



# basic education

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

## **NATIONAL SENIOR CERTIFICATE**

**GRADE 11**

**MATHEMATICS P2**

**NOVEMBER 2017**

**MARKS: 150**

**TIME: 3 hours**

**This question paper consists of 13 pages and an answer book of 24 pages.**



**INSTRUCTIONS AND INFORMATION**

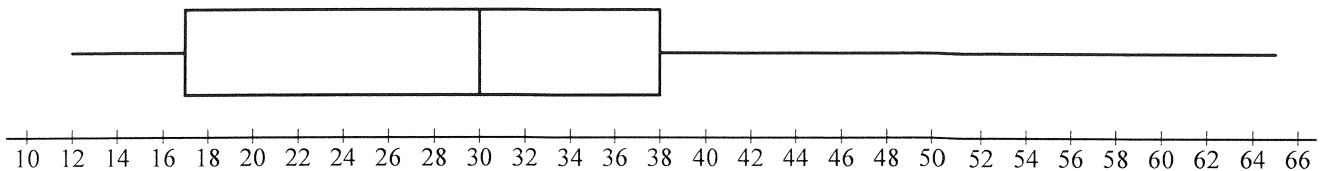
Read the following instructions carefully before answering the questions.

1. This question paper consists of 12 questions.
2. Answer ALL the questions in the ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs et cetera that you used to determine the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. Round off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
8. Write neatly and legibly.



**QUESTION 1**

1.1 Mr Brown conducted a survey on the amount of airtime (in rands) EACH student had on his or her cellphone. He summarised the data in the box and whisker diagram below.



- 1.1.1 Write down the five-number summary of the data. (2)
- 1.1.2 Determine the interquartile range. (1)
- 1.1.3 Comment on the skewness of the data. (1)

1.2 A group of 13 students indicated how long it took (in hours) before their cellphone batteries required recharging. The information is given in the table below.

5	8	10	17	20	29	32	48	50	50	63	$y$	107
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- 1.2.1 Calculate the value of  $y$  if the mean for this data set is 41. (2)
  - 1.2.2 If  $y = 94$ , calculate the standard deviation of the data. (1)
  - 1.2.3 The mean time before another group of 6 students needed to recharge the batteries of their cellphones was 18 hours. Combine these groups and calculate the overall mean time needed for these two groups to recharge the batteries of their cellphones. (3)
- [10]**



**QUESTION 2**

A student conducted a survey among his friends and relatives to determine the relationship between the age of a person and the number of marketing phone calls he or she received within one month. The information is given in the table below.

AGE OF PERSON IN SURVEY	FREQUENCY	CUMULATIVE FREQUENCY
$20 < x \leq 30$	7	7
$30 < x \leq 40$		27
$40 < x \leq 50$	25	
$50 < x \leq 60$		64
$60 < x \leq 70$		72
$70 < x \leq 80$	4	
$80 < x \leq 90$		80

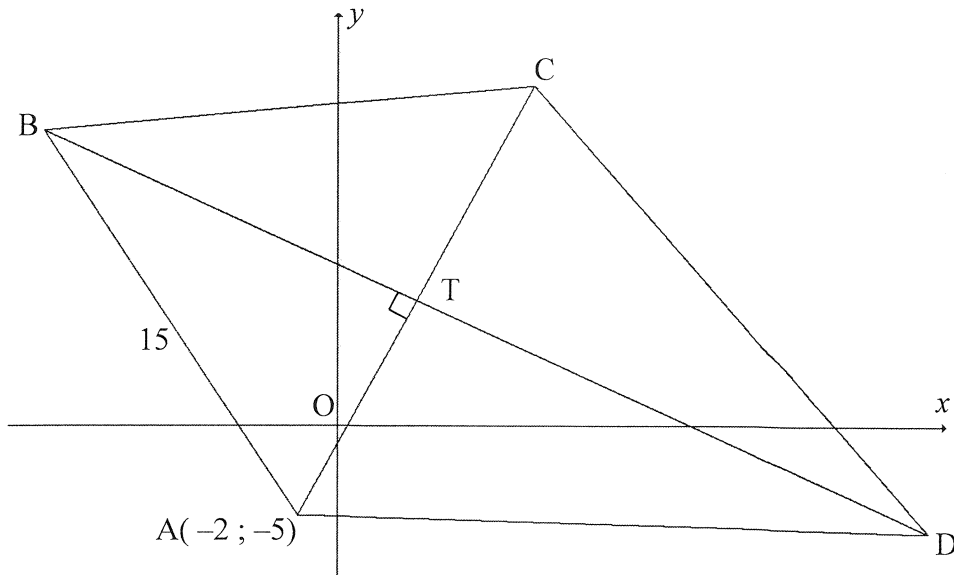
- 2.1 Complete the frequency and cumulative frequency columns in the table given in the ANSWER BOOK. (4)
- 2.2 How many people participated in this survey? (1)
- 2.3 Write down the modal class. (1)
- 2.4 Draw an ogive (cumulative frequency graph) to represent the data on the grid given in the ANSWER BOOK. (3)
- 2.5 Determine the percentage of marketing calls received by people older than 54 years. (3)
- [12]



**QUESTION 3**

$A(-2 ; -5)$ ,  $B$ ,  $C$  and  $D$  are the vertices of quadrilateral  $ABCD$  such that diagonal  $AC$  is perpendicular to diagonal  $BD$  at  $T$ .

The equation of  $BD$  is given by  $2y + x = 18$  and  $AB = 15$  units.



- 3.1 Determine the gradient of line  $AC$ . (2)
- 3.2 Determine the equation of  $AC$  in the form  $y = mx + c$ . (2)
- 3.3 If the equation of  $AC$  is  $y = 2x - 1$ , calculate the coordinates of  $T$ . (3)
- 3.4 If  $ABCD$  is a kite with  $AB = BC$ :
- 3.4.1 Determine the coordinates of  $C$  (2)
- 3.4.2 Calculate the length of  $BT$  (4)
- 3.4.3 Write down the length of the radius of the circle passing through points  $B$ ,  $C$  and  $T$  (2)
- [15]**

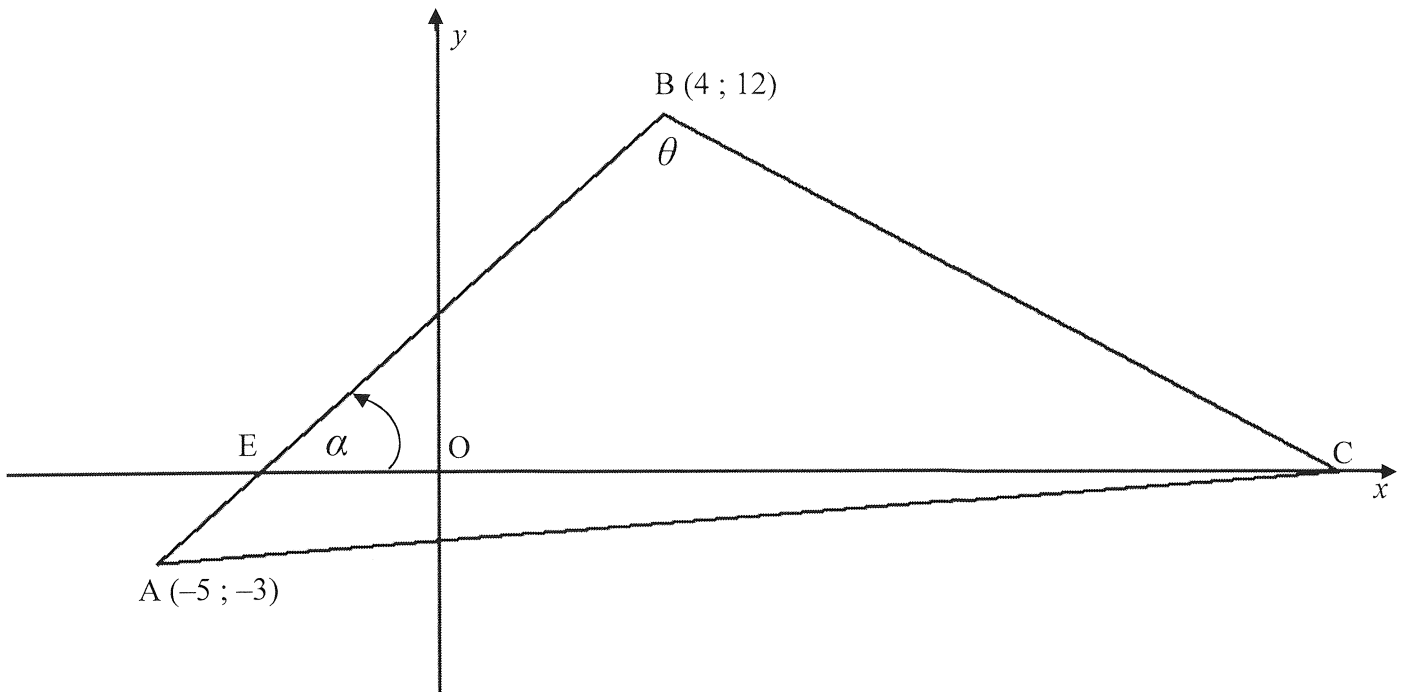


**QUESTION 4**

C, a point on the  $x$ -axis,  $A(-5 ; -3)$  and  $B(4 ; 12)$  are the vertices of a triangle.

$AB$  intersects the  $x$ -axis at  $E$ .

$\hat{A}BC = \theta$  and  $\hat{B}EC = \alpha$ .



- 4.1 Calculate the gradient of  $AB$ . (2)
- 4.2 Determine the coordinates of point  $E$ . (3)
- 4.3 Determine the size of  $\alpha$ . Round off to the nearest whole number. (2)
- 4.4 If  $\theta = 76^\circ$ , determine the equation of the line through  $A$  parallel to  $BC$ . (5)

**[12]**

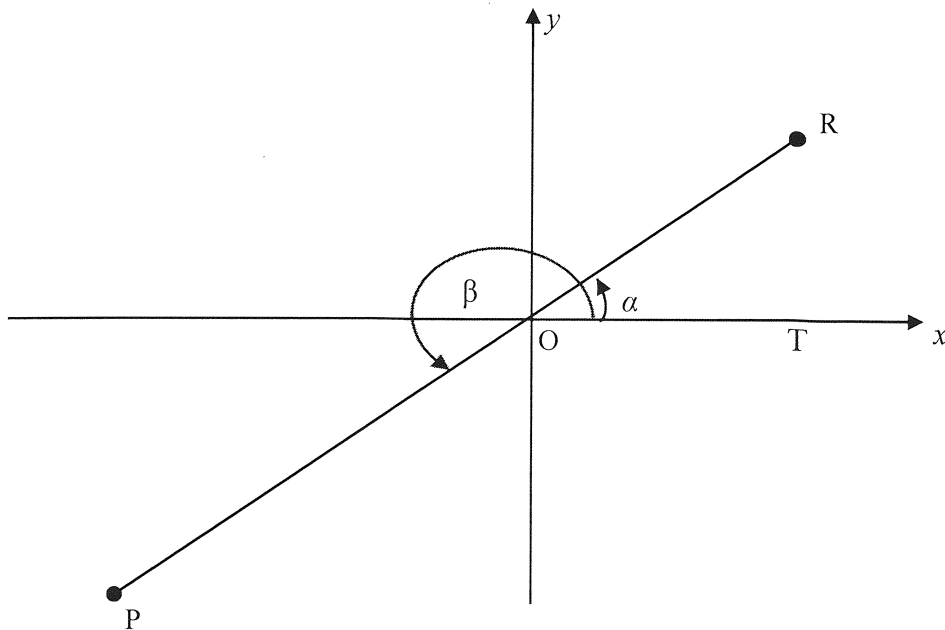
**QUESTION 5**

5.1 Simplify fully:  $\sin(90^\circ - x) \cdot \cos(180^\circ + x) + \tan x \cdot \cos x \cdot \sin(x - 180^\circ)$  (6)

5.2 Prove, WITHOUT using a calculator, that

$$\frac{\sin 315^\circ \cdot \tan 210^\circ \cdot \sin 190^\circ}{\cos 100^\circ \cdot \sin 120^\circ} = \frac{-\sqrt{2}}{3} \quad (6)$$

5.3 In the diagram below, R is a point in the first quadrant such that  $\hat{T}OR = \alpha$ .  
RO is extended to P such that  $OP = 2 RO$  and  $\hat{T}OP = \beta$ .  
It is given that  $\sin \alpha = \frac{3}{5}$ .



WITHOUT using a calculator, determine:

5.3.1 The value of  $\tan \alpha$  (3)

5.3.2 The value of  $\sin \beta$  (3)

5.3.3 The coordinates of P (4)

5.4 Prove the identity:  $\frac{\sin \theta - \tan \theta \cdot \cos^2 \theta}{\cos \theta - 1 + \sin^2 \theta} = \tan \theta$  (4)

**[26]**



**QUESTION 6**

6.1 Determine the general solution for  $\sin(x-30^\circ) = \cos 2x$  (5)

6.2 Consider the functions  $f(x) = \sin(x-30^\circ)$  and  $g(x) = \cos 2x$

6.2.1 Write down the period of  $g$ . (1)

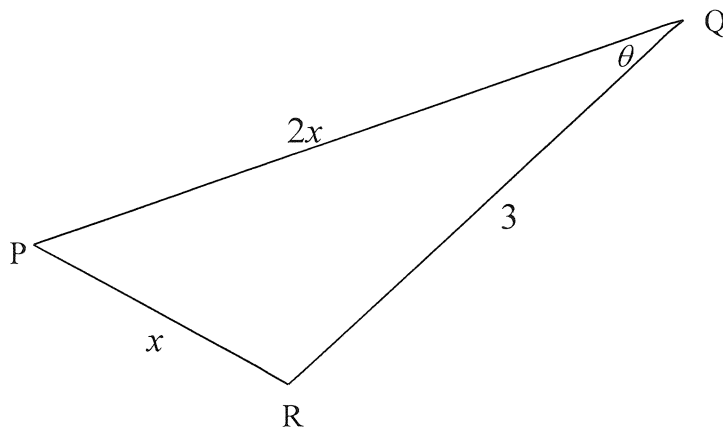
6.2.2 State the range of  $f$ . (2)

6.2.3 On the grid provided in the ANSWER BOOK, draw the graphs of  $f$  and  $g$  for  $x \in [-90^\circ; 180^\circ]$ .  
Clearly show ALL intercepts with the axes, turning points and end points. (5)

6.2.4 Write down the  $x$ -coordinates of the points of intersection of  $f$  and  $g$  in the interval  $x \in [-90^\circ; 180^\circ]$ . (3)

**[16]****QUESTION 7**

In  $\triangle PQR$ ,  $QR = 3$  units,  $PR = x$  units,  $PQ = 2x$  units and  $\hat{PQR} = \theta$ .



7.1 Show that  $\cos \theta = \frac{x^2 + 3}{4x}$  (3)

7.2 If  $x = 2,4$  units:

7.2.1 Calculate  $\theta$  (3)

7.2.2 Calculate the area of  $\triangle PQR$  (2)

7.3 Calculate the values of  $x$  for which the triangle exists. (4)

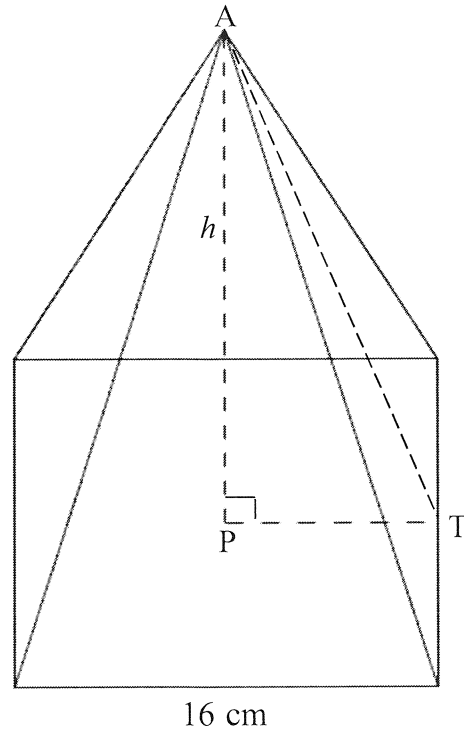
**[12]**



**QUESTION 8**

A pyramid with a square base with a side length of 16 cm is sketched below. P lies on the square base directly below A.

The volume of the pyramid is  $640 \text{ cm}^3$ .



$$\text{Volume of pyramid} = \frac{1}{3}Ah$$

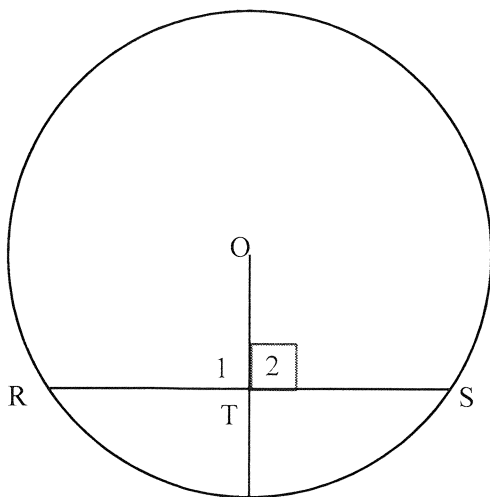
- 8.1 Show that the perpendicular height of the pyramid, AP, is 7,5 cm. (2)
- 8.2 Hence, determine the total surface area of the pyramid. (4)
- [6]**



Give reasons for your statements and calculations in QUESTIONS 9, 10, 11 and 12.

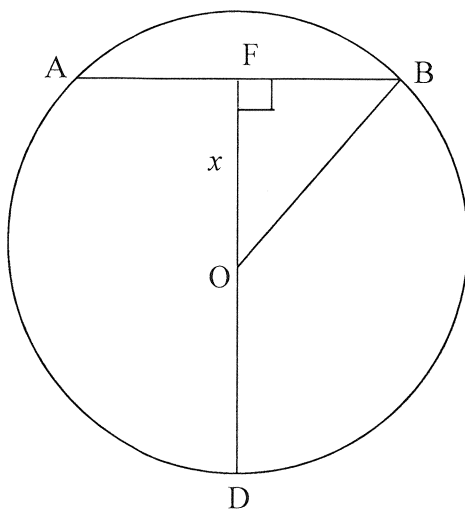
**QUESTION 9**

- 9.1 In the diagram below,  $O$  is the centre of the circle and point  $T$  lies on chord  $RS$ . Prove the theorem which states that if  $OT \perp RS$  then  $RT = TS$ .



(5)

- 9.2 In the diagram,  $O$  is the centre of circle  $ABD$ .  $F$  is a point on chord  $AB$  such that  $DOF \perp AB$ .  $AB = FD = 8$  cm and  $OF = x$  cm.



Determine the length of the radius of the circle.

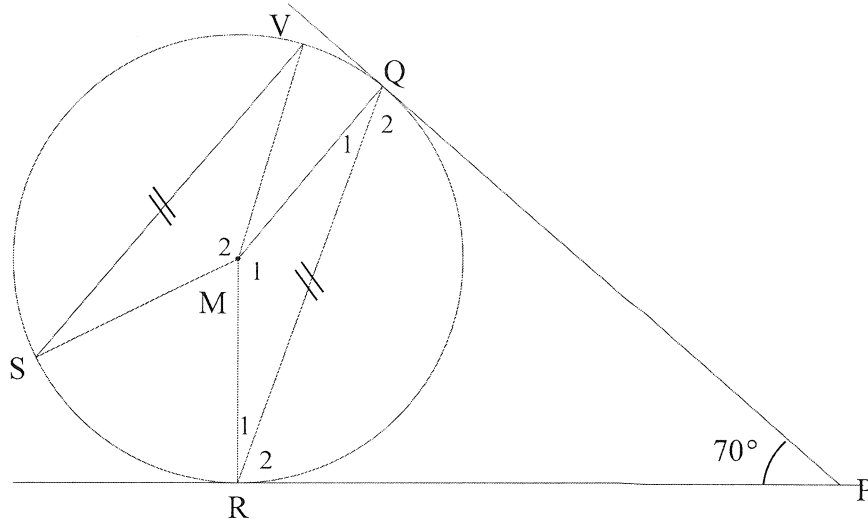
(5)  
[10]



**QUESTION 10**

M is the centre of the circle SVQR having equal chords SV and QR.

RP and QP are tangents to the circle at R and Q respectively such that  $\hat{R}PQ = 70^\circ$ .

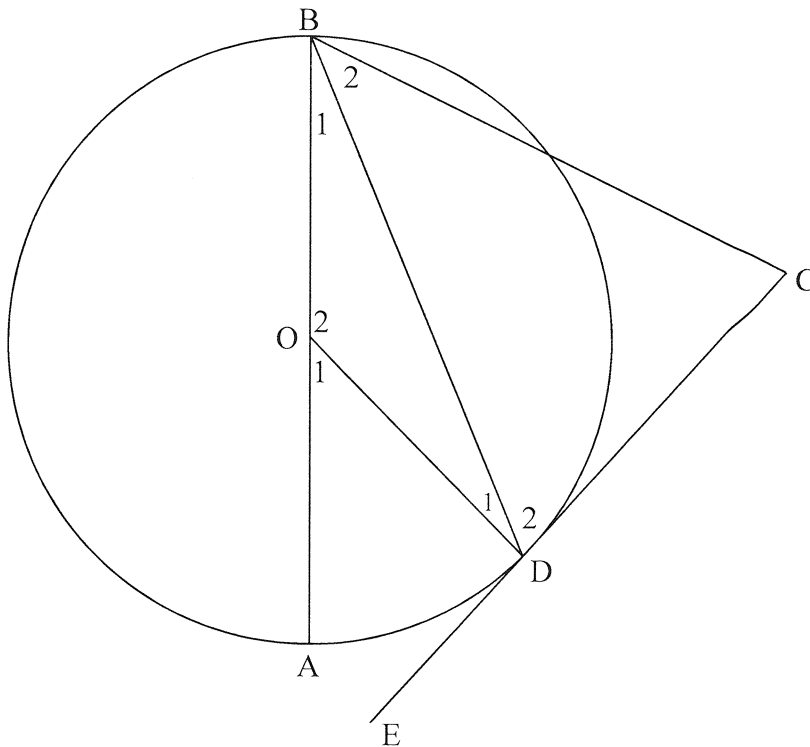


- 10.1 Calculate the size of  $\hat{R}_2$ . (4)
  - 10.2 Calculate the size of  $\hat{Q}_1$ . (2)
  - 10.3 Determine the size of  $\hat{M}_2$ . (3)
- [9]**



**QUESTION 11**

In the diagram below,  $O$  is the centre of the circle.  $CDE$  is a tangent to the circle at  $D$ .  $DB$  bisects  $\hat{A}BC$ . Let  $\hat{B}_1 = x$

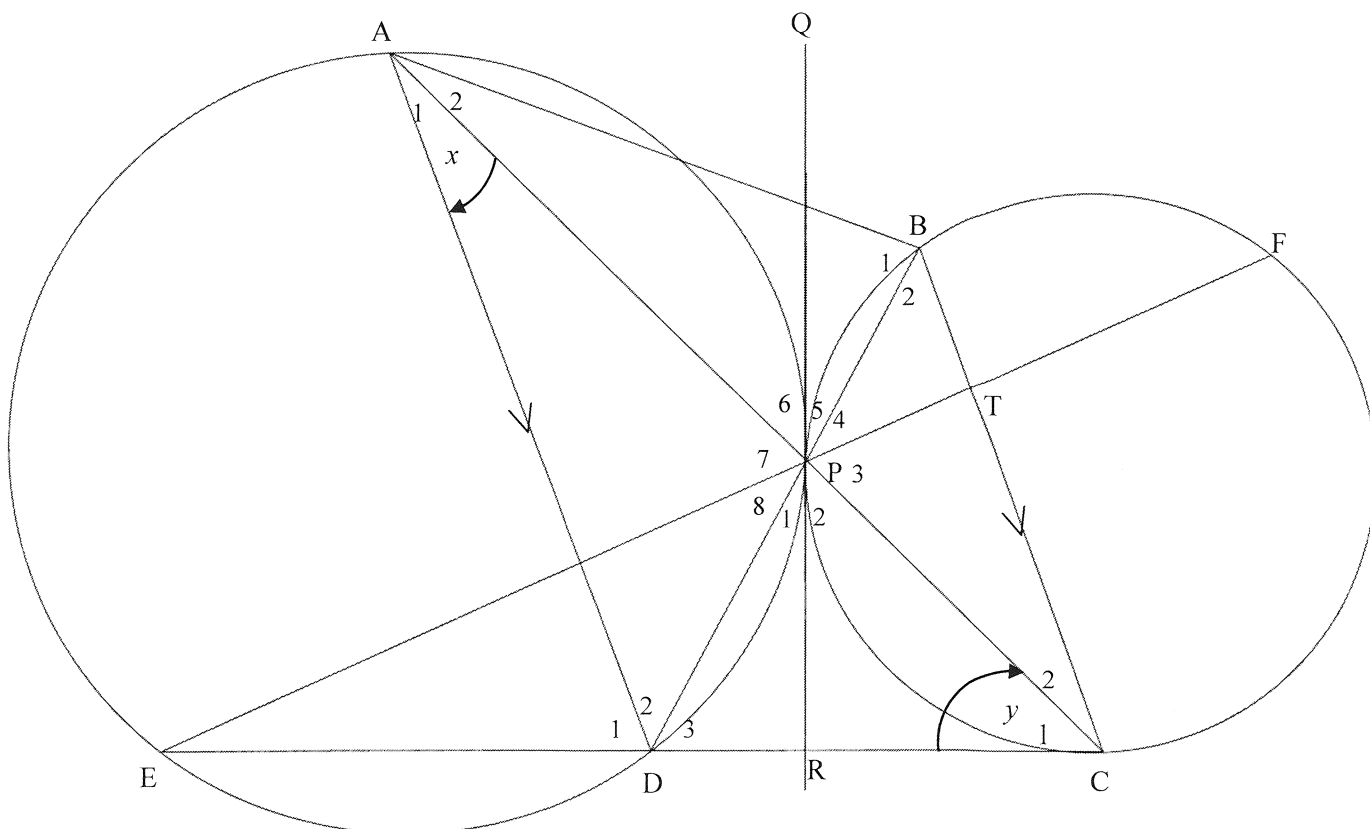


- 11.1 Prove that  $BC \parallel OD$  (4)
- 11.2 Show that  $\hat{C} = 90^\circ$  (3)
- [7]



**QUESTION 12**

In the diagram below, two circles touch each other externally at point P.  
 QPR is a common tangent to both circles at P. EDRC is a tangent to circle PBFC at C.  
 $\hat{RCA} = y$  and  $\hat{DAC} = x$ .  $AD \parallel BC$ .



- 12.1 Name, with reasons, FOUR other angles equal to  $x$ . (7)
- 12.2 Show that  $\hat{EPA} = x + y$  (4)
- 12.3 Determine the numerical value of  $x + y$ , if it is given that DCTP is a cyclic quadrilateral. (4)

[15]

**TOTAL: 150**











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

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

**MATHEMATICS P2/*WISKUNDE V2***



**GRADE/*GRAAD* 11**

**NOVEMBER 2017**

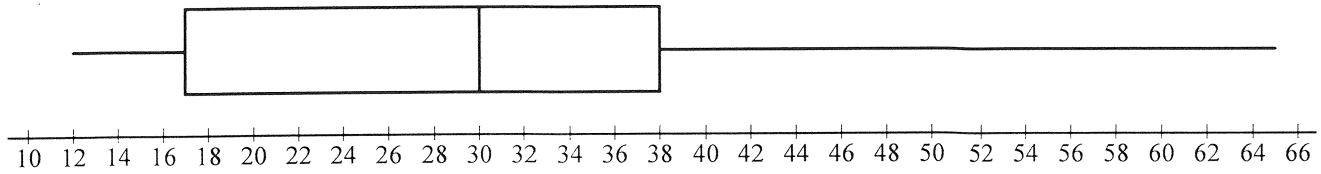
**SPECIAL ANSWER BOOK**  
***SPESIALE ANTWOORDEBOEK***

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								
9								
10								
11								
12								
TOTAL <i>TOTAAL</i> (150)								

**This answer book consists of 24 pages.**  
***Hierdie antwoordeboek bestaan uit 24 bladsye.***



**QUESTION/VRAAG 1**



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
1.1.1		(2)
1.1.2		(1)
1.1.3		(1)

5	8	10	17	20	29	32	48	50	50	63	$y$	107
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1.2.1		(2)
1.2.2		(1)
1.2.3		(3)
		<b>[10]</b>



**QUESTION/VRAAG 2**

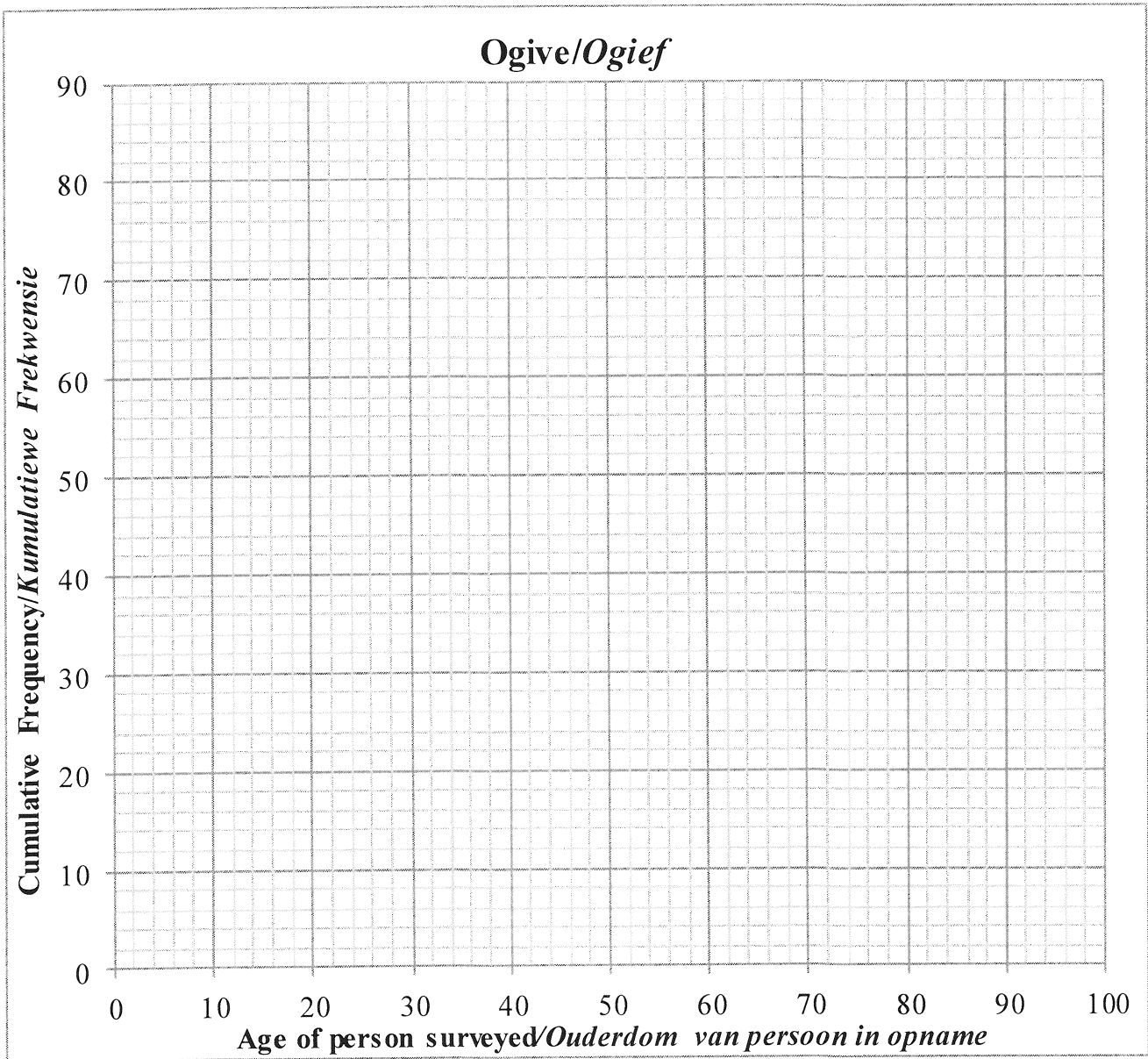
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>																								
2.1	<table border="1"> <thead> <tr> <th><b>AGE OF PERSON SURVEYED /OUDERDOM VAN PERSOON IN OPNAME</b></th> <th><b>FREQUENCY/ FREKWENSIE</b></th> <th><b>CUMULATIVE FREQUENCY/ KUMULATIEWE FREKWENSIE</b></th> </tr> </thead> <tbody> <tr> <td><math>20 &lt; x \leq 30</math></td> <td>7</td> <td>7</td> </tr> <tr> <td><math>30 &lt; x \leq 40</math></td> <td></td> <td>27</td> </tr> <tr> <td><math>40 &lt; x \leq 50</math></td> <td>25</td> <td></td> </tr> <tr> <td><math>50 &lt; x \leq 60</math></td> <td></td> <td>64</td> </tr> <tr> <td><math>60 &lt; x \leq 70</math></td> <td></td> <td>72</td> </tr> <tr> <td><math>70 &lt; x \leq 80</math></td> <td>4</td> <td></td> </tr> <tr> <td><math>80 &lt; x \leq 90</math></td> <td></td> <td>80</td> </tr> </tbody> </table>	<b>AGE OF PERSON SURVEYED /OUDERDOM VAN PERSOON IN OPNAME</b>	<b>FREQUENCY/ FREKWENSIE</b>	<b>CUMULATIVE FREQUENCY/ KUMULATIEWE FREKWENSIE</b>	$20 < x \leq 30$	7	7	$30 < x \leq 40$		27	$40 < x \leq 50$	25		$50 < x \leq 60$		64	$60 < x \leq 70$		72	$70 < x \leq 80$	4		$80 < x \leq 90$		80	(4)
<b>AGE OF PERSON SURVEYED /OUDERDOM VAN PERSOON IN OPNAME</b>	<b>FREQUENCY/ FREKWENSIE</b>	<b>CUMULATIVE FREQUENCY/ KUMULATIEWE FREKWENSIE</b>																								
$20 < x \leq 30$	7	7																								
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$60 < x \leq 70$		72																								
$70 < x \leq 80$	4																									
$80 < x \leq 90$		80																								
2.2		(1)																								
2.3		(1)																								



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
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2.4

(3)



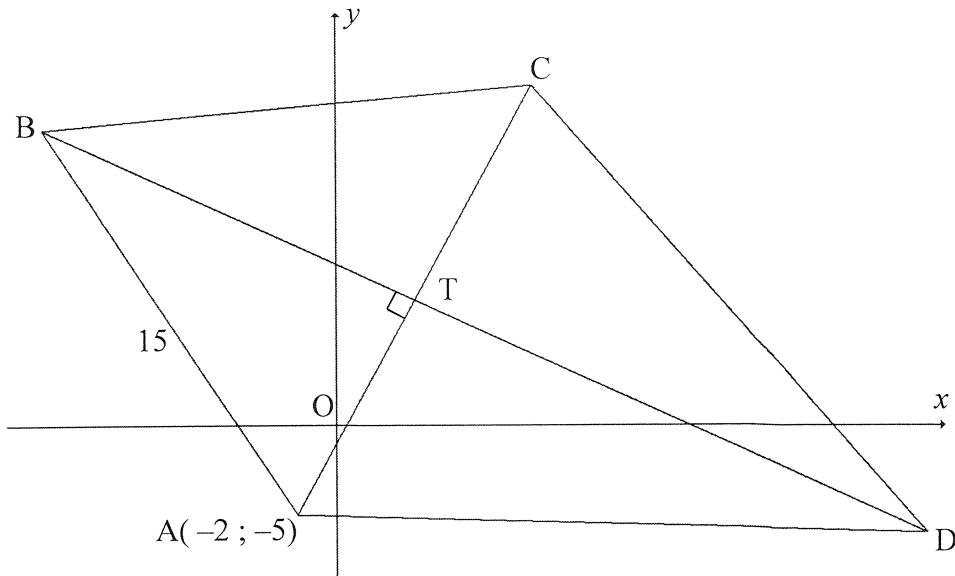
2.5		

(3)

[12]



**QUESTION/VRAAG 3**



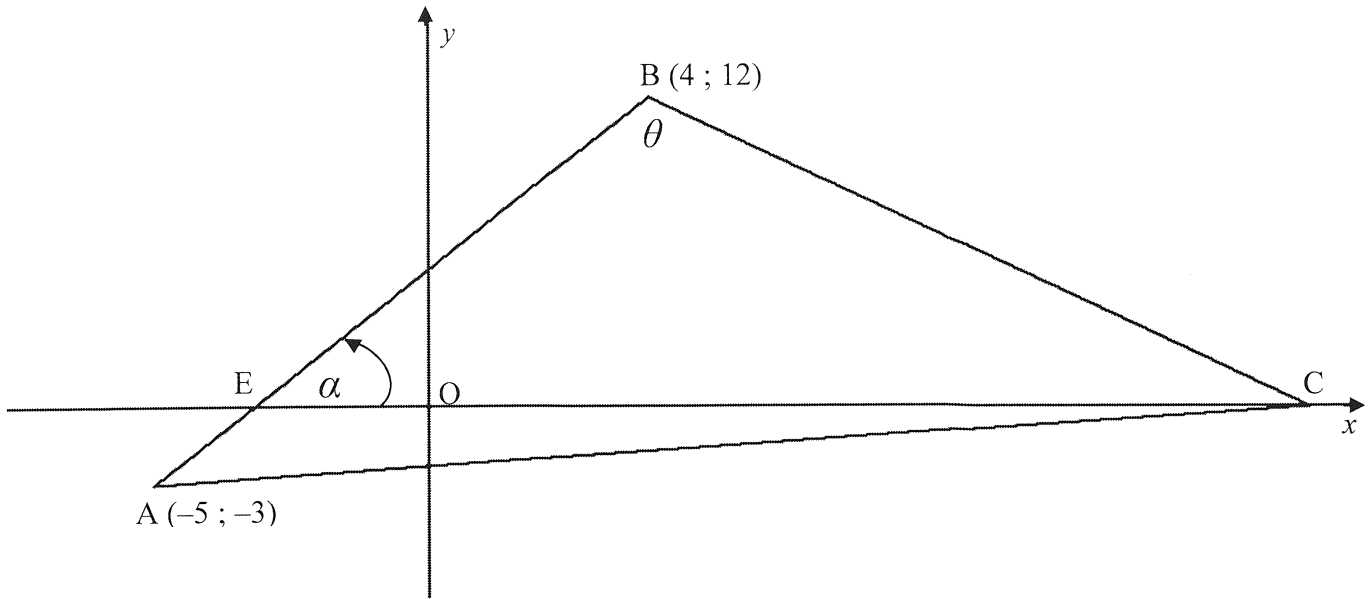
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
3.1		(2)
3.2		(2)



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
3.3		(3)
3.4.1		(2)
3.4.2		(4)
3.4.3		(2)
		<b>[15]</b>



**QUESTION/VRAAG 4**



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
4.1		(2)
4.2		(3)



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
4.3		
		(2)
4.4		
		(5)
		[12]

<b>Additional space/Bykomende ruimte</b>		
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>





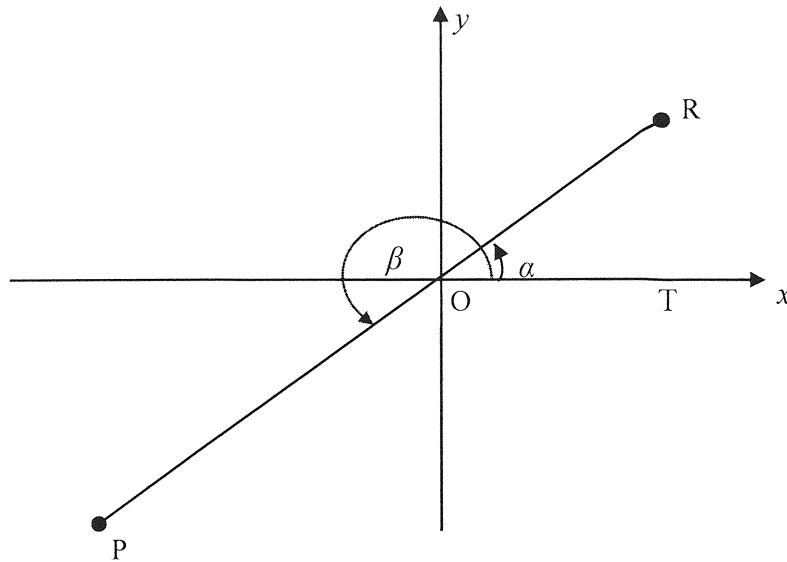
**QUESTION/VRAAG 5**

	<b>Solution/Oplossing</b>	<b>Marks Punte</b>
5.1		
5.2		

(6)

(6)





	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
5.3.1		(3)
5.3.2		(3)
5.3.3		(4)



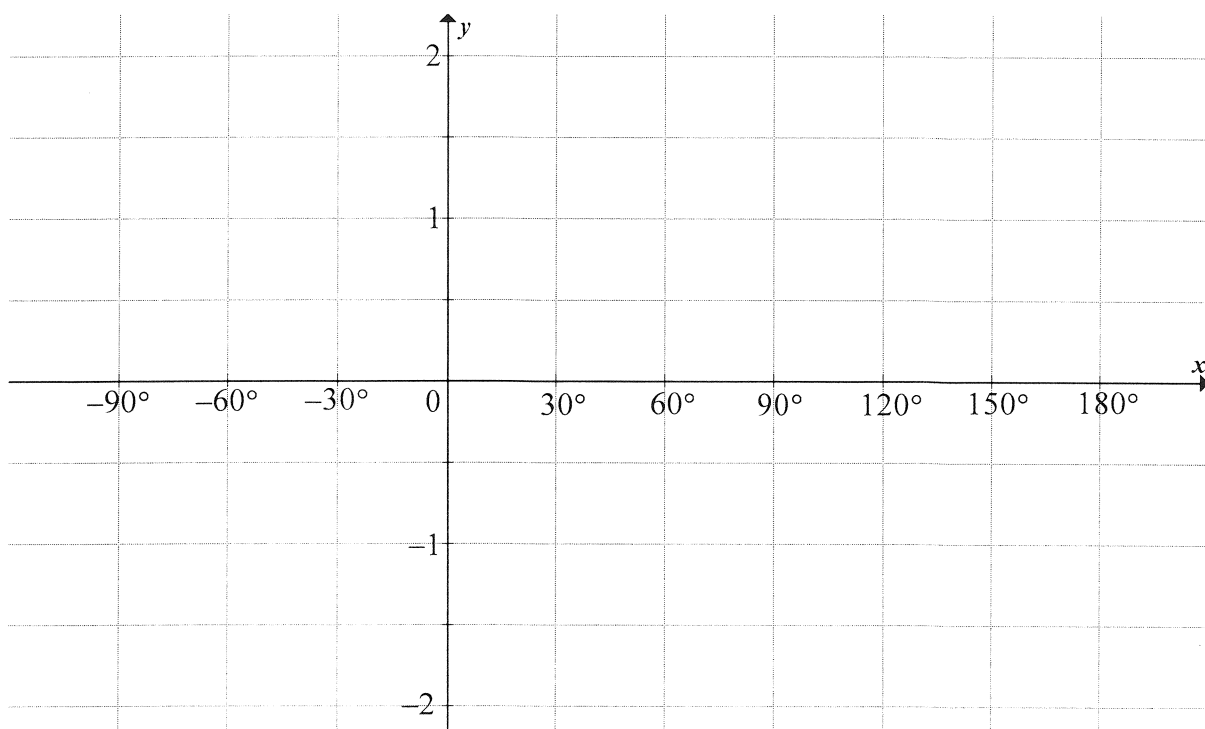
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
5.4		
		(4)
		[26]

<b>Additional space/Bykomende ruimte</b>		
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>



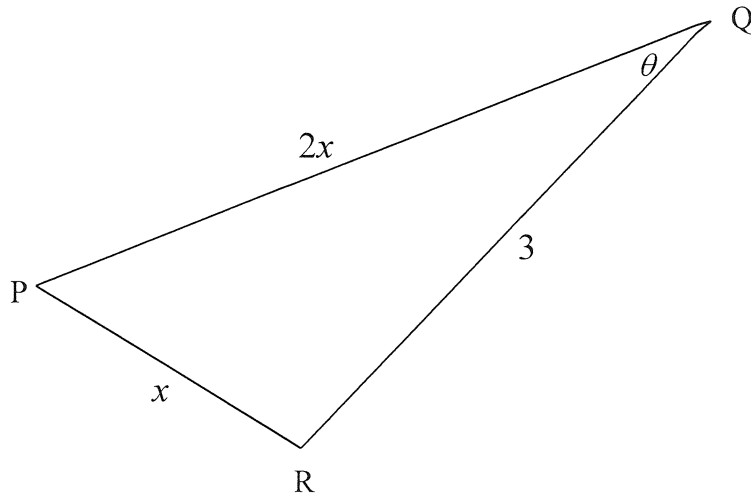
**QUESTION/VRAAG 6**

	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
6.1		
6.2.1		(5)
6.2.2		(1)
6.2.3		(2)
6.2.3		(5)



	Solution/Oplissing	Marks Punte
6.2.4		(3)
		[16]

**QUESTION/VRAAG 7**



	Solution/Oplissing	Marks Punte
7.1		(3)
7.2.1		(3)

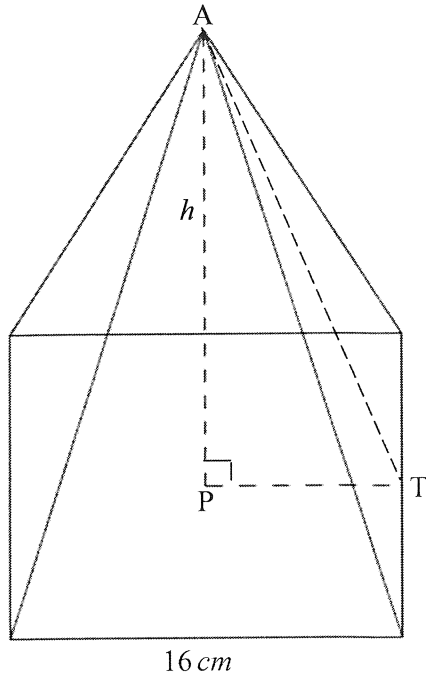


	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
7.2.2		
		(2)
7.3		
		(4)
		<b>[12]</b>

<b>Additional space/Bykomende ruimte</b>		
	<b>Solution/Oplissing</b>	<b>Marks Punte</b>



**QUESTION/VRAAG 8**



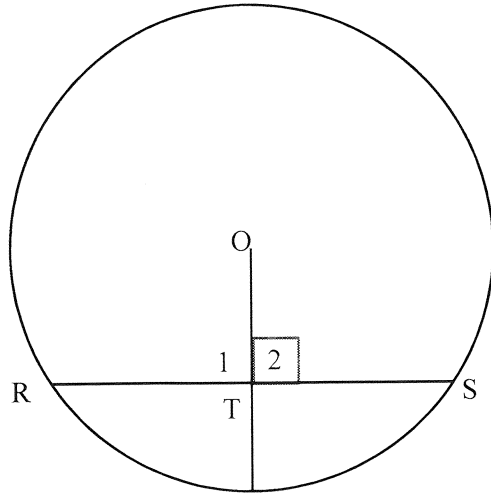
<p>Volume of pyramid = <math>\frac{1}{3} Ah</math></p>
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	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
8.1		(2)
8.2		(4)
		<b>[6]</b>



Give reasons for your statements and calculations in QUESTIONS 9, 10, 11 and 12.  
 Gee redes vir jou bewerings en berekeninge in VRAAG 9, 10, 11 en 12.

**QUESTION/VRAAG 9**



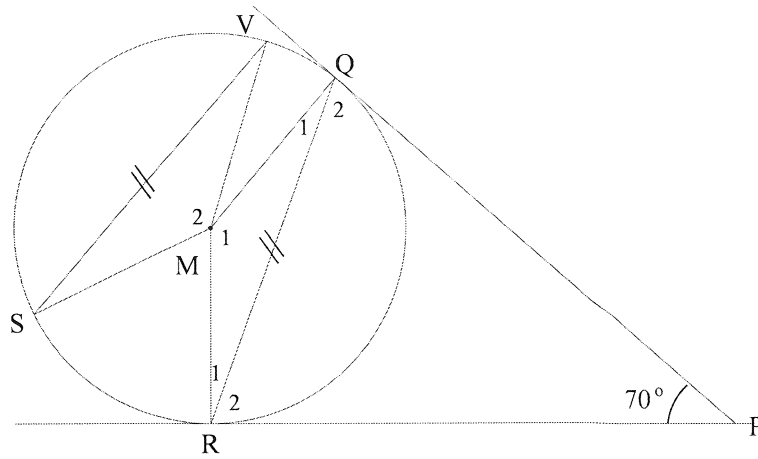
	Solution/Oplissing	Marks Punte
9.1	<div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; height: 20px; margin-bottom: 5px;"></div>	(5)







**QUESTION/VRAAG 10**

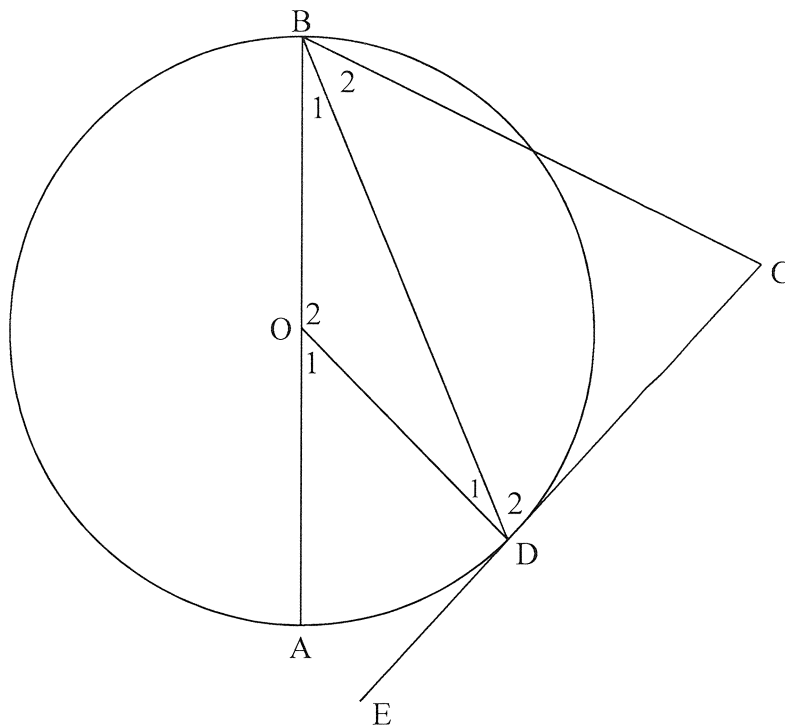


	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
10.1		(4)
10.2		(2)





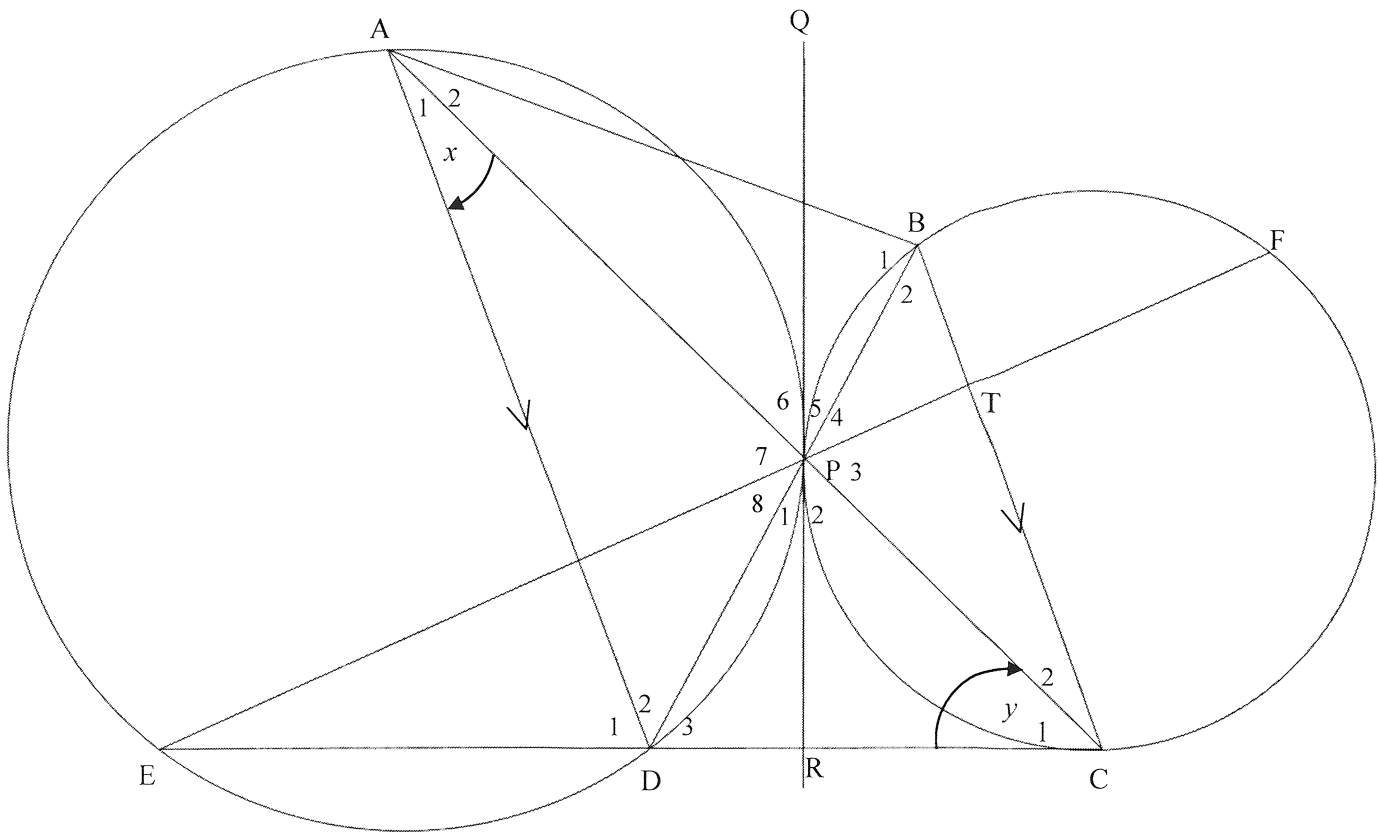
**QUESTION/VRAAG 11**



	<i>Solution/Oplossing</i>	<b>Marks Punte</b>
11.1		(4)
11.2		(3)
		<b>[7]</b>



**QUESTION/VRAAG 12**



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
12.1	<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)



	<b>Solution/Oplissing</b>	<b>Marks Punte</b>
12.2		
12.3		
		(4)
		(4)
		[15]

**TOTAL/TOTAAL: 150**









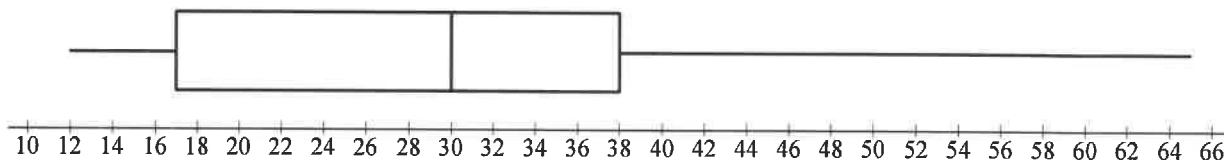
**NOTE:**

- If a candidate answered 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 guidelines.
- 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 nasienriglyne van toepassing.
- Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.

**QUESTION/VRAAG 1**

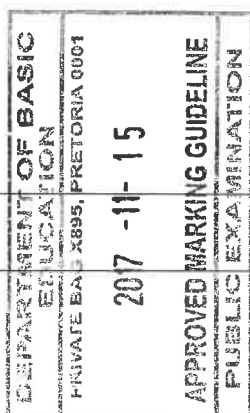


1.1.1	$\min = 12$ $Q_1 = 17$ $Q_2 = \text{median} / \text{mediaan} = 30$ $Q_3 = 38$ $\max = 65$	✓ min + max ✓ median, $Q_1$ and/en $Q_3$ (2)
1.1.2	$IQR = Q_3 - Q_1$ $= 38 - 17$ $= 21$	✓ answer/antw (1)
1.1.3	Skewed to the right OR positively skewed <i>Skeef na regs OF positief skeef</i>	✓ answer/antw (1)

5	8	10	17	20	29	32	48	50	50	63	$y$	107
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1.2.1	$\text{Mean/Gemiddeld} = \frac{439 + y}{13}$ $41 = \frac{439 + y}{13}$ $439 + y = 533$ $y = 94$	✓ $41 = \frac{439 + y}{13}$ ✓ answer/antw (2)
1.2.2	$\sigma = 30,94$	✓ answer/antw (1)

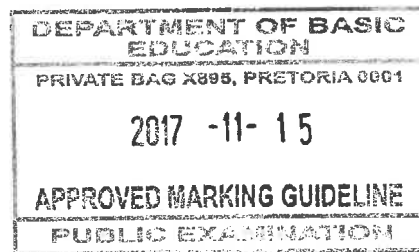
4



1.2.3	$41 \times 13 = 533$ $18 \times 6 = 108$ Overall mean time : $\frac{533 + 108}{19} = \frac{641}{19} = 33,74$	✓ 108 ✓ $533 + 108 = 641$ ✓ answer/antw (3) <b>[10]</b>
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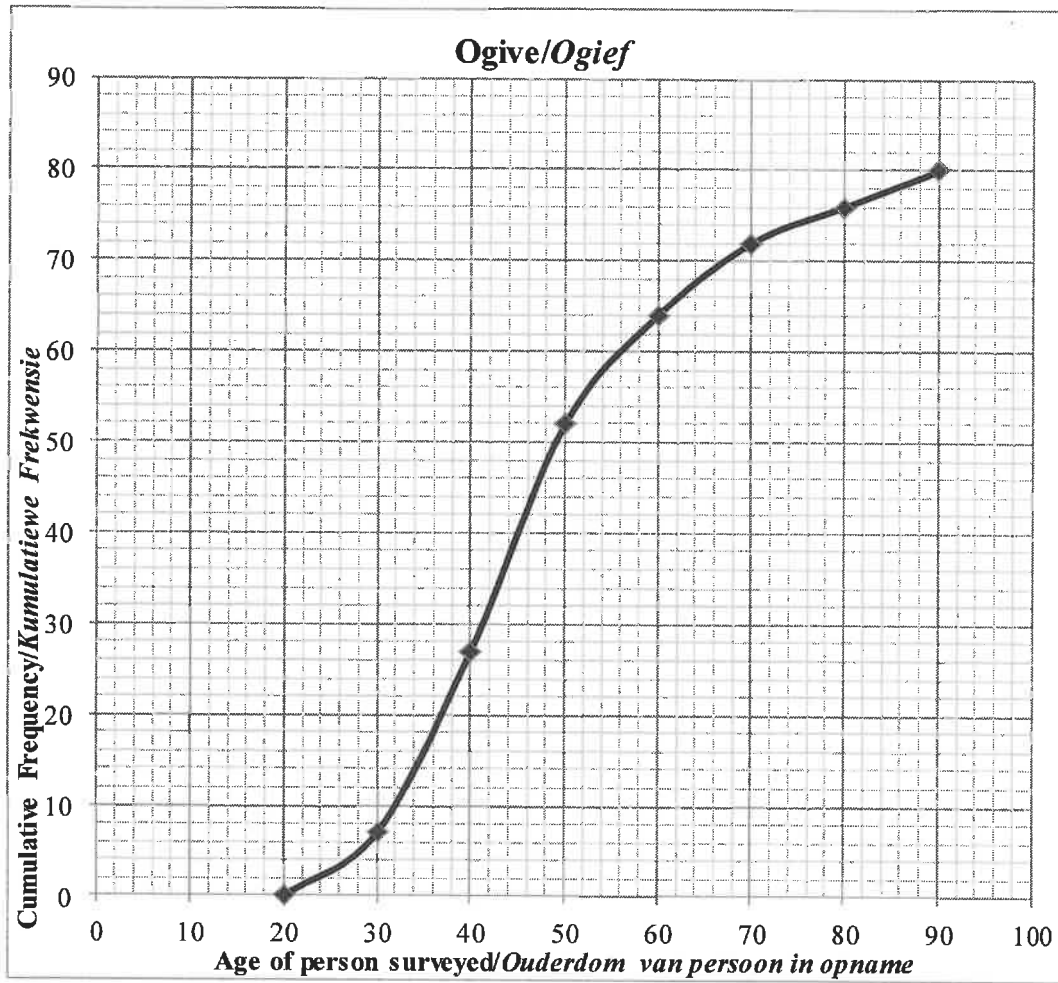
**QUESTION/VRAAG 2**

2.1	<b>AGE OF PERSON SURVEYED/OUDERDOM VAN PERSOON IN OPNAME</b>	<b>FREQUENCY/FREKWENSIE</b>	<b>CUMULATIVE FREQUENCY/KUMULATIEWE FREKWENSIE</b>	✓ 20, 12 ✓ 8, 4 ✓ 52 ✓ 76 (4)
	$20 < x \leq 30$	7	7	
	$30 < x \leq 40$	<b>20</b>	27	
	$40 < x \leq 50$	25	<b>52</b>	
	$50 < x \leq 60$	<b>12</b>	64	
	$60 < x \leq 70$	<b>8</b>	72	
	$70 < x \leq 80$	4	<b>76</b>	
	$80 < x \leq 90$	4	80	
2.2	$n = 80$			✓ answ/antw (1)
2.3	$40 < x \leq 50$			✓ answ/antw (1)



✍

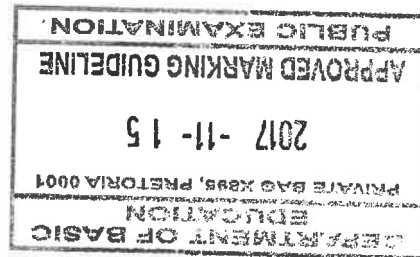
2.4



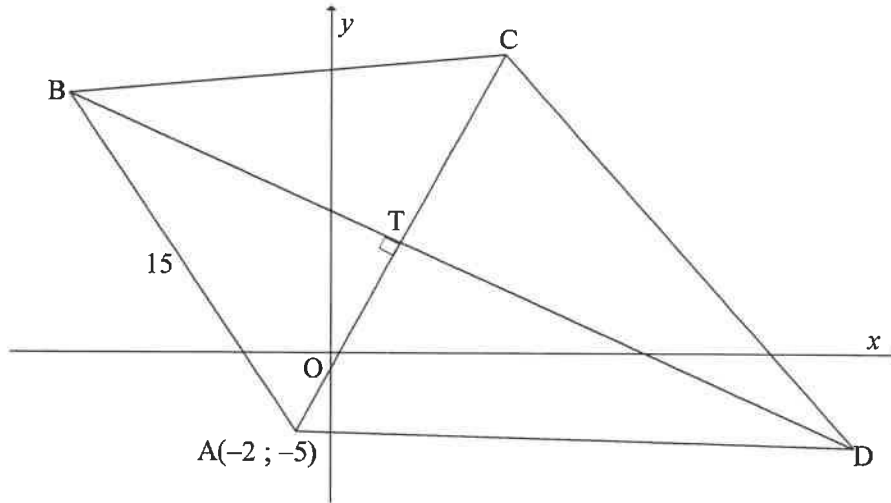
- ✓ Grounding (20; 0)  
/Geanker by (20; 0)
  - ✓ upper limits/  
boonste limiete
  - ✓ shape  
(smooth curve)/  
vorm  
(gladde kurwe)
- (3)

2.5	$80 - 58 = 22$ $\frac{22}{80} \times 100 = 27,5\%$	<b>Accept/aanvaar: 56 – 59 calls/oproepe</b>	✓ 58 calls/oproepe ✓ 22 ✓ 27,5% (3) <b>[12]</b>
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CH

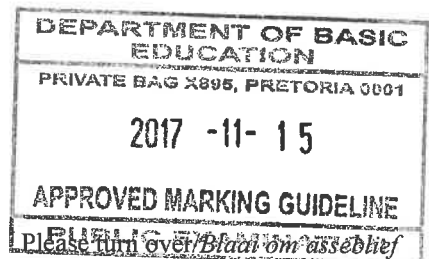


**QUESTION/VRAAG 3**

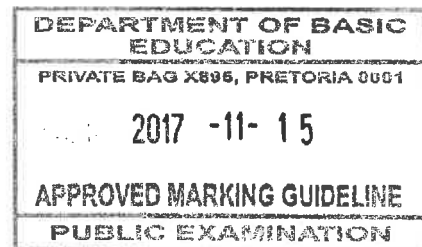


<p>3.1</p>	<p><math>BD \quad y = -\frac{1}{2}x + 9</math>  <math>\therefore m_{BD} = -\frac{1}{2}</math>  <math>\therefore m_{AC} = 2</math></p>	<p>✓ Standard form/vorm                   ✓ answ/antw                  (2)</p>
<p>3.2</p>	<p><math>y - y_1 = m(x - x_1)</math>  <math>y - (-5) = 2(x - (-2))</math>  <math>y = 2x - 1</math></p>	<p>✓ subst (-2 ; -5)                  ✓ answ/antw                  (2)</p>
<p>3.3</p>	<p><math>2x - 1 = -\frac{1}{2}x + 9</math> OR / OF  <math>\frac{5}{2}x = 10</math>  <math>x = 4</math>   <math>y = 2(4) - 1</math>  <math>y = 7</math>   <math>T(4 ; 7)</math></p>	<p>✓ <math>2x - 1 = -\frac{1}{2}x + 9</math>                  ✓ <math>x = 4</math>                   ✓ <math>y = 7</math> (3)   <b>OR/OF</b>                  ✓ <math>2(2x - 1) + x = 18</math>                  ✓ <math>x = 4</math>                   ✓ <math>y = 7</math>                  (3)</p>

4

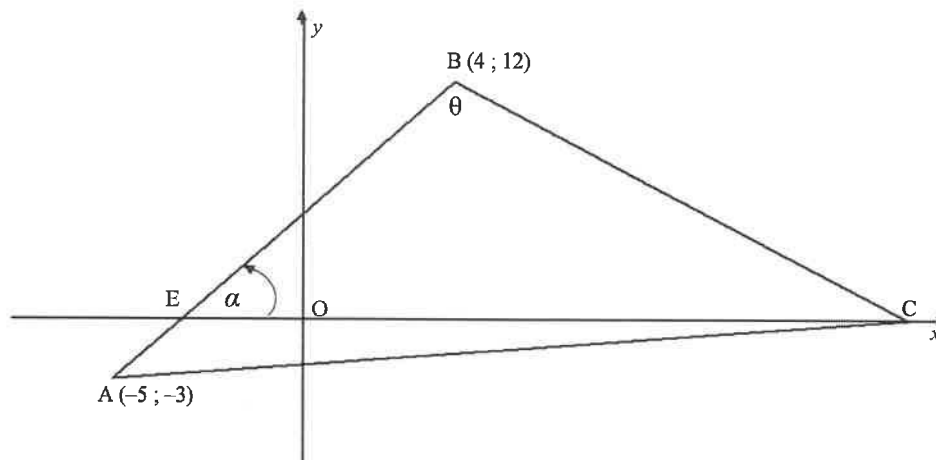


<p>3.4.1</p>	$4 = \frac{-2+x}{2}$ $8 = -2+x$ $x = 10$ $7 = \frac{-5+y}{2}$ $14 = -5+y$ $y = 19$ <p>C(10 ; 19)</p>	<p>✓ <math>x = 10</math></p> <p>✓ <math>y = 19</math></p> <p>(2)</p>
<p>3.4.2</p>	$AT = \sqrt{(4 - (-2))^2 + (7 - (-5))^2}$ $= \sqrt{180}$ $= 6\sqrt{5} = 13,42$ $BT^2 + AT^2 = AB^2 \quad (\text{Pythagoras})$ $BT = \sqrt{15^2 - (\sqrt{180})^2}$ $= \sqrt{45}$ $= 3\sqrt{5} = 6,71$	<p>✓ subst. in distance/afstand form.</p> <p>✓ answer/antw in any form</p> <p>✓ subst. in pyth</p> <p>✓ answer/antw</p> <p>(4)</p>
<p>3.4.3</p>	<p>BC is the diameter/ <i>middellyn</i> [subt. right / <i>ondersp. reg</i> <math>\angle</math>] or/o          [conv. <math>\angle^s</math> in semi - circle/ <i>omgk.</i> <math>\angle^s</math> in <i>halfsi</i>rkel]</p> $\text{Radius} = \frac{15}{2} = 7,5 \text{ units/ eenh.}$	<p>✓✓ answ/antw</p> <p>(2)</p> <p>[15]</p>

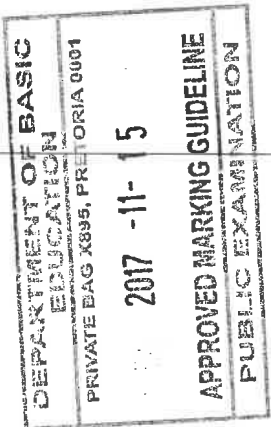


GH

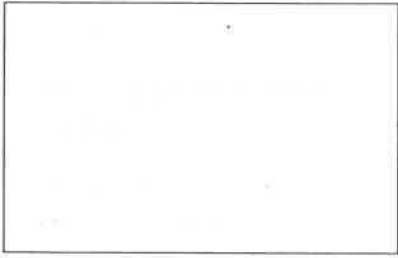
**QUESTION/VRAAG 4**



<p>4.1</p>	$m_{AB} = \frac{12 - (-3)}{4 - (-5)} = \frac{5}{3}$ <p><b>OR/OF</b></p> $m_{AB} = \frac{-3 - 12}{-5 - 4} = \frac{5}{3}$	<p>✓ subst. in gradient form.                  ✓ answ/antw                  (2)</p>
<p>4.2</p>	$y - 12 = \frac{5}{3}(x - 4)$ $0 - 12 = \frac{5}{3}(x - 4)$ $x = -\frac{16}{5}$ $E\left(-\frac{16}{5}; 0\right)$ <p><b>OR/OF</b></p> $\frac{0 - 12}{x - 4} = \frac{5}{3}$ $-36 = 5x - 20$ $-16 = 5x$ $x = -\frac{16}{5}$ $E\left(-\frac{16}{5}; 0\right)$	<p>✓ equation/verg.                  ✓ <math>y = 0</math>                  ✓ answ/antw                  (3)</p> <p>✓ equating/verg.                  ✓ <math>y = 0</math></p> <p>✓ answ/antw                  (3)</p>



GF

	$= AB$ 	
4.4	$\hat{BCX} = 76^\circ + 59^\circ = 135^\circ$ [ext $\angle$ of $\Delta$ ]  $\tan 135^\circ = m_{BC}$ $m_{BC} = -1 = m_{ll}$  $y - (-3) = -1(x - (-5))$ $y = -x - 8$	<ul style="list-style-type: none"> <li>✓ <math>\tan 135^\circ = m_{BC}</math></li> <li>✓ answer/antw</li> <li>✓ subst <math>(-3 ; -5)</math></li> <li>✓ answer/antw</li> </ul> <p style="text-align: right;">(5) [12]</p>

### QUESTION/VRAAG 5

5.1	$\sin(90^\circ - x) \cdot \cos(180^\circ + x) + \tan x \cdot \cos x \cdot \sin(x - 180^\circ)$ $\cos x \cdot (-\cos x) + \frac{\sin x}{\cos x} \cdot \cos x \cdot (-\sin x)$ $= -\cos^2 x - \sin^2 x$ $-(\cos^2 x + \sin^2 x)$ $-1$	<ul style="list-style-type: none"> <li>✓ <math>\cos x</math></li> <li>✓ <math>-\cos x</math></li> <li>✓ <math>\sin x</math></li> <li>✓ <math>\cos x</math></li> <li>✓ <math>-\sin x</math></li> <li>✓ common factor/gemene fakt.</li> <li>✓ identity/identiteit</li> </ul> <p style="text-align: right;">(6)</p>
5.2	$\text{LHS} = \frac{\sin 315^\circ \cdot \tan 210^\circ \cdot \sin 190^\circ}{\cos 100^\circ \cdot \sin 120^\circ}$ $= \frac{(-\sin 45^\circ) \cdot (\tan 30^\circ) \cdot (-\sin 10^\circ)}{(-\sin 10^\circ) \cdot (\sin 60^\circ)}$ $= \frac{-1 \cdot 1}{-\frac{\sqrt{3}}{2}}$ $= -\frac{\sqrt{2}}{3}$	<ul style="list-style-type: none"> <li>✓ <math>-\sin 45^\circ</math></li> <li>✓ <math>\tan 30^\circ</math></li> <li>✓ <math>-\sin 10^\circ</math></li> <li>✓ <math>-\sin 10^\circ</math></li> <li>✓ <math>\sin 60^\circ</math></li> <li>✓ subst. of special angles/inverv. van sp hoeke</li> </ul> <p style="text-align: right;">(6)</p>

4



# basic education

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

**NATIONAL  
SENIOR CERTIFICATE  
NASIONALE  
SENIOR SERTIFIKAAT**

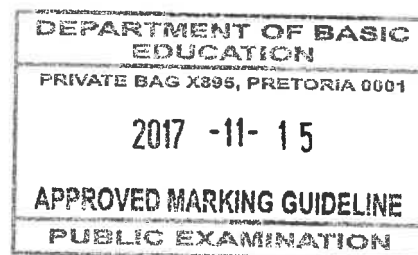
**GRADE/GRAAD 11**

**MATHEMATICS P2/WISKUNDE V2**

**NOVEMBER 2017**

**MARKING GUIDELINES/NASIENRIGLYNE**

**MARKS/PUNTE: 150**



**These marking guidelines consist of 20 pages.  
Hierdie nasienriglyne bestaan uit 20 bladsye.**

*Grovender*  
15/11/2017