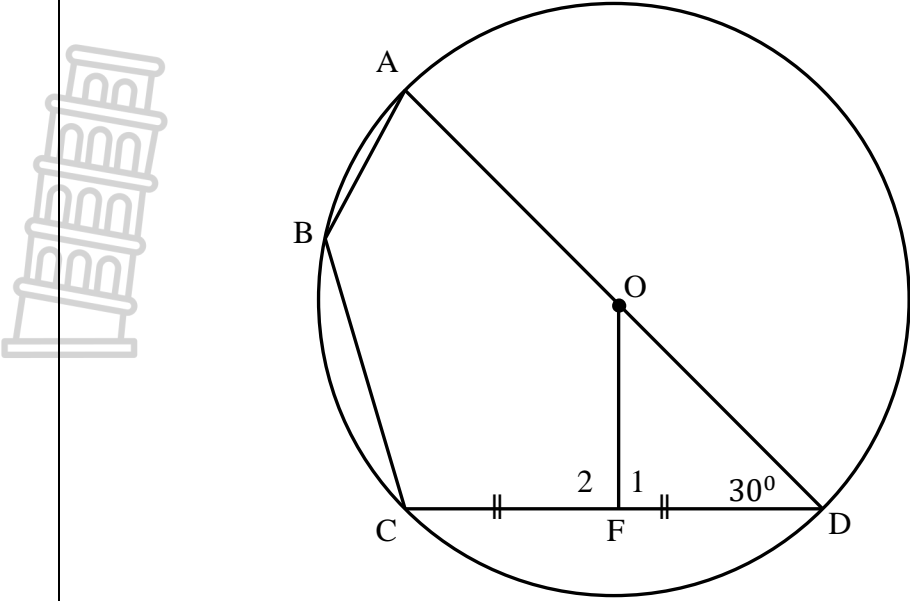
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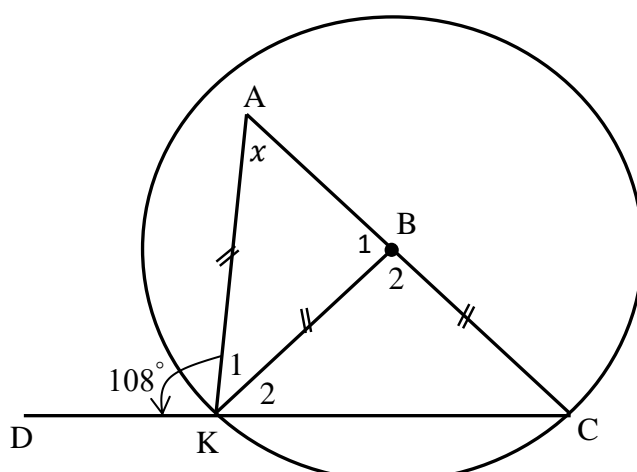
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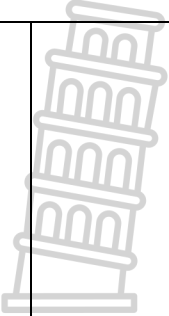
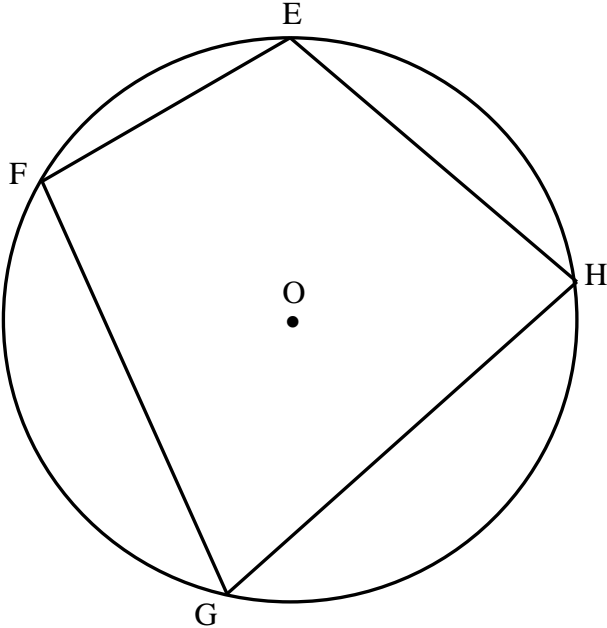
(2)



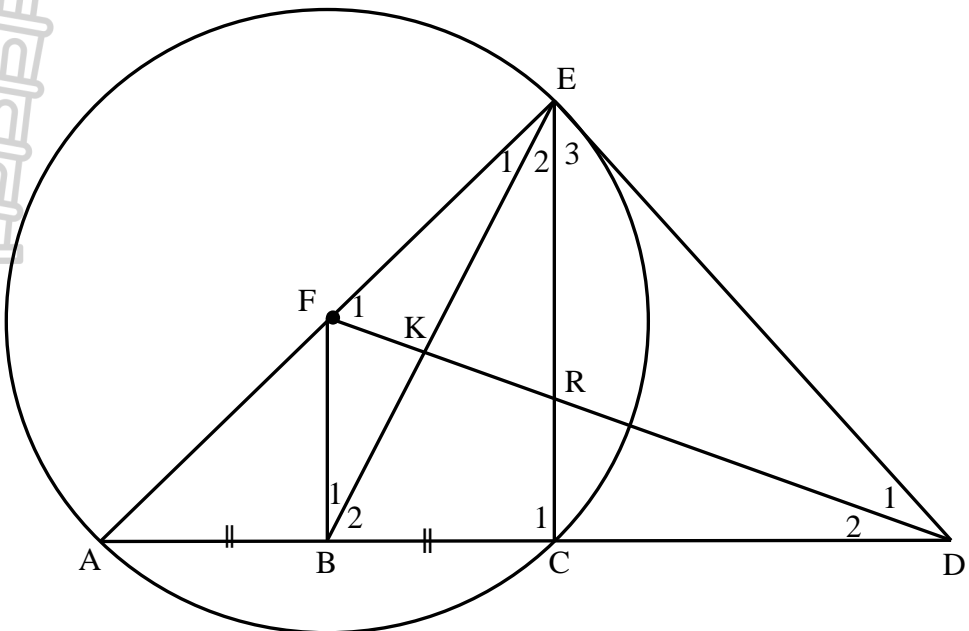
<p>8.2</p> 		
	<p>Solution/Oplissing</p>	<p>Marks/ Punte</p>
<p>8.2.1</p>	<p> </p> <p> </p> <p> </p> <p> </p>	<p>(2)</p>
<p>8.2.2</p>	<p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p>	<p>(2)</p>

<p>8.3</p> 		
	<p>Solution/Oplissing</p>	<p>Marks/Punte</p>
<p>8.3.1</p>	<p>Blank space for solution</p>	<p>(2)</p>
<p>8.3.2</p>	<p>Blank space for solution</p>	<p>(3)</p>
<p>8.3.3</p>	<p>Blank space for solution</p>	<p>(4)</p>
		<p>[17]</p>

QUESTION 9/VRAAG 9

		
	<p>Solution/Oplissing</p>	<p>Marks/ Punte</p>
	<div style="border: 1px solid black; height: 385px; width: 100%;"></div>	<div style="border: 1px solid black; height: 385px; width: 100%;"></div>
		<p>[6]</p>

QUESTION 10/VRAAG 10

		
	<p>Solution/Oplissing</p>	<p>Marks/ Punte</p>
<p>10.1</p>	<p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p>	<p>(4)</p>
<p>10.2</p>	<p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p> <p> </p>	<p>(6)</p>

	Solution/Oplossing	Marks/ Punte
10.3		(3)
10.4		(4)
		[17]

TOTAL/TOTAAL: 150





**NATIONAL
SENIOR CERTIFICATE
*NASIONALE
SENIORSERTIFIKAAT***

GRADE/GRAAD 12

JUNE/JUNIE 2023

**MATHEMATICS P2/WISKUNDE V2
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 150



This marking guideline consists of 12 pages.
Hierdie nasienriglyn bestaan uit 12 bladsye.

QUESTION 1/VRAAG 1

1.1	16	✓✓ answer / antwoord	(2)
1.2	$sd = 5,83$	✓✓ answer / antwoord	(2)
1.3	$16 + 5,83 = 21,83 \therefore 2$ above/bokant.	✓✓ answer / antwoord	(2)
1.4	$16 - 5,83 = 10,17$ $\frac{3}{11} \times 100 = 27,27\%$	✓✓	(2)
			[8]

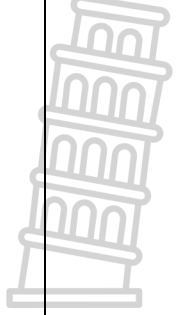
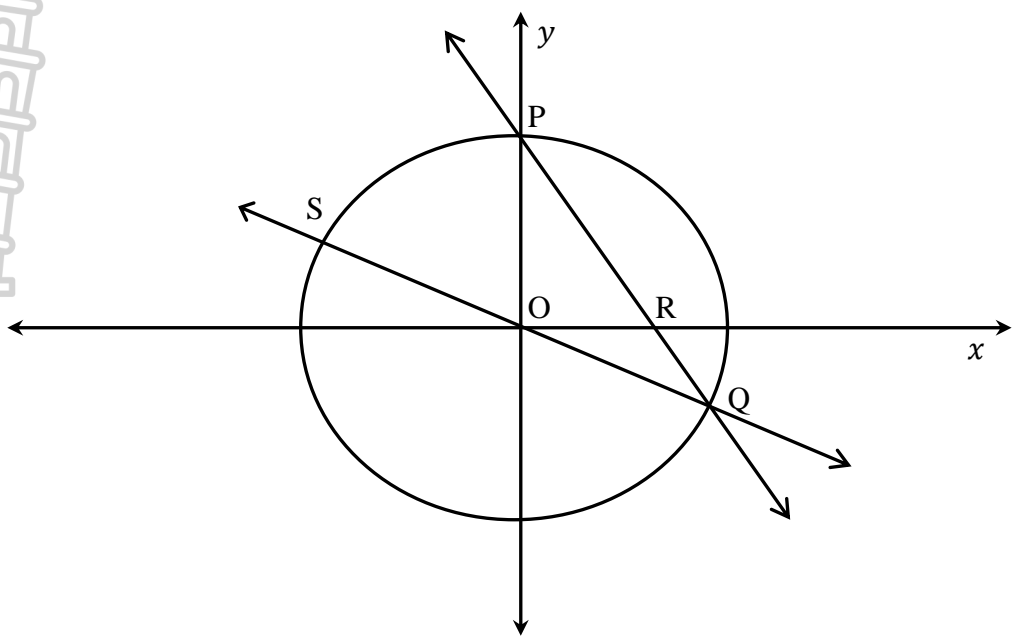
QUESTION 2/VRAAG 2

	<table border="1"> <thead> <tr> <th>Hours / Ure</th> <th>Number of dads Aantal pa's</th> <th>Cumulative frequency Kumulatiewe frekwensie</th> </tr> </thead> <tbody> <tr> <td>$0 < x \leq 5$</td> <td>1</td> <td>1</td> </tr> <tr> <td>$5 < x \leq 10$</td> <td>18</td> <td>19</td> </tr> <tr> <td>$10 < x \leq 15$</td> <td>24</td> <td>43</td> </tr> <tr> <td>$15 < x \leq 20$</td> <td>25</td> <td>68</td> </tr> <tr> <td>$20 < x \leq 25$</td> <td>18</td> <td>86</td> </tr> <tr> <td>$25 < x \leq 30$</td> <td>12</td> <td>98</td> </tr> <tr> <td>$30 < x \leq 35$</td> <td>1</td> <td>99</td> </tr> <tr> <td>$35 < x \leq 40$</td> <td>1</td> <td>100</td> </tr> </tbody> </table>		Hours / Ure	Number of dads Aantal pa's	Cumulative frequency Kumulatiewe frekwensie	$0 < x \leq 5$	1	1	$5 < x \leq 10$	18	19	$10 < x \leq 15$	24	43	$15 < x \leq 20$	25	68	$20 < x \leq 25$	18	86	$25 < x \leq 30$	12	98	$30 < x \leq 35$	1	99	$35 < x \leq 40$	1	100	
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$30 < x \leq 35$	1	99																												
$35 < x \leq 40$	1	100																												
2.1	<p>Working dads help working moms. <i>Werkende pa's help werkende ma's</i></p>	<p>✓ table / tabel ✓ anchor point / ankerpunt (0;0) ✓ (10; 19) ✓ (25; 86) ✓ (40; 100)</p>	(4)																											
2.2	± 16 (Accept values from 14 to 18) / (Aanvaar waardes vanaf 14 tot 18)	✓✓ answer / antwoord	(2)																											
2.3	$15 < x \leq 20$	✓ answer / antwoord	(1)																											
2.4	$\bar{x} = 16,8$	✓✓ answer / antwoord	(2)																											
2.5	<p>Mean \approx Median and lies in the Modal class. Data is symmetrical / Normal / Data not skewed. <i>Gemiddelde \approx Mediaan en lê in die Modale klas</i> <i>Data is simmetries / Normaal / Data nie skeefnie.</i></p>	<p>✓ ✓✓ reason / rede</p>	(3)																											
			[12]																											

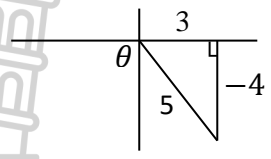
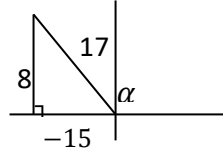
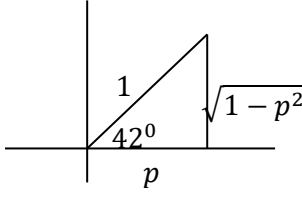

QUESTION 3/VRAAG 3

3.1	$y = -\frac{1}{3}x + 10 \quad (m_1 \times m_2 = -1)$ $\frac{p}{2} = -\frac{1}{3}(4) + 10$ $p = \frac{52}{3}$	✓ equation of line / <i>verg. van lyn</i> ✓ substitution of point / <i>vervanging van punt</i> ✓ answer / <i>antwoord</i>	(3)
3.2	O(0;0) and/en P(-2; p - 1) and/en OP = 2 units/eenhede. $OP^2 = (-2 - 0)^2 + (p - 1 - 0)^2$ $(2p)^2 = 4 + p^2 - 2p + 1$ $4p^2 = p^2 - 2p + 5$ $3p^2 + 2p - 5 = 0$ $(3p + 5)(p - 1) = 0$ $p = -\frac{5}{3}$ or $p = 1$ (slegs) $p = 1$ only	✓ substitution / <i>vervanging</i> ✓ simplification / <i>vereenvoudiging</i> ✓ standard form / <i>standaardvorm</i> ✓ factors / <i>faktore</i> ✓ answer / <i>antwoord</i>	(5)
3.3.1	$m_{BD} = 2$	✓✓ answer / <i>antwoord</i>	(2)
3.3.2	Midpoint of BD : <i>Middelpunt van BD</i> (0; -1) $y = -\frac{1}{2}x - 1$	✓ ✓ midpoint / <i>middelpunt</i> ✓ answer / <i>antwoord</i>	(3)
3.3.3	$x^2 + y^2 = 25$	✓✓ answer / <i>antwoord</i>	(2)
3.3.4	$x^2 + \left(-\frac{1}{2}x - 1\right)^2 = 25$ $x^2 + \frac{1}{4}x^2 + x + 1 = 25$ $4x^2 + x^2 + 4x + 4 = 100$ $5x^2 + 4x - 96 = 0$ $(5x + 24)(x - 4) = 0$ $x = -\frac{24}{5}$ or/of $x = 4$ $\therefore y = \frac{7}{5}$	✓ substitution / <i>vervanging</i> ✓ simplification / <i>vereenvoudiging</i> ✓ standard form / <i>standaardvorm</i> ✓ factorisation / <i>faktorisering</i> ✓ x-values / <i>x-waardes</i> ✓ answer / <i>antwoord</i>	(6)
			[21]

QUESTION 4 / VRAAG 4

			
<p>4.1</p>	$x^2 + y^2 = 16 \quad y = 4 - 2x$ $x^2 + (4 - 2x)^2 = 16$ $x^2 + 16 - 16x + 4x^2 = 16$ $5x^2 - 16x = 0$ $x(5x - 16) = 0$ $x = 0 \quad \text{or/of} \quad x = \frac{16}{5} = 3,2$ $y = 4 - 2(0) \quad y = 4 - 2(3,2)$ $y = 4 \quad y = -2,4$	<ul style="list-style-type: none"> ✓ $y = 4 - 2x$ ✓ substitution / <i>vervanging</i> ✓ standard form / <i>standaardvorm</i> ✓ factors / <i>faktore</i> ✓ x-values / x-waardes ✓ substitution / <i>vervanging</i> ✓ y-values / y-waardes 	<p>(7)</p>
<p>4.2</p>	<p>$S(-3,2 ; 2,4)$</p>	<ul style="list-style-type: none"> ✓✓ answer / <i>antwoord</i> 	<p>(2)</p>
<p>4.3</p>	$y = 4 - 2x$ $0 = 4 - 2x$ $2x = 4$ $x = 2$ $R(0 ; 2)$ <p>∴ radius = 2 units / <i>eenhede</i></p> $(x - 2)^2 + y^2 = 4$	<ul style="list-style-type: none"> ✓ equating to 0 / <i>gelyk stel aan 0</i> ✓ $x = 2$ ✓ radius = 2 units/<i>eenhede</i> ✓ answer / <i>antwoord</i> 	<p>(4)</p>
<p>4.4</p>	$(x - y)^2 + y^2 - y = 12$ $(x - 6)^2 + y^2 - y + \frac{1}{4} = 12 + \frac{1}{4}$ $(x - 6)^2 + \left(y - \frac{1}{2}\right)^2 = \frac{49}{4}$ <p>Centre/Middelpunt $\left(6 ; \frac{1}{2}\right)$ and/en $O(0 ; 0)$</p> $d = \sqrt{36 + \frac{1}{4}}$ $d \approx 6,02 / \frac{\sqrt{145}}{2}$	<ul style="list-style-type: none"> ✓ completing the square <i>vierkantsvoltooiing</i> ✓ simplification / <i>vereenvoudiging</i> ✓ coordinates of midpoint <i>koördinate van middelpunt</i> ✓ substitution in distance formula <i>vervanging in afstand formule</i> ✓ answer / <i>antwoord</i> 	<p>(5)</p>
			<p>[18]</p>

QUESTION 5/VRAAG 5

<p>5.1</p>	$5 \cos \theta - 3 = 0$ $\cos \theta = \frac{3}{5}$ 	$17 \sin \alpha = 8$ $\sin \alpha = \frac{8}{17}$ 	<ul style="list-style-type: none"> ✓ $\cos \theta = \frac{3}{5}$ ✓ $\sin \alpha = \frac{8}{17}$ ✓ -4 in correct quadrant <i>in korrekte kwadrant</i> ✓ -15 in correct quadrant <i>in korrekte kwadrant</i> ✓ correct values / <i>korrekte waardes</i> ✓ answer / <i>antwoord</i> 	<p>(6)</p>
<p>5.2</p>	$\cos 42^\circ = p$ 			
<p>5.2.1</p>	$\sin 48^\circ = p$	<ul style="list-style-type: none"> ✓ ✓ answer / <i>antwoord</i> 	<p>(2)</p>	
<p>5.2.2</p>	$\begin{aligned} \sin(-2202^\circ) &= \sin(-42^\circ) \\ &= -\sin 42^\circ \\ &= -\sqrt{1-p^2} \end{aligned}$	<ul style="list-style-type: none"> ✓ $-\sin(42^\circ)$ ✓ answer / <i>antwoord</i> 	<p>(2)</p>	
<p>5.2.3</p>	$\begin{aligned} \cos 84^\circ &= \cos 2(42^\circ) \\ &= 2 \cos^2 42^\circ - 1 \\ &= 2p^2 - 1 \end{aligned}$	<ul style="list-style-type: none"> ✓ $\cos 2(42^\circ)$ ✓ answer / <i>antwoord</i> 	<p>(2)</p>	
<p>5.3</p>	$\frac{\tan 300^\circ + \cos(90^\circ + x)}{\sin(180^\circ - x) + 2 \cos(-30^\circ)}$ $= \frac{-\tan 60^\circ - \sin x}{\sin x + 2 \left(\frac{\sqrt{3}}{2}\right)}$ $= \frac{-\sqrt{3} - \sin x}{\sin x + \sqrt{3}}$ $\frac{-(\sin x + \sqrt{3})}{(\sin x + \sqrt{3})}$ $= -1$	 <ul style="list-style-type: none"> ✓ $-\tan 60^\circ$ ✓ $-\sin x$ ✓ $\sin x$ ✓ $\frac{\sqrt{3}}{2}$ ✓ taking out of negative sign. <i>uithaal van negatiewe teken</i> ✓ answer / <i>antwoord</i> 	<p>(6)</p>	

5.4	$\frac{1 - \sin 2x}{\cos 2x} = \frac{\cos x - \sin x}{\cos x + \sin x}$ $LHS = \frac{1 - 2 \sin x \cos x}{\cos^2 x - \sin^2 x}$ $LHS = \frac{\cos^2 x - 2 \sin x \cos x + \sin^2 x}{\cos^2 x - \sin^2 x}$ $LHS = \frac{(\cos x - \sin x)(\cos x - \sin x)}{(\cos x - \sin x)(\cos x + \sin x)}$ $LHS = \frac{\cos x - \sin x}{\cos x + \sin x}$	<ul style="list-style-type: none"> ✓ $2 \sin x \cos x$ ✓ $\cos^2 x - \sin^2 x$ ✓ $1 = \cos^2 x + \sin^2 x$ ✓ factorising / faktorisering ✓ factorising / faktorisering 	(5)
5.5	$\cos x - \sin x = \sqrt{2}$ $\frac{1}{\sqrt{2}} \cos x - \frac{1}{\sqrt{2}} \sin x = 1$ $\cos 45^\circ \cos x - \sin 45^\circ \sin x = 1$ $\cos(45^\circ + x) = 1$ $45^\circ + x = 0^\circ + 360^\circ \cdot k$ $x = -45^\circ + 360^\circ \cdot k$	<ul style="list-style-type: none"> ✓ division by / deling deur $\sqrt{2}$ ✓ $\frac{1}{\sqrt{2}} = \cos 45^\circ / \sin 45^\circ$ ✓ expansion rule / reël ✓ $45^\circ + x = 0^\circ + 360^\circ \cdot k$ ✓ answer / antwoord 	(5)
			[28]



QUESTION 6/VRAAG 6

<p>6.1</p>		<ul style="list-style-type: none"> ✓ shape / vorm ✓ intercepts / afsnitte ✓ starting and end points / begin en eindpunte 	<p>(3)</p>
<p>6.2</p>	<p>Period / Periode = 180°</p>	<p>✓ answer / antwoord</p>	<p>(1)</p>
<p>6.3</p>	<p>$h(x) = \tan x + 2$</p>	<p>✓ answer / antwoord</p>	<p>(1)</p>
<p>6.4</p>	<p>$-135^{\circ} \leq x < -90^{\circ}$</p>	<ul style="list-style-type: none"> ✓ -135° ✓ -90° ✓ answer / antwoord 	<p>(3)</p>
<p>6.5</p>	<p>$\cos B + 1 = \tan \frac{1}{2} B$ Let/Laat $B = 2x$ $\cos 2x + 1 = \tan \frac{1}{2} (2x)$ $\cos 2x = \tan x - 1$ $x = -135^{\circ}$ and/en $x = 45^{\circ}$ $\therefore B = -270^{\circ}$ and/en $B = 90^{\circ}$</p>	<ul style="list-style-type: none"> ✓ $\cos 2x + 1 = \tan \frac{1}{2} (2x)$ ✓ $\cos 2x = \tan x - 1$ ✓ both x-values beide x-waardes ✓ both B values / beide B waardes 	<p>(4)</p>
			<p>[12]</p>

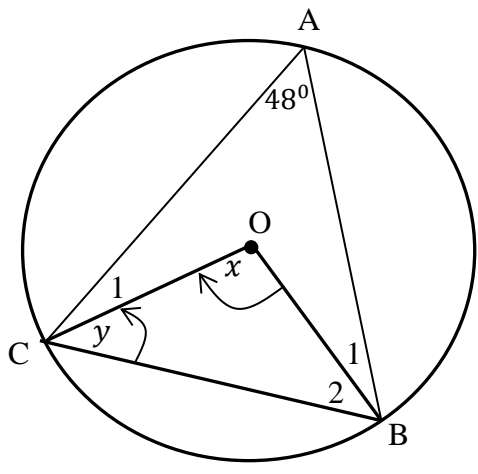
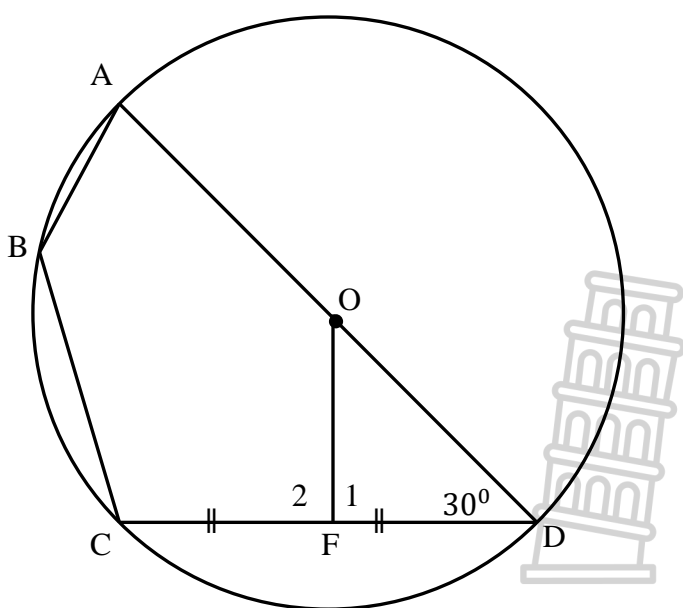


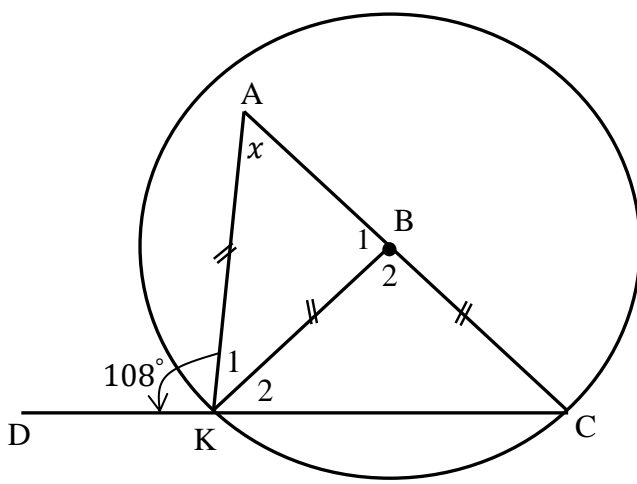
QUESTION 7/VRAAG 7

7.1	<p>In ΔOAK $\sin x = \frac{AK}{2}$ $AK = 2 \sin x$ $2 \sin x = 2 KT \sin x$ $KT = 1$</p> <p>In ΔKAT $\frac{AK}{\sin 2x} = \frac{KT}{\sin(90^\circ + x)}$ $AK = \frac{KT 2 \sin x \cos x}{\cos x}$ $AK = 2KT \sin x$</p>	<p>✓ $\sin x = \frac{AK}{2}$ ✓ $AK = 2 \sin x$ ✓ use of sine rule / <i>gebruik van sinusreël</i> ✓ $AK = 2KT \sin x$ ✓ $KT = 1$</p>	(5)
7.2	<p>In ΔKAT $T\hat{K}A = 90^\circ - 3x$ $\frac{AT}{\sin(90^\circ - 3x)} = \frac{1}{\sin(90^\circ + x)}$ $AT = \frac{\cos 3x}{\cos x}$</p>	<p>✓ $T\hat{K}A = 90^\circ - 3x$ ✓ use of sine rule <i>gebruik van sinusreël</i></p>	(2)
7.3	<p>$AT = \frac{\cos 3x}{\cos x}$ $AT = \frac{\cos(2x + x)}{\cos x}$ $AT = \frac{\cos 2x \cos x - \sin 2x \sin x}{\cos x}$ $AT = \frac{\cos 2x \cos x - 2 \sin x \cos x \sin x}{\cos x}$ $AT = \frac{\cos x (\cos 2x - 2 \sin^2 x)}{\cos x}$ $AT = 1 - 2 \sin^2 x - 2 \sin^2 x$ $AT = 1 - 4 \sin^2 x$</p>	<p>✓ splitting of $\cos 3x$ and expansion <i>opbreek van $\cos 3x$ en uitbreiding</i> ✓ common factor / <i>gemene faktor</i> ✓ expansion of $\cos 2x$ <i>uitbreiding van $\cos 2x$</i> ✓ answer / <i>antwoord</i></p>	(4)
			[11]



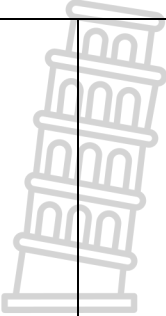
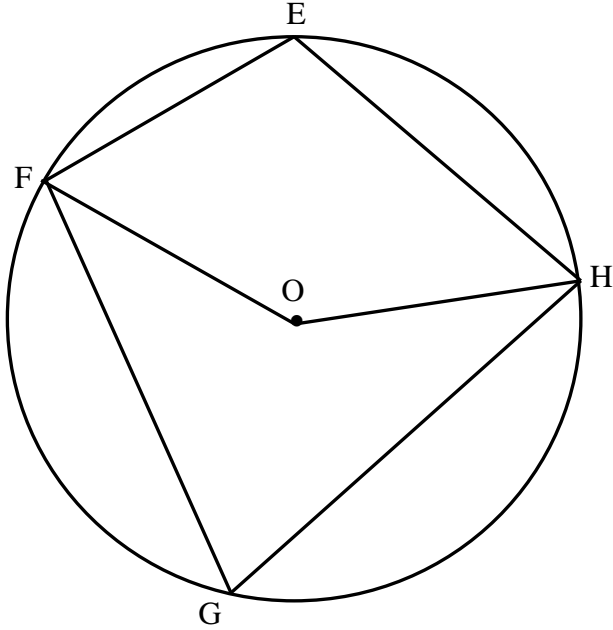
QUESTION 8/VRAAG 8

<p>8.1</p> 			
<p>8.1.1</p>	<p>$x = 96^\circ$ [∠ at centre = $2 \times$ ∠ at circumference] [middelpunte ∠ = $2 \times$ omtrekshoek]</p>	<p>✓ answer / antwoord ✓R</p>	<p>(2)</p>
<p>8.1.2</p>	<p>$\hat{B}_2 = y$ [angles opp = sides] [hoeke teenoor = sye] $2y + 96^\circ = 180^\circ$ [sum of angles of Δ] [som van die hoeke van Δ] $y = 42^\circ$</p>	<p>✓ S/R ✓ answer / antwoord</p>	<p>(2)</p>
<p>8.2</p> 			
<p>8.2.1</p>	<p>$\hat{F}_1 = 90^\circ$ [line from centre bisects chord] [lyn vanaf middelpunt halveer koord]</p>	<p>✓ S ✓R</p>	<p>(2)</p>
<p>8.2.2</p>	<p>$\hat{A}BC = 150^\circ$ [opp angles of cyclic quad] [teenoorst. hoeke van koordevierhoek]</p>	<p>✓ S ✓R</p>	<p>(2)</p>

<p>8.3</p> 			
<p>8.3.1</p>	$\hat{B}_1 = x$ [angles opp equal sides] [hoeke teenoor gelyke sye]	\checkmark S \checkmark R	(2)
<p>8.3.2</p>	$\hat{K}_2 + \hat{C} = x$ $\hat{C} = \hat{K}_2$ $\hat{C} = \frac{x}{2}$ [ext angle of Δ] / [buitehoek van Δ] [angles opp equal sides] [hoeke teenoor gelyke sye]	\checkmark S \checkmark R \checkmark S/R	(3)
<p>8.3.3</p>	$\hat{K}_1 = 180^\circ - 2x$ [sum of angles of Δ] [som van die hoeke van Δ] $108^\circ + 180^\circ - 2x + \frac{x}{2} = 180^\circ$ [adj angles on str line] [aangrensende hoeke op reguitlyn] $x = 72^\circ$	\checkmark S/R \checkmark S \checkmark R \checkmark answer / antwoord	(4)
			<p>[17]</p>



QUESTION 9 / VRAAG 9

		
	<p>Construct radii OF and OH. $\widehat{FOH} = 2 \times \widehat{G}$ [angle at centre = 2 × angle at circum] Reflex $\widehat{FOH} = 2 \times \widehat{E}$ [angle at centre = 2 × angle at circum] $\widehat{FOH} + \widehat{F\hat{O}H} = 2\widehat{G} + 2\widehat{E}$ but $\widehat{FOH} + \widehat{F\hat{O}H} = 360^\circ$ [angles around a point] $2\widehat{G} + 2\widehat{E} = 360^\circ$ $\widehat{G} + \widehat{E} = 180^\circ$</p>	<p>✓S ✓S/R ✓S/R ✓S ✓S/R ✓S</p>
	<p>Trek radiusse OF en OH. $\widehat{FOH} = 2 \times \widehat{G}$ [middelpunte $\sphericalangle = 2 \times$ omtrekshoek] Omwenteling $\widehat{FOH} = 2 \times \widehat{E}$ [middelpunte $\sphericalangle = 2 \times$ omtrekshoek] $\widehat{FOH} + \widehat{F\hat{O}H} = 2\widehat{G} + 2\widehat{E}$ maar $\widehat{FOH} + \widehat{F\hat{O}H} = 360^\circ$ [hoeke rondom 'n punt] $2\widehat{G} + 2\widehat{E} = 360^\circ$ $\widehat{G} + \widehat{E} = 180^\circ$</p>	<p>✓S ✓S/R ✓S/R ✓S ✓S/R ✓S</p>
		<p>[6]</p>



