



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 10**

**MATHEMATICS P2**

**NOVEMBER 2019**

**MARKS: 100**

**TIME: 2 hours**

**This question paper consists of 10 pages and a 15-page answer book.**

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**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

1. This question paper consists of EIGHT questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. that you used to determine the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. If necessary, round off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. You must use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
8. Write neatly and legibly.



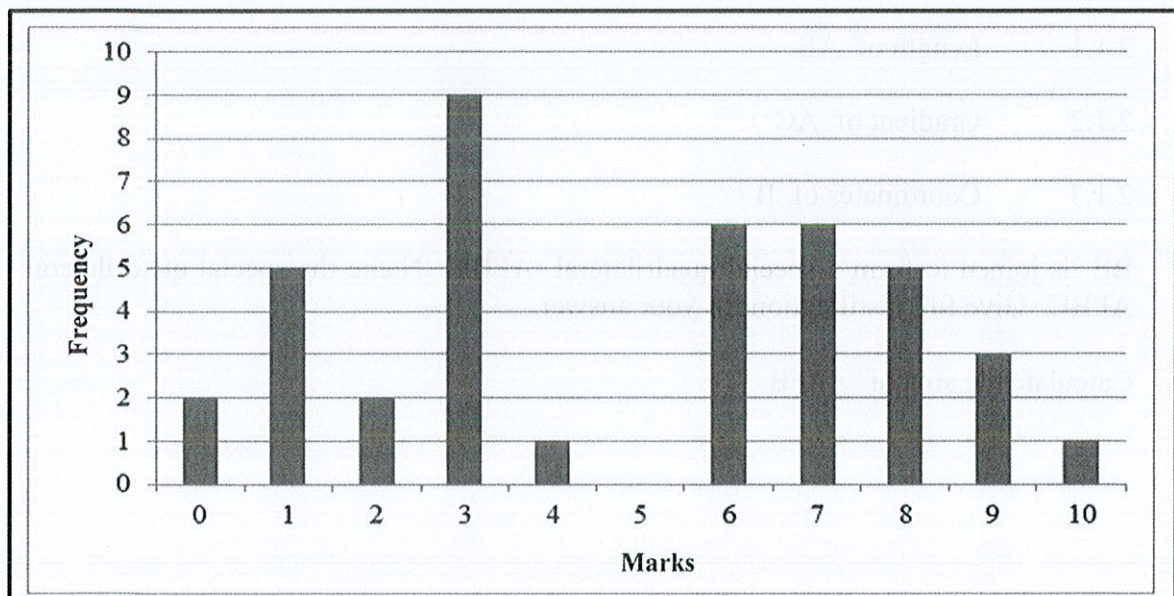
**QUESTION 1**

- 1.1 An ice cream vendor recorded his daily sales for a period of time. The number of ice creams that he sold each day is given in the table below.

5	7	8	10	13	15	15	15	21	24
29	30	32	36	38	44	45	51	55	

- 1.1.1 Write down the mode of the data set. (1)
- 1.1.2 Determine the median of the data set. (1)
- 1.1.3 Calculate the interquartile range. (3)
- 1.1.4 On the scaled line provided in the ANSWER BOOK, draw a box and whisker diagram for the data set. (2)
- 1.2 Learners in a certain class wrote a Mathematics test that had a maximum mark of 10. The teacher represented the marks obtained by the learners of this class in the bar graph below.

**Bar graph showing distribution of marks scored in Mathematics test**

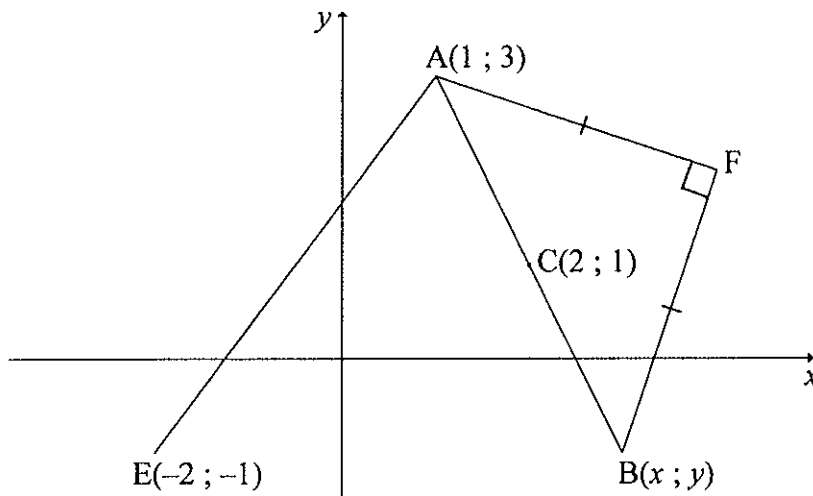


- 1.2.1 How many learners scored 8 marks out of 10 for the test? (1)
- 1.2.2 How many learners are in this class? (1)
- 1.2.3 Calculate the range of the marks scored in the test. (2)
- 1.2.4 If the pass mark for the test was 50%, what percentage of the learners failed the test? (2)
- 1.2.5 Calculate the mean mark scored in the test. (3)

**[16]**

**QUESTION 2**

In the diagram below,  $A(1 ; 3)$ ,  $B(x ; y)$  and  $E(-2 ; -1)$  are points on a Cartesian plane.  $C(2 ; 1)$  is the midpoint of  $AB$ . Also,  $F$  is a point such that  $AF = FB$  and  $AF \perp FB$ .



- 2.1 Determine the:
- 2.1.1 Length of  $AE$  (2)
- 2.1.2 Gradient of  $AC$  (2)
- 2.1.3 Coordinates of  $B$  (3)
- 2.2  $BE$  is joined to form a special quadrilateral  $AFBE$ . Name the special quadrilateral  $AFBE$ . Give full justification for your answer. (3)
- 2.3 Calculate the area of  $\triangle AFB$ . (5)
- [15]**

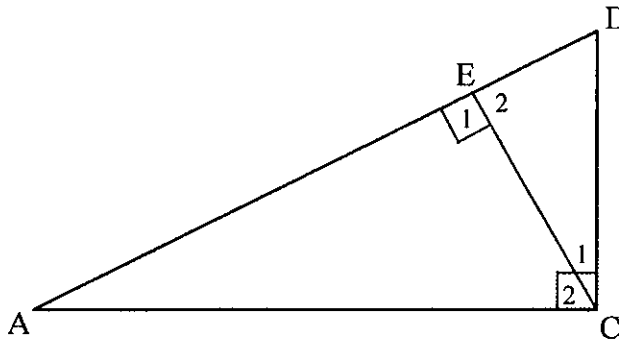


**QUESTION 3**

3.1 If  $x = 37^\circ$  and  $y = 44^\circ$ , calculate the value of  $\sin^2 x + 2 \cos y$ . (1)

3.2 WITHOUT using a calculator, determine the value of  $\frac{\sin 30^\circ \cdot \cot 45^\circ}{\cos 30^\circ \cdot \tan 60^\circ}$  (3)

3.3 In the diagram below,  $\triangle ACD$  is right-angled at  $C$ .  $E$  lies on  $AD$  such that  $CE$  is perpendicular to  $AD$ .



3.3.1 Write down the ratio for  $\cos D$  in  $\triangle ACD$ . (1)

3.3.2 Write down the ratio for  $\cos D$  in  $\triangle CED$ . (1)

3.3.3 If  $AD = 13$  units and  $DC = 5$  units, calculate the length of  $ED$ . (2)

3.4 Given that  $\cos \theta = \frac{5}{13}$  and  $\sin \theta < 0$ .

With the aid of a diagram and WITHOUT using a calculator, determine the value of:

3.4.1  $\sin \theta$  (3)

3.4.2  $\sec \theta + \tan^2 \theta + 1$  (4)

[15]

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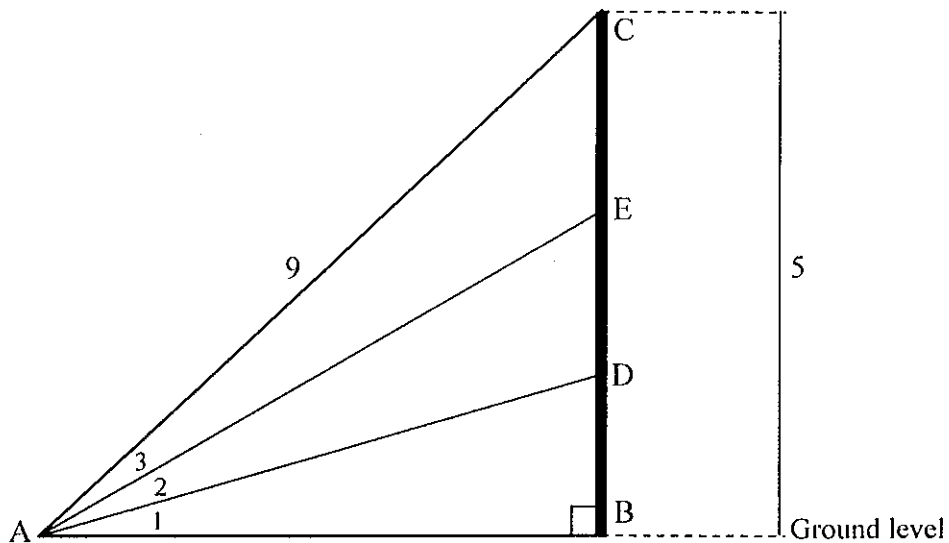
**QUESTION 4**

4.1 If  $0^\circ \leq \theta \leq 90^\circ$ , solve for  $\theta$  in each of the following questions:

4.1.1  $2 \sin \theta + 1 = 1,28$  (2)

4.1.2  $\tan 2\theta = 4 \cot 60^\circ$  (3)

4.2 In the diagram below, B is the foot of a multi-storey building. Three people, D, E and C, are standing at the windows on three different floors. They are all looking at object A on the ground, which is in the same horizontal plane as B.  $AC = 9$  units,  $BC = 5$  units and  $\hat{A}_1 = \hat{A}_2 = \hat{A}_3$ .



Calculate the:

4.2.1 Size of  $\hat{CAB}$  (2)

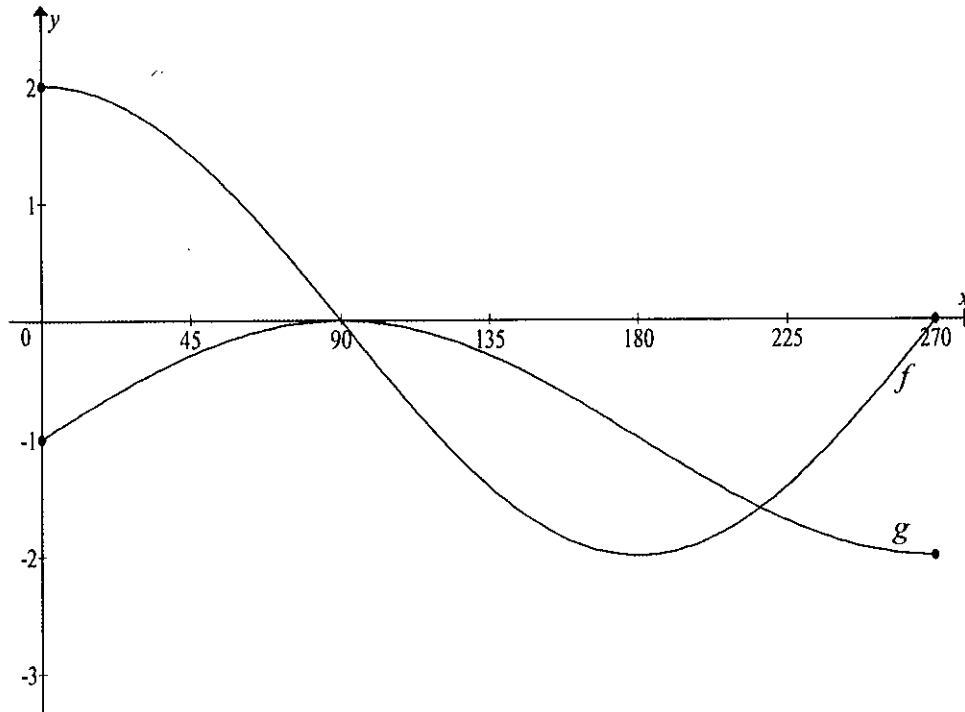
4.2.2 Length of AE (5)

4.2.3 Length of DE (4)  
[16]



**QUESTION 5**

Sketched below are the graphs of  $f(x) = 2\cos x$  and  $g(x) = \sin x - 1$  for the interval  $x \in [0^\circ; 270^\circ]$ .

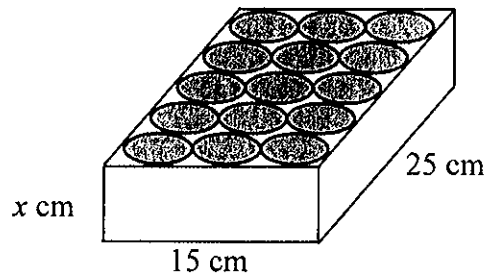


- 5.1 Write down the:
- 5.1.1 Period of  $f$  (1)
- 5.1.2 Range of  $g$  (2)
- 5.1.3 Number of solution(s) to  $f(x) = g(x)$  in the interval  $0^\circ \leq x \leq 270^\circ$  (1)
- 5.2 For which value(s) of  $x$  in the interval  $0^\circ \leq x \leq 270^\circ$  is  $f(x) \cdot g(x) \geq 0$ ? (2)
- 5.3 The graph  $h$  is obtained by reflecting graph  $g$  about the  $x$ -axis. Write down the coordinates of the minimum turning point of  $h$  in the interval  $0^\circ \leq x \leq 270^\circ$ . (2)
- [8]



**QUESTION 6**

An open rectangular cardboard box has the following dimensions: length = 25 cm, breadth = 15 cm and height =  $x$  cm. The volume of the box is  $3\,000\text{ cm}^3$ . Fifteen (15) identical cans of cold drink fit snugly into the box, as shown in the diagram below. The box and the cans are of equal height. (Ignore the thickness of the cardboard in your calculations.)



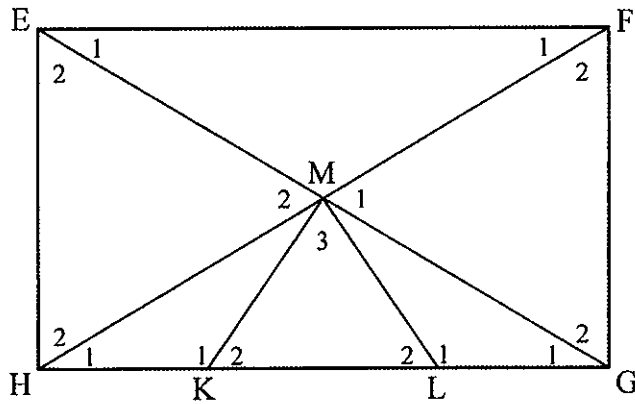
- 6.1 Calculate the height of the box. (3)
- 6.2 Calculate the radius of a can. (2)
- 6.3 If a can is filled to the top, calculate the volume of cold drink contained in the can. (2)
- 6.4 Calculate the volume of the space in between all the cans in the box. (2)
- [9]



Give reasons for ALL geometry statements used in QUESTIONS 7 and 8.

**QUESTION 7**

7.1 In the diagram, EFGH is a rectangle having diagonals intersecting at M.  $\hat{M}_2 = 60^\circ$  and  $\hat{L}_2 = 40^\circ$ .

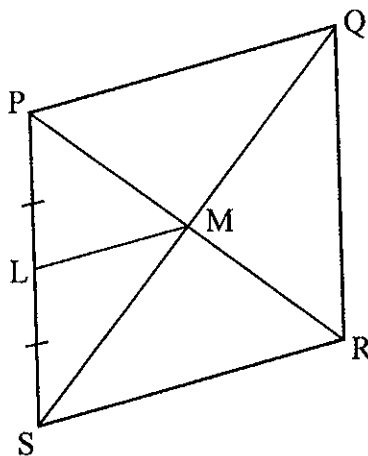


Calculate the size of:

7.1.1  $\hat{F}_1$  (2)

7.1.2  $\hat{GML}$  (3)

7.2 PQRS is a rhombus with diagonals PR and SQ intersecting at M. The perimeter of the rhombus is 12 cm. L is the midpoint of PS.



Calculate the length of LM. (4)  
[9]

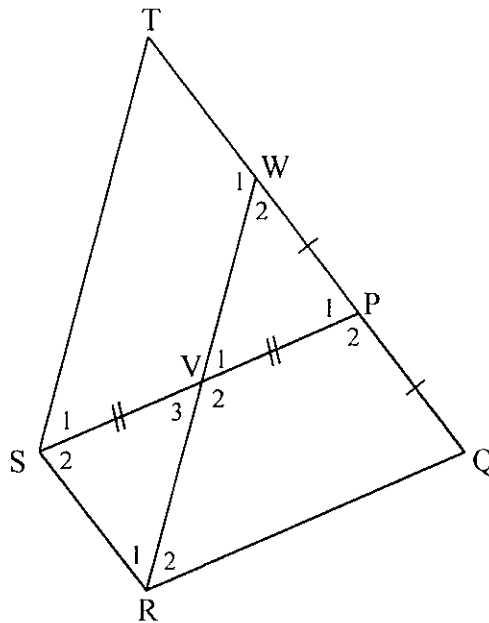


**QUESTION 8**

8.1 Complete the statement so that it is TRUE:

The diagonals of a parallelogram ... each other. (1)

8.2 In the diagram below, P is the midpoint of side WQ of  $\Delta WQR$ . V is on WR such that  $VP \parallel RQ$ . PV is produced by its own length to S. PW is produced to T and ST drawn.



8.2.1 Give a reason why  $WV = VR$ . (1)

8.2.2 Prove that:

(a)  $\Delta VWP \cong \Delta VRS$  (3)

(b) SWPR is a parallelogram (2)

(c) PQRS is a parallelogram (3)

8.2.3 If it is further given that RSTW is a parallelogram, show that  $TQ = 3SR$ . (2)  
[12]

downloaded from [Stanmorephysics.com](http://Stanmorephysics.com) TOTAL: 100



NAME OF LEARNER: <i>NAAM VAN LEERDER:</i>	
CLASS: <i>KLAS:</i>	

**NATIONAL SENIOR CERTIFICATE  
*NASIONALE SENIOR SERTIFIKAAT***

**MATHEMATICS P2/*WISKUNDE V2***

**GRADE/*GRAAD* 10**

**NOVEMBER 2019**

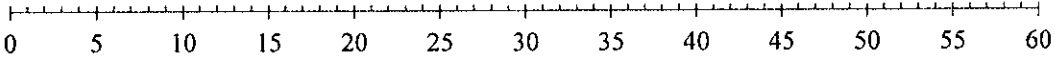
<p><b>SPECIAL ANSWER BOOK <i>SPESIALE ANTWOORDEBOEK</i></b></p>
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QUESTION <i>VRAAG</i>	MARK <i>PUNT</i>			INITIAL <i>PARAAF</i>	MODERATION <i>MODERERING</i>			INITIAL <i>PARAAF</i>
1								
2								
3								
4								
5								
6								
7								
8								
TOTAL <i>TOTAAL</i> (100)								

**This answer book consists of 15 pages.  
*Hierdie antwoordeboek bestaan uit 15 bladsye.***

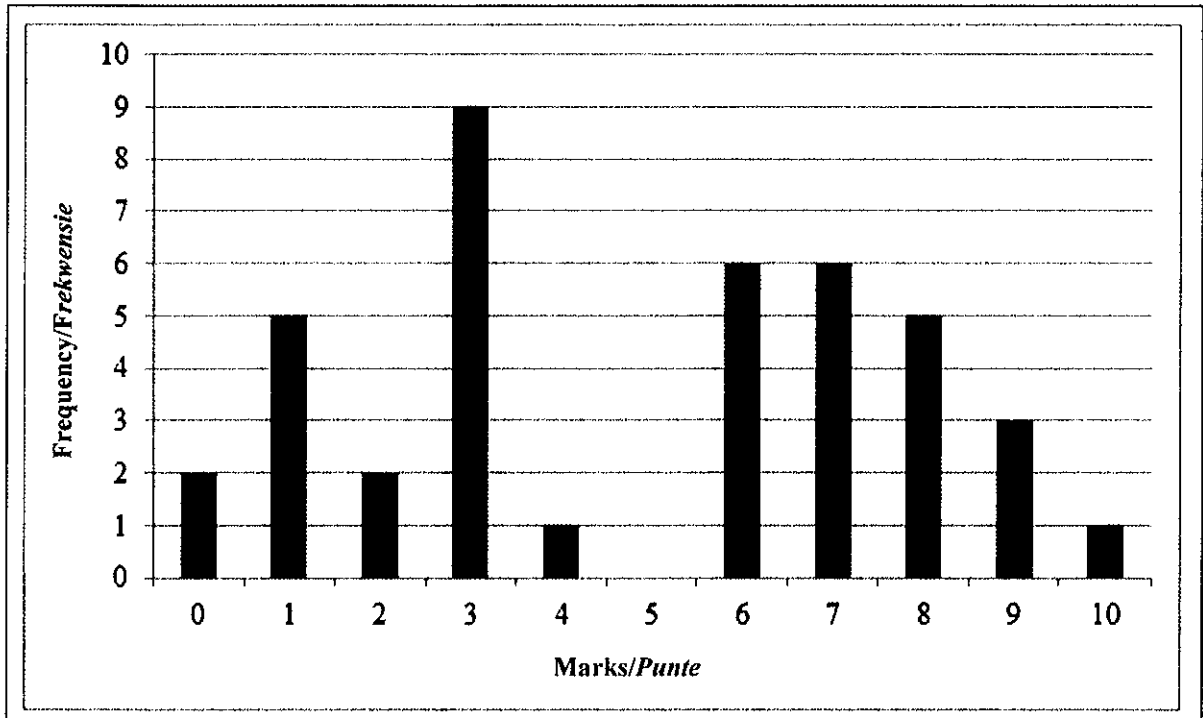


**QUESTION/VRAAG 1**

	<b>Solution/Oplissing</b>	<b>Marks Punte</b>																				
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>5</td><td>7</td><td>8</td><td>10</td><td>13</td><td>15</td><td>15</td><td>15</td><td>21</td><td>24</td> </tr> <tr> <td>29</td><td>30</td><td>32</td><td>36</td><td>38</td><td>44</td><td>45</td><td>51</td><td>55</td><td></td> </tr> </table>	5	7	8	10	13	15	15	15	21	24	29	30	32	36	38	44	45	51	55		
5	7	8	10	13	15	15	15	21	24													
29	30	32	36	38	44	45	51	55														
1.1.1		(1)																				
1.1.2	<table border="1" style="width: 100%; height: 100%;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table>					(1)																
1.1.3	<table border="1" style="width: 100%; height: 100%;"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table>						(3)															
1.1.4	<div style="text-align: center;">  </div>	(2)																				

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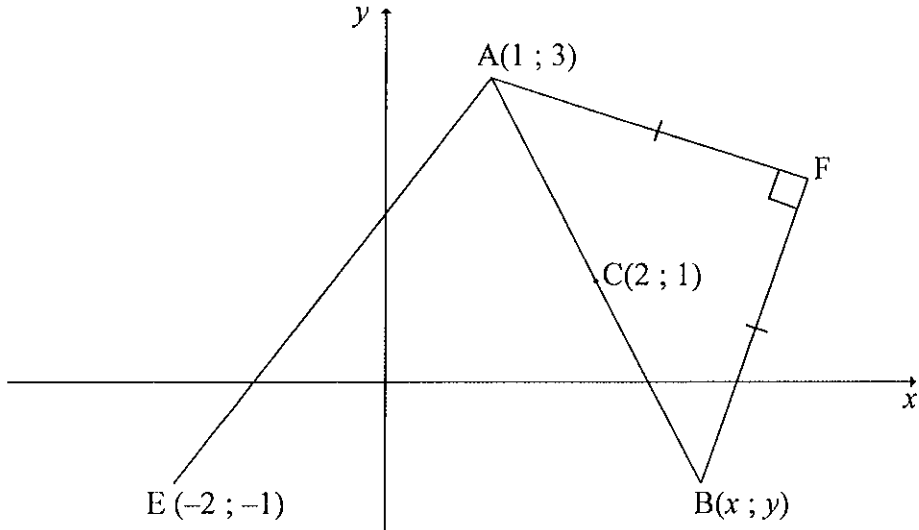




1.2.1		(1)
1.2.2		(1)
1.2.3		(2)
1.2.4		(2)
1.2.5		(3)
		<b>[16]</b>



QUESTION/VRAAG 2

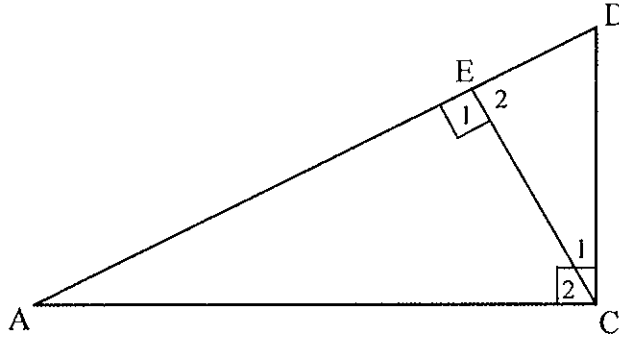
	Solution/Oplissing	Marks Punte
		
2.1.1	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(2)
2.1.2	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(2)
2.1.3	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(3)



2.2		
	(3)	
2.3		
	(5)	
	[15]	



**QUESTION/VRAAG 3**

	Solution/Oplissing	Marks Punte
3.1		(1)
3.2		(3)
3.3		
3.3.1		(1)
3.3.2		(1)
3.3.3		(2)





3.4.1		
3.4.2		
		<b>[15]</b>

(3)

(4)

**[15]**



**QUESTION/VRAAG 4**

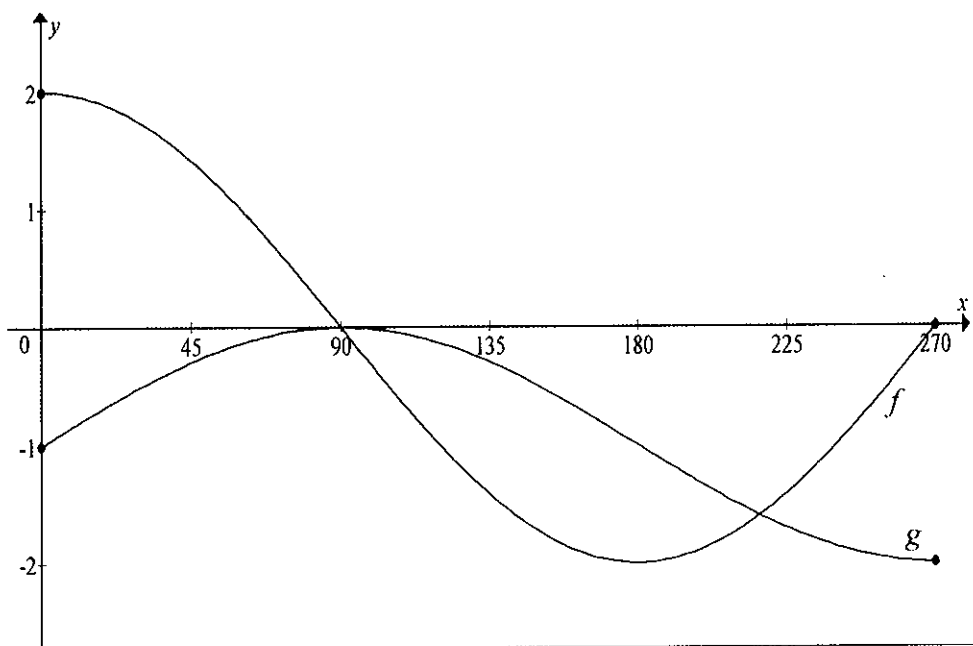
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
4.1.1		(2)
4.1.2		(3)
4.2		
4.2.1		(2)



4.2.2		
4.2.3		(5)
		(4)
		<b>[16]</b>



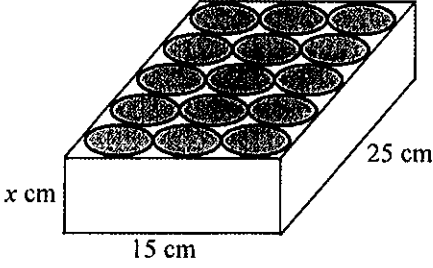
**QUESTION/VRAAG 5**



5.1.1		(1)
5.1.2		(2)
5.1.3		(1)
5.2		(2)
5.3		(2)
		<b>[8]</b>



**QUESTION/VRAAG 6**

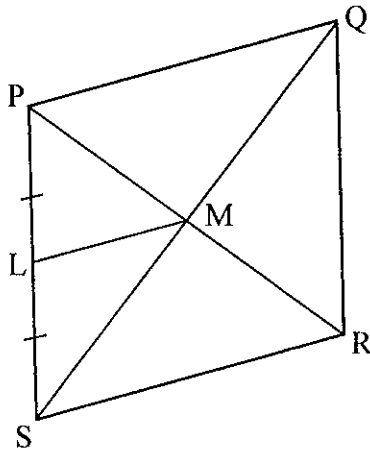
	Solution/Oplissing	Marks Punte
		
6.1	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(3)
6.2	<hr/> <hr/> <hr/> <hr/>	(2)
6.3	<hr/> <hr/> <hr/> <hr/> <hr/>	(2)
6.4	<hr/> <hr/> <hr/> <hr/> <hr/>	(2)
		<b>[9]</b>



**QUESTION/VRAAG 7**

	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
7.1.1	<div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 15px; margin-bottom: 5px;"></div>	

7.2



(4)

[9]



**QUESTION/VRAAG 8**

	Solution/Oplissing	Marks Punte
8.1		(1)
8.2.1		
		(1)
8.2.2		
(a)		
		(3)
8.2.2		
(b)		
		(2)
8.2.2		
(c)		
		(3)











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**REPUBLIC OF SOUTH AFRICA**

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**GRADE/GRAAD 10**

**MATHEMATICS P2/WISKUNDE V2**

**NOVEMBER 2019**

**MARKING GUIDELINES/NASIENRIGLYNE**

**MARKS/PUNTE: 100**

DEPARTMENT OF BASIC  
EDUCATION

PRIVATE BAG X895, PRETORIA 0001

2019 -11- 15

APPROVED MARKING GUIDELINE  
PUBLIC EXAMINATION

**These marking guidelines consist of 16 pages.  
Hierdie nasienriglyne bestaan uit 16 bladsye.**

*Hec*  
15/11/2019

**NOTE:**

- If a candidate answer a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking memorandum.
- Assuming values/answers in order to solve a problem is unacceptable.

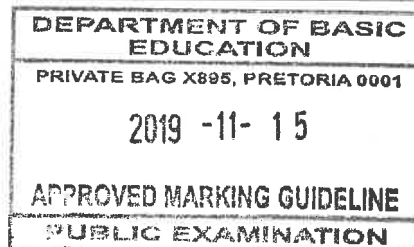
**LET WEL:**

- As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.
- Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.
- Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.

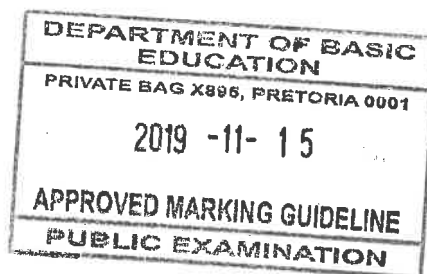
**QUESTION/VRAAG 1**

1.1.1	15 is the mode/is die modus	✓ answer/antwoord (1)
1.1.2	<p>Position of the median: <math>\frac{n+1}{2} = 10^{th}</math> position</p> <p>median = 24</p> <p><i>Posisie van die mediaan = <math>\frac{n+1}{2}</math></i></p> <p><i>= 10de posisie</i></p> <p><i>mediaan = 24</i></p> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: full marks</div>	✓ answer/antwoord (1)
1.1.3	<p>Interquartile range = <math>Q_3 - Q_1</math></p> <p>= 38 - 13</p> <p>= 25</p> <p><i>Variasiewydte = <math>Q_3 - Q_1</math></i></p> <p><i>= 38 - 13</i></p> <p><i>= 25</i></p> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: full marks</div>	✓ $Q_3$ ✓ $Q_1$ ✓ answer/antwoord (3)
1.1.4		✓ box/mond CA from 1.1.2 and 1.1.3 ✓ whiskers/snor (accuracy)

(2)

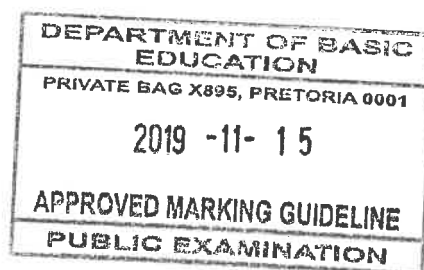


1.2.1	5 learners/ <i>leerders</i>	✓ answer/ <i>antwoord</i> (1)
1.2.2	40 learners/ <i>leerders</i>	✓ answer/ <i>antwoord</i> (1)
1.2.3	<p>Range = max value - min value                      = 10 - 0                      = 10</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: full marks</p> <p><i>Variasiewydte = maks waarde – min waarde</i>                      = 10 - 0                      = 10</p>	<p>✓ min and max/<i>min en maks</i>                      ✓ answer/<i>antwoord</i> (2)</p>
1.2.4	<p>Number of learners/<i>Getal leerders</i> = 1 + 9 + 2 + 5 + 2                      = 19</p> <p>Percentage / <i>Persentasie</i> = <math>\frac{19}{40} \times 100</math>                      = 47,5%</p> <p style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: full marks</p>	<p>✓ no. of learners/<i>getal leerders</i>                      ✓ answer/<i>antwoord</i> (2)</p>
1.2.5	<p><math>\bar{x} = \frac{(0 \times 2) + (1 \times 5) + (2 \times 2) + (3 \times 9) + \dots + (10 \times 1)}{40}</math></p> <p><math>\bar{x} = \frac{195}{40}</math></p> <p><math>\bar{x} = \frac{39}{8}</math></p> <p><math>\bar{x} = 4,88</math></p>	<p>✓ 195                      ✓ 40                      ✓ answer/<i>antwoord</i> (3)</p>
		<b>[16]</b>

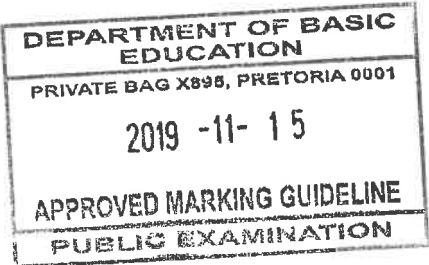


**QUESTION/VRAAG 2**

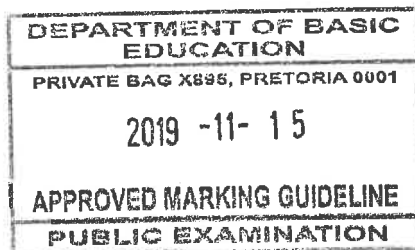
2.1.1	$AE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(1 + 2)^2 + (3 + 1)^2}$ $= 5 \text{ units}$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: max. 1/2</div> ✓ substitution/ <i>vervanging</i> ✓ answer/antwoord (2)
2.1.2	$m_{AC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{3 - 1}{1 - 2}$ $= -2$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: max. 1/2</div> ✓ substitution/ <i>vervanging</i> ✓ answer/antwoord (2)
2.1.3	$x_C = \frac{x_A + x_B}{2}$ $2 = \frac{1 + x}{2}$ $x = 3$ $B(3; -1)$ <b>OR/OF</b> $(x_A; y_A) \rightarrow (x_C; y_C) \quad [(x + 1); (y - 2)]$ $\therefore (x_C; y_C) \rightarrow (x_B; y_B) \text{ by symmetry}$ $\therefore B(3; -1)$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: max. 3/3</div> ✓ substitution/ <i>vervanging</i>  ✓ x-value/-waarde ✓ y-value/-waarde (3)  ✓ symmetry/ <i>simmetrie</i> ✓ x-value/-waarde ✓ y-value/-waarde



<p>2.2</p>	$BE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3 + 2)^2 + (-1 + 1)^2}$ $= 5 \text{ units}$ <p><b>OR/OF</b>  <math>BE = 3 + 2</math> (horizontal line/horizontale lyn)  <math>= 5 \text{ units}</math></p> <p><math>BE = AE</math> and/en <math>AF = BF</math>  <math>\therefore AFBE</math> is a kite/is 'n vlieër          (2 adj. sides = but opp. sides not equal/  <i>2 aangr. sye = maar teenoorg. sye is nie gelyk nie</i>)</p> <p><b>OR/OF</b>  <math>m_{EF} = \frac{1}{2} \rightarrow AB</math> is perpendicular to <math>EF</math> and <math>C</math> is the midpoint  <math>\therefore AFBE</math> is a kite (Longer diag. bisects the shorter diag. at <math>90^\circ</math>)</p>	<p>✓BE</p> <p>✓kite/vlieër          ✓justification/          regverdiging (3)</p> <p>✓<math>m_{EF} = \frac{1}{2}</math>          ✓kite/vlieër          ✓justification/          regverdiging (3)</p>
<p>2.3</p>	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3 - 1)^2 + (-1 - 3)^2}$ $= 2\sqrt{5} \text{ units}$ <p><math>\therefore AC = \sqrt{5} \text{ units}</math></p> <p>In <math>\triangle ACF</math>  <math>\hat{A} = 45^\circ</math></p> $\tan 45^\circ = \frac{CF}{\sqrt{5}}$ $CF = \sqrt{5} \text{ units}$ $\text{Area} = \frac{1}{2} \times AB \times CF$ $= \frac{1}{2} \times 2\sqrt{5} \times \sqrt{5}$ $= 5 \text{ units}^2$	<p>✓AB</p> <p>✓ratio/verhouding</p> <p>✓CF</p> <p>✓substitution/          vervanging          ✓answer/antwoord (5)</p>



	<p><b>OR / OF</b></p> $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3 - 1)^2 + (-1 - 3)^2}$ $= 2\sqrt{5} \text{ units}$ <p>In <math>\Delta AFB</math>: <math>F\hat{A}B = F\hat{B}A = 45^\circ</math> (<math>\angle</math>sopp = sides)</p> $\sin 45^\circ = \frac{AF}{AB} = \frac{AF}{2\sqrt{5}}$ $AF = \sqrt{10}$ $AF = BF = \sqrt{10}$ $\text{Area of } \Delta AFB = \frac{1}{2} \sqrt{10} \cdot \sqrt{10}$ $= 5 \text{ units}^2$ <p><b>OR / OF</b></p> $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3 - 1)^2 + (-1 - 3)^2}$ $= 2\sqrt{5} \text{ cm}$ <p>In <math>\Delta AFB</math>: <math>AF = BF</math> (given)</p> $AB^2 = BF^2 + BF^2$ $BF = \sqrt{\frac{20}{2}}$ $BF = \sqrt{10}$ $\text{Area of } \Delta AFB = \frac{1}{2} \sqrt{10} \cdot \sqrt{10}$ $= 5 \text{ units}^2$	<p>✓ AB                  ✓ <math>F\hat{A}B = F\hat{B}A = 45^\circ</math></p> <p>✓ ratio</p> <p>✓ substitution/                  vervanging                  ✓ answer/antwoord (5)</p> <p>✓ AB</p> <p>✓ Pythagoras theorem                  /stelling van Pythagoras</p> <p>✓ BF</p> <p>✓ substitution/                  vervanging                  ✓ answer/antwoord (5)</p>
<b>[15]</b>		





**QUESTION/VRAAG 3**

3.1	$\sin^2 x + 2 \cos y$ $= \sin^2 37^\circ + 2 \cos 44^\circ$ $= 1,80$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">Answer only: full marks</div>	✓ answer/antwoord (1)
3.2	$\frac{\sin 30^\circ \cdot \cot 45^\circ}{\cos 30^\circ \cdot \tan 60^\circ}$ $= \frac{\frac{1}{2} \cdot 1}{\frac{\sqrt{3}}{2} \cdot \sqrt{3}}$ $= \frac{1}{3}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;">Answer only: max. 1/3</div>	✓ $\frac{1}{2}$ and/en 1 ✓ $\frac{\sqrt{3}}{2}$ and/en $\sqrt{3}$ ✓ answer/antwoord (3)
3.3.1	In $\Delta ACD$ , $\cos D = \frac{CD}{AD}$	✓ answer/antwoord (1)
3.3.2	In $\Delta CDE$ , $\cos D = \frac{DE}{CD}$	✓ answer/antwoord (1)
3.3.3	$\frac{CD}{AD} = \frac{DE}{CD} \quad \text{both/beide} = \cos D$ $ED = \frac{CD^2}{AD}$ $ED = \frac{25}{13}$ $ED = 1,92 \text{ units/eenhede}$ <p><b>OR/OF</b></p> $\cos D = \frac{CD}{AD}$ $= \frac{5}{13}$ $\hat{D} = 67,38^\circ$ $\cos 67,38^\circ = \frac{ED}{5}$ $ED = 1,92 \text{ units/eenhede}$	✓ equating/ gelykstelling  ✓ answer/antwoord (2)  ✓ $\hat{D} = 67,38^\circ$  ✓ answer/antwoord (2)

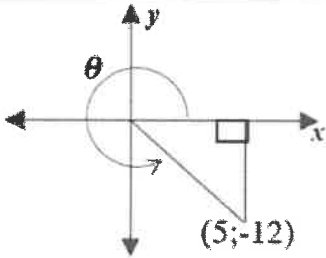
**DEPARTMENT OF BASIC EDUCATION**

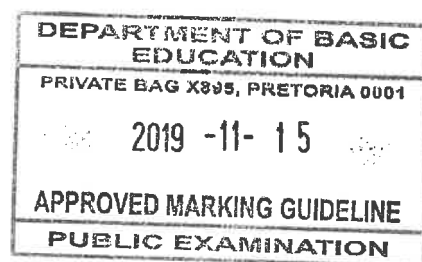
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**2019 -11- 15**

**APPROVED MARKING GUIDELINE**

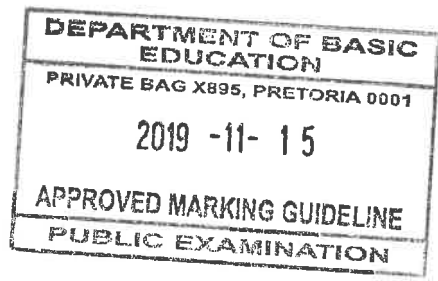
**PUBLIC EXAMINATION**

3.4.1	 <p> <math>\cos \theta = \frac{5}{13}</math>  <math>y^2 = r^2 - x^2</math>  <math>= (13)^2 - (5)^2</math>  <math>= 144</math>  <math>y = -12</math> (in the 4th quad/in 4de kwad)  <math>\therefore \sin \theta = -\frac{12}{13}</math> </p>	<p>✓ diagram in correct quadrant</p> <p>✓ y-value/-waarde</p> <p>✓ answer/antwoord (3)</p>
3.4.2	$\sec \theta + \tan^2 \theta + 1$ $= \frac{13}{5} + \left(\frac{-12}{5}\right)^2 + 1$ $= \frac{13}{5} + \frac{144}{25} + 1$ $= \frac{234}{25}$	<p>✓ <math>\frac{13}{5}</math></p> <p>✓ <math>\frac{-12}{5}</math></p> <p>✓ 234</p> <p>✓ 25 (4)</p>
		<b>[15]</b>

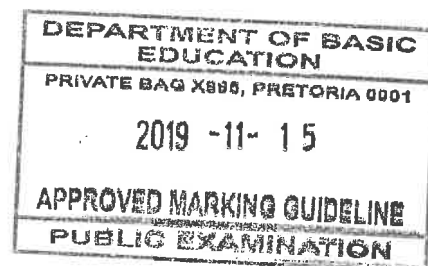


**QUESTION/VRAAG 4**

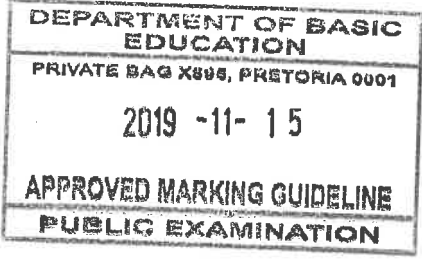
<p>4.1.1</p>	$2 \sin \theta + 1 = 1,28$ $2 \sin \theta = 0,28$ $\sin \theta = 0,14$ $\theta = 8,05^\circ$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">                 Penalty for incorrect rounding in this question only.             </div>	<p>✓ simplification/ <i>vereenvoudiging</i></p> <p>✓ answer/<i>antwoord</i> (2)</p>
<p>4.1.2</p>	$\tan 2\theta = 4 \cot 60^\circ$ $\tan 2\theta = \frac{4}{\sqrt{3}}$ $2\theta = 66,5867... \dots^\circ$ $\theta = 33,29^\circ$	<p>✓ <math>\frac{4}{\sqrt{3}}</math></p> <p>✓ <math>66,5867... \dots^\circ</math></p> <p>✓ answer/<i>antwoord</i> (3)</p>
<p>4.2.1</p>	<p>In <math>\triangle ABC</math></p> $\sin A = \frac{BC}{AC} = \frac{5}{9}$ $\hat{C}AB = 33,75^\circ$ <p><b>OR/OF</b></p> $AB = 2\sqrt{14} \text{ (Pythagoras theorem)/} \textit{stelling van Pythagoras}$ $\cos A = \frac{2\sqrt{14}}{9}$ $A = 33,75^\circ$ <p><b>OR/OF</b></p> $\tan A = \frac{5}{2\sqrt{14}}$ $A = 33,75^\circ$	<p>✓ ratio/<i>verhouding</i></p> <p>✓ answer/<i>antwoord</i> (2)</p> <p>✓ ratio/<i>verhouding</i></p> <p>✓ answer/<i>antwoord</i> (2)</p> <p>✓ ratio/<i>verhouding</i></p> <p>✓ answer/<i>antwoord</i> (2)</p>



<p>4.2.2</p>	<p>Finding AB:</p> $\sqrt{9^2 - 5^2} = 7,48 \text{ units/eenhede}$ <p>OR / OF</p> <p>In <math>\triangle ABC</math>: <math>\cos \hat{A} = \frac{AB}{9}</math>  <math>AB = \cos 33,75^\circ \times 9</math>  <math>AB = 7,48 \text{ units/eenhede}</math></p> <p>OR / OF</p> <p><math>BC = 5 \text{ units}</math></p> $AB = \frac{5}{\tan 33,75^\circ}$ $= 7,48 \text{ units/eenhede}$ <p><math>\therefore</math> In <math>\triangle AEB</math>: <math>\hat{A}_1 + \hat{A}_2 + \hat{A}_3 = 33,75^\circ</math>  <math>\therefore \hat{A}_1 + \hat{A}_2 = \hat{BAE} = 22,50^\circ</math></p> $\cos \hat{A} = \frac{AB}{AE}$ $\cos 22,5^\circ = \frac{7,48}{AE}$ <p><math>AE = 8,096\dots</math></p> <p><math>AE = 8,10</math></p>	<p>✓ AB</p> <p>✓ AB</p> <p>✓ <math>\hat{BAE} = 22,50^\circ</math></p> <p>✓ ratio/verhouding</p> <p>✓ substitution/ vervanging</p> <p>✓ AE (5)</p>
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4.2.3	<p>In <math>\triangle ABE</math></p> $BE = \sqrt{AE^2 - AB^2}$ $= \sqrt{(8,1)^2 - (7,48)^2}$ $= 3,11$ <p style="text-align: center;">OR/OF</p> $BE = \sin 22,5^\circ \times 8,10 = 3,10$ <p style="text-align: center;">OR/OF</p> $BE = \tan 22,5^\circ \times 7,48 = 3,10$ <p>In <math>\triangle ABD</math></p> $\tan 11,25^\circ = \frac{DB}{AB}$ $\therefore DB = \tan 11,25^\circ \times 7,48$ $DB = 1,49$ $DE = BE - DB$ $= 3,10 - 1,49 \qquad \text{or} \qquad 3,11 - 1,49$ $= 1,61 \text{ units/eenhede} \qquad \qquad = 1,62 \text{ units/eenhede}$	<p>✓BE</p>       <p>✓DB</p> <p>✓BE - DB</p> <p>✓answer/antwoord (4)</p>
<b>[16]</b>		

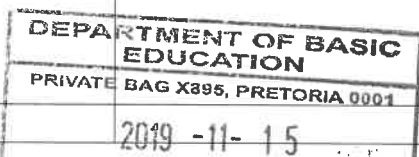


**QUESTION/VRAAG 5**

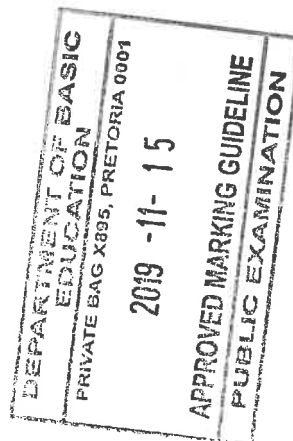
5.1.1	Period of/ <i>Periode van</i> $f$ : $360^\circ$	✓ answer/ <i>antwoord</i> (1)
5.1.2	Range of/ <i>Waardeversameling van</i> $g$ : $-2 \leq y \leq 0$ or/of $y \in [-2; 0]$	✓ critical values/ <i>kritieke waardes</i> ✓ notation/ <i>antwoord</i> (2)
5.1.3	2 solutions/ <i>oplossings</i>	✓ answer/ <i>antwoord</i> (1)
5.2	$90^\circ \leq x \leq 270^\circ$ or/of $x \in [90^\circ; 270^\circ]$	✓ critical values/ <i>kritieke waardes</i> ✓ notation (2)
5.3	$h(x) = -\sin x + 1$ Minimum T.P/ <i>Draaipunt</i> = $(90^\circ; 0)$	✓✓ $(90^\circ; 0)$ (2) (accuracy marks)
		<b>[8]</b>

**QUESTION/VRAAG 6**

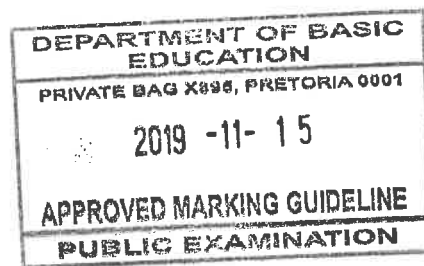
6.1	Volume of the box/ <i>van houer</i> = $L \times B \times H$ $3000 = 25 \times 15 \times x$ $x = \frac{3000}{375}$ $x = 8 \text{ cm}$ The height of the box/ <i>hoogte van houer</i> = 8 cm	✓ formula/ <i>formule</i> ✓ substitution/ <i>vervanging</i>  ✓ answer/ <i>antwoord</i> (3)
6.2	The diameter of each can is 5 cm./ <i>Die diameter van elke blikkie is 5 cm.</i> The radius of each can is 2,5 cm./ <i>Die radius van elke blikkie is 2,5 cm.</i>	✓ diameter  ✓ answer/ <i>antwoord</i> (2)
<div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: full marks</div>		
6.3	Volume of drink in a can/ <i>van koeldrank in blikkie</i> = $\pi r^2 h$ $= \pi(2,5)^2(8)$ $= \pi(2,5)^2(8)$ $= 157,08 \text{ cm}^3$	✓ substitution into correct formula/ <i>vervanging</i> ✓ answer/ <i>antwoord</i> (2)
6.4	Volume of the remaining space = $V$ of the box – $V$ of the 15 cans/ <i>Volume van oorblywende spasie = <math>V</math> van die houer – <math>V</math> van die 15 blikkies</i> $= 3000 - (15 \times 157,08)$ $= 3000 - 2356,20$ $= 643,80 \text{ cm}^3$	✓ $15 \times 157,08$ ✓ answer/ <i>antwoord</i> (2)
		<b>[9]</b>



QUESTION/VRAAG 7		
7.1.1	<p><math>\hat{E}M\hat{F} = 120^\circ</math> (<math>\angle</math>'s on straight line/opreguitlyn)</p> <p><math>\hat{F}_1 = \hat{E}_1 = 30^\circ</math> (<math>\angle</math>'s opp. = sides OR diag. of a rectangle = and bisect each other).</p> <p><b>OR/OF</b></p> <p><math>\hat{F}_1 = \hat{E}_1</math> (angles opp. = sides OR diag. of a rectangle = and bisect each other).</p> <p><math>\hat{M}_2 = \hat{E}_1 + \hat{F}_1</math> (ext. angle of <math>\Delta</math>)</p> <p><math>60^\circ = \hat{E}_1 + \hat{F}_1</math></p> <p><math>\therefore \hat{F}_1 = 30^\circ</math></p>	<p>✓S/R</p> <p>✓S/R (2)</p> <p>✓S/R</p> <p>✓answer/antwoord (2)</p>
7.1.2	<p><math>\hat{E}_1 = \hat{G}_1 = 30^\circ</math> (Alt. <math>\angle</math>'s: EF    HG)</p> <p><math>\hat{L}_2 = \hat{G}_1 + \hat{G}\hat{M}\hat{L}</math> (ext. <math>\angle</math> = sum of two opp. int. <math>\angle</math>'s)</p> <p><math>40^\circ = 30^\circ + \hat{G}\hat{M}\hat{L}</math></p> <p><math>\hat{G}\hat{M}\hat{L} = 10^\circ</math></p> <p><b>OR/OF</b></p> <p><math>\hat{M}_1 = 60^\circ</math> (vert. opp. angles)</p> <p><math>\therefore \hat{G}_2 = \hat{F}_2 = 60^\circ</math> (angles opp. = sides)</p> <p>But <math>\hat{G}_2 + \hat{G}_1 = 90^\circ</math> (angles of rectangle)</p> <p><math>\hat{G}_1 = 30^\circ</math></p> <p><math>\hat{L}_2 = \hat{G}_1 + \hat{G}\hat{M}\hat{L}</math> (ext. angle of <math>\Delta</math>)</p> <p><math>40^\circ = 30^\circ + \hat{G}\hat{M}\hat{L}</math></p> <p><math>\hat{G}\hat{M}\hat{L} = 10^\circ</math></p> <p><b>OR/OF</b></p> <p><math>\hat{G}_1 = \hat{E}_1 = 30^\circ</math> (alt. angle EF  HG)</p> <p><math>\hat{L}_2 = 40^\circ</math> (given)</p> <p><math>\hat{L}_1 = 180 - 40^\circ = 140^\circ</math> (angles in str. line)</p> <p><math>\hat{G}\hat{M}\hat{L} = 180^\circ - 140^\circ - 30^\circ</math></p> <p><math>\hat{G}\hat{M}\hat{L} = 10^\circ</math> (sum of angles in a <math>\Delta</math>)</p>	<p>✓S/R</p> <p>✓S/R</p> <p>✓answer/antwoord (3)</p> <p>✓<math>\hat{G}_1 = 30^\circ</math></p> <p>✓S/R</p> <p>✓answer/antwoord (3)</p> <p>✓<math>\hat{G}_1 = 30^\circ</math></p> <p>✓S/R</p> <p>✓answer/antwoord (3)</p>



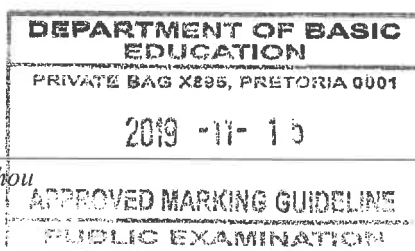
7.2	<p>Perimeter of/Omtrek van PQRS = 12 cm</p> $\text{One side/Een sy} = \frac{12}{4} = 3 \text{ cm}$ $\therefore SR = 3 \text{ cm}$ <p>PM = MR (diag. of rhombus/rombus (ruit) PQRS)</p> <p>PL = LS (given/gegee)</p> <p>In <math>\Delta</math>PSR</p> $LM = \frac{1}{2} SR \text{ (Midpoint thm/Middelpuntstelling)}$ $= \frac{1}{2} (3)$ $= \frac{3}{2} = 1,5 \text{ cm}$	<p>✓ SR=PQ=QR=PS =3cm ✓ S/R</p> <p>✓ S/R</p> <p>✓ answer/antwoord (4)</p>
		[9]





**QUESTION/VRAAG 8**

8.1	Bisect/ <i>Halveer mekaar</i>	✓ answer/ <i>antwoord</i> (1)
8.2.1	A line drawn from the midpoint of one side of a triangle parallel to another side bisects the third side. <i>’n Lyn wat van die middelpunt van een sy van ’n driehoek parallel aan ’n ander sy getrek word, halveer die derde sy.</i>  <b>OR/OF</b>  Midpoint theorem	✓R   ✓R (1)
8.2.2 (a)	In $\triangle VWP \equiv \triangle VRS$ 1. $WV = VR$ (proved/ <i>bewys</i> ) 2. $VP = SV$ (given/ <i>gegee</i> ) 3. $\hat{V}_1 = \hat{V}_3$ (vert. opp $\angle$ s) $\therefore \triangle VWP \equiv \triangle VRS$ (SAS)	✓S  ✓S/R ✓R (3)
8.2.2(b)	$WV = VR$ (proved/ <i>bewys</i> ) $VP = SV$ (given/ <i>gegee</i> ) $\therefore$ SWPR is a // <sup>m</sup> (diagonals bisect each other/ <i>hoeklyne halveer mekaar</i> )	✓S  ✓R (2)
8.2.2(c)	$PQ \parallel SR$ (WP $\parallel$ SR OR/OF proved OR/OF same str. line as WP) $SP \parallel RQ$ (given/ <i>gegee</i> ) $\therefore$ PQRS is a parallelogram (both pairs of opp. sides are // <i>beide pare teenoorg. sye is //</i> )  <b>OR/OF</b> $PQ \parallel SR$ (WP $\parallel$ SR) $PQ = SR$ (PQ = WP = SR, proved/ <i>bewys</i> ) $\therefore$ PQRS is a // <sup>m</sup> (one pair of opp. sides = and // <i>een paar teenoorg. sye = en//</i> )  <b>OR/OF</b> $VP = SV$ (given) $VP = \frac{1}{2} RQ$ (Mid. pnt thm) $VP \parallel RQ$ (V and P are mid. pnt) $SP = RQ$ (V is the mid. pnt) $\therefore$ PQRS is parm. (one pair = and //)	✓S ✓R  ✓R (3)  ✓S ✓R  ✓R (3)  ✓S  ✓S ✓R (3)



	<p><b>OR/OF</b></p> <p>VP  RQ (V and P are the mid. pnt)  <math>\therefore</math> SP  RQ (same str. line as VP)  SR  PQ (same str. line as WP <b>OR/OF</b> proved)  <math>\therefore</math> PQRS is parm. (both pairs of opp. sides are   )</p>	<p>✓S/R  ✓S  ✓R</p> <p>(3)</p>
8.2.3	<p>SR = TW (RSTW is    gram)  But SR = WP (proved <i>bewys</i>)  WP = QP (given <i>gegeë</i>)  <math>\therefore</math> TQ = TW + WP + PQ  = 3SR</p>	<p>✓S/R   ✓S</p> <p>(2)</p>
		[12]

TOTAL/TOTAAL: 100

