



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIORSERTIFIKAAT-EKSAMEN

WISKUNDE V2

2018

PUNTE: 150

TYD: 3 uur

**Hierdie vraestel bestaan uit 13 bladsye, 1 inligtingsblad
en 'n antwoordeboek van 27 bladsye.**

INSTRUKSIES EN INLIGTING

Lees die volgende instruksies aandagtig deur voordat die vrae beantwoord word.

1. Hierdie vraestel bestaan uit 10 vrae.
2. Beantwoord AL die vrae in die SPESIALE ANTWOORDEBOEK wat verskaf word.
3. Dui ALLE berekeninge, diagramme, grafieke ens. wat jy in die beantwoording van die vrae gebruik, duidelik aan.
4. Slegs antwoorde sal NIE noodwendig volpunte verdien NIE.
5. Jy mag 'n goedgekeurde wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, tensy anders aangedui.
6. Tensy anders aangedui, rond antwoorde tot TWEE desimale plekke af.
7. Diagramme is NIE noodwendig volgens skaal geteken NIE.
8. 'n Inligtingsblad met formules is aan die einde van die vraestel ingesluit.
9. Skryf netjies en leesbaar.

VRAAG 1

Die maandelikse wins (in duisende rand) wat 'n maatskappy in 'n jaar maak, word in die tabel hieronder aangetoon.

110	112	156	164	167	169
171	176	192	228	278	360

- 1.1 Bereken die:
- 1.1.1 Gemiddelde wins vir die jaar (3)
- 1.1.2 Mediaanwins vir die jaar (1)
- 1.2 Gebruik die getallelyn wat in die ANTWOORDEBOEK verskaf word en teken 'n mond-en-snordigram (boksplot) om die data voor te stel. (2)
- 1.3 Bepaal vervolgens die interkwartielvariasiewydte van die data. (1)
- 1.4 Lewer kommentaar op die skeefheid van die verspreiding van die data. (1)
- 1.5 Vir die gegewe data:
- 1.5.1 Bereken die standaardafwyking (1)
- 1.5.2 Bepaal die aantal maande waarin die wins minder as een standaardafwyking onder die gemiddelde was (2)

[11]

VRAAG 2

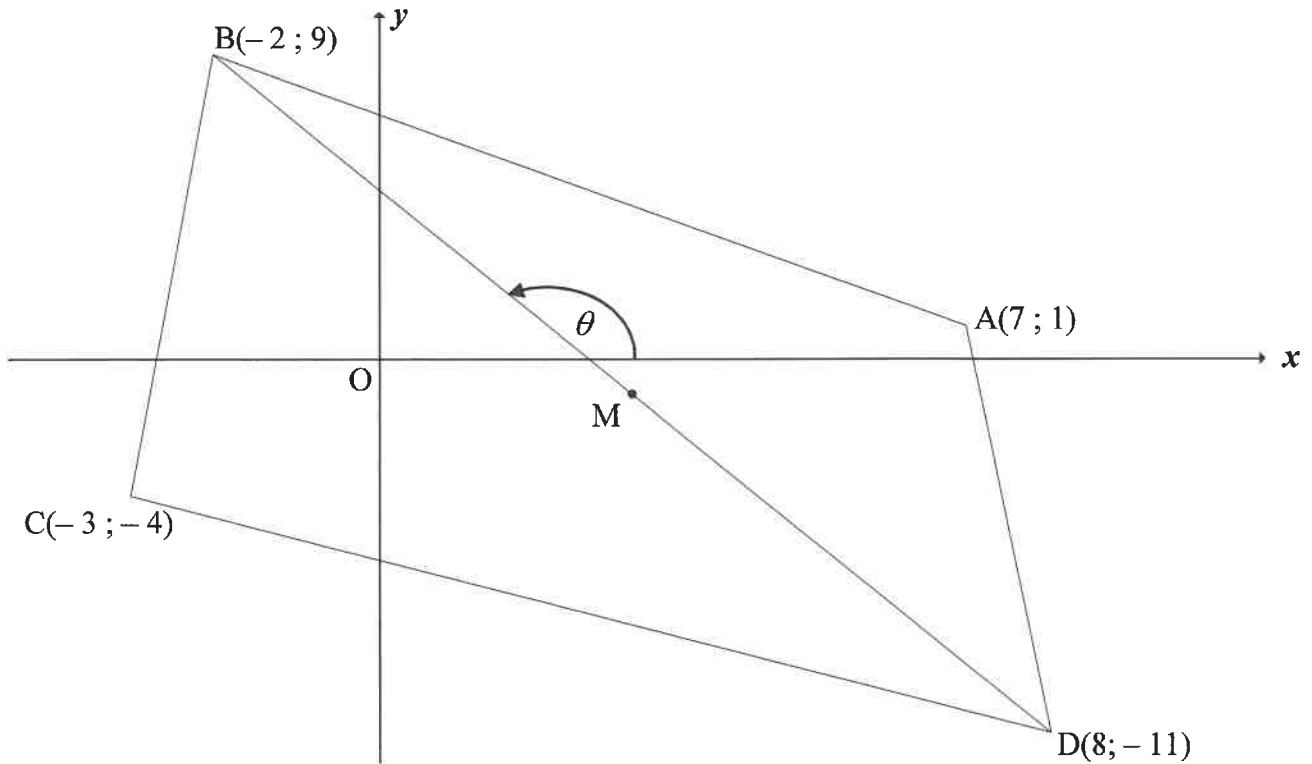
Daar word beweer dat die aantal keer wat 'n kriek in 'n minuut tjirp 'n goeie aanduiding is van die lugtemperatuur (in °C). Die tabel hieronder toon die inligting wat gedurende 'n navorsing-studie aangeteken is.

TJIRPGELUIDE PER MINUUT	LUGTEMPERATUUR IN °C
32	8
40	10
52	12
76	15
92	17
112	20
128	25
180	28
184	30
200	35

- 2.1 Stel die data hierbo op die rooster wat in die ANTWOORDEBOEK verskaf word, voor. (3)
- 2.2 Verduidelik waarom die woorde, ' 'n goeie aanduiding is', WAAR is. (1)
- 2.3 Bepaal die vergelyking van die kleinstekwadrate-regressielyn van die data. (3)
- 2.4 Voorspel die lugtemperatuur (in °C) as 'n kriek 80 keer 'n minuut tjirp. (2)
- [9]

VRAAG 3

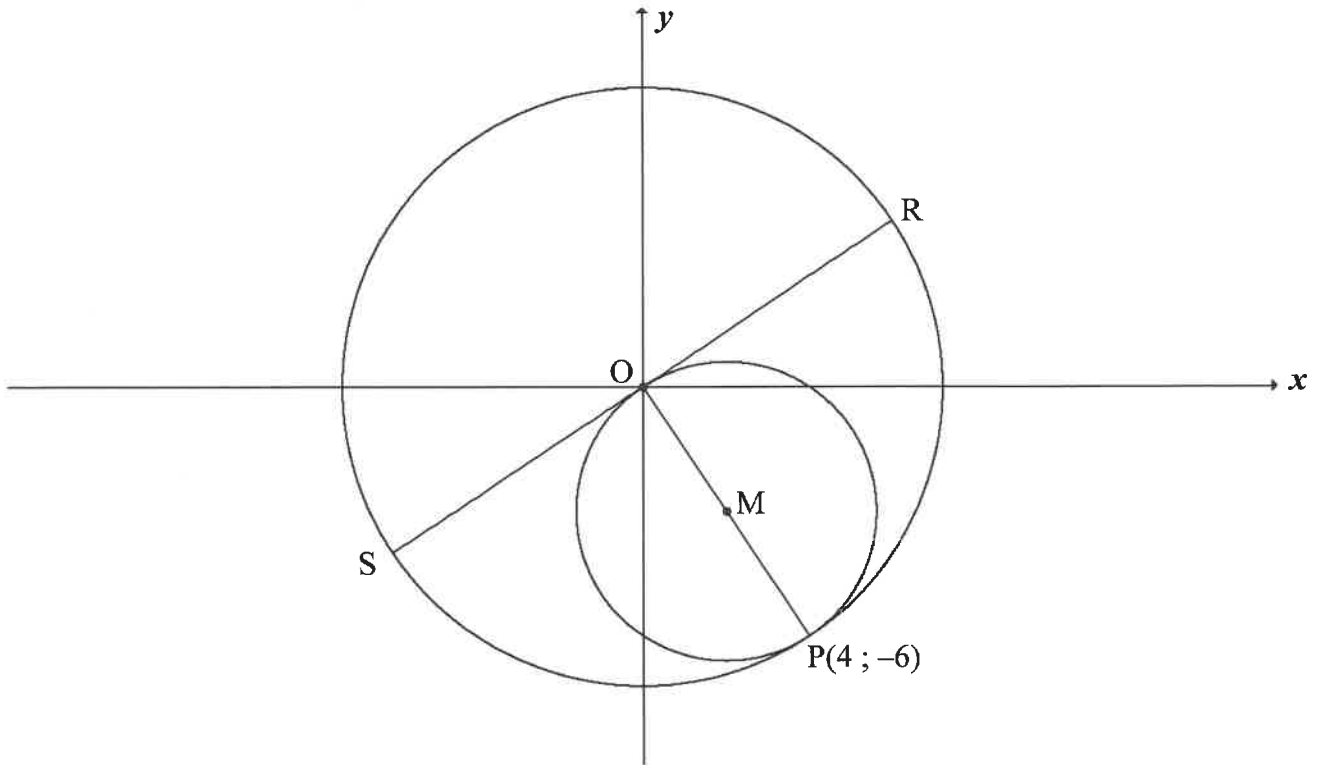
In die diagram is ABCD 'n vierhoek met hoekpunte $A(7; 1)$, $B(-2; 9)$, $C(-3; -4)$ en $D(8; -11)$. M is die middelpunt van BD.



- 3.1 Bereken die gradiënt van AC. (2)
- 3.2 Bepaal:
- 3.2.1 Die vergelyking van AC in die vorm $y = mx + c$ (2)
- 3.2.2 Of M op die lyn AC lê (4)
- 3.3 Bewys dat $BD \perp AC$. (3)
- 3.4 Bereken:
- 3.4.1 θ , die inklinasie van BD (2)
- 3.4.2 Die grootte van $\hat{C}BD$ (3)
- 3.4.3 Die lengte van AC (2)
- 3.4.4 Die oppervlakte van ABCD (5)
- [23]

VRAAG 4

In die diagram gaan 'n sirkel, met die oorsprong as middelpunt, deur $P(4; -6)$. PO is die middellyn van 'n kleiner sirkel met middelpunt by M . Die middellyn RS van die groter sirkel is 'n raaklyn aan die kleiner sirkel by O .



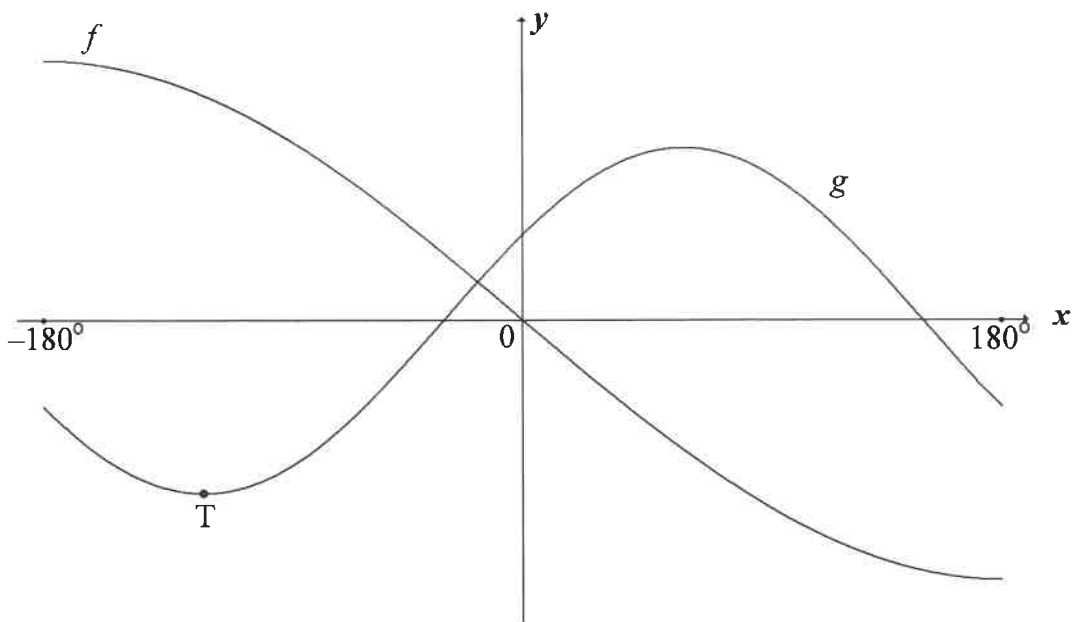
- 4.1 Bereken die koördinate van M . (2)
- 4.2 Bepaal die vergelyking van:
- 4.2.1 Die groot sirkel (2)
- 4.2.2 Die klein sirkel in die vorm $x^2 + y^2 + Cx + Dy + E = 0$ (3)
- 4.2.3 Die vergelyking van RS in die vorm $y = mx + c$ (3)
- 4.3 Bepaal die lengte van koord NR , waar N die refleksie van R in die y -as is. (4)
- 4.4 Die sirkel, met middelpunt M , word om die x -as gereflekteer om nog 'n sirkel, met middelpunt K , te vorm. Bereken die lengte van die gemeenskaplike koord van hierdie twee sirkels. (3)
- [17]

VRAAG 5

- 5.1 In $\triangle MNP$ is $\hat{N} = 90^\circ$ en $\sin M = \frac{15}{17}$.
Bepaal, **sonder die gebruik van 'n sakrekenaar**:
- 5.1.1 $\tan M$ (3)
- 5.1.2 Die lengte van NP as $MP = 51$ (2)
- 5.2 Vereenvoudig tot 'n enkele term: $\cos(x - 360^\circ) \cdot \sin(90^\circ + x) + \cos^2(-x) - 1$ (4)
- 5.3 Beskou: $\sin(2x + 40^\circ) \cos(x + 30^\circ) - \cos(2x + 40^\circ) \sin(x + 30^\circ)$
- 5.3.1 Skryf as 'n enkele trigonometriese term in die eenvoudigste vorm. (2)
- 5.3.2 Bepaal die algemene oplossing van die volgende vergelyking:
 $\sin(2x + 40^\circ) \cos(x + 30^\circ) - \cos(2x + 40^\circ) \sin(x + 30^\circ) = \cos(2x - 20^\circ)$ (7)
- [18]

VRAAG 6

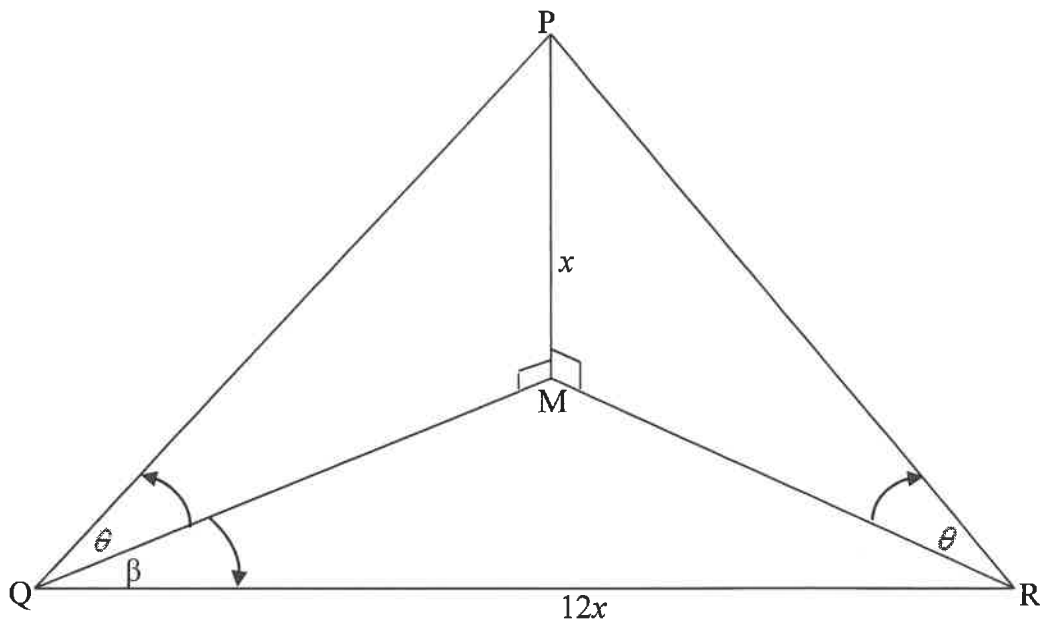
In die diagram is die grafieke van $f(x) = -3 \sin \frac{x}{2}$ en $g(x) = 2 \cos(x - 60^\circ)$ in die interval $x \in [-180^\circ; 180^\circ]$ geskets. T(p ; q) is 'n draaipunt van g met $p < 0$.



- 6.1 Skryf die periode van f neer. (1)
 - 6.2 Skryf die waardeversameling van g neer. (2)
 - 6.3 Bereken $f(p) - g(p)$. (3)
 - 6.4 Gebruik die grafieke om die waarde(s) van x , in die interval $x \in [-180^\circ; 180^\circ]$, te bepaal waarvoor:
 - 6.4.1 $g(x) > 0$ (3)
 - 6.4.2 $g(x) \cdot g'(x) > 0$ (4)
- [13]**

VRAAG 7

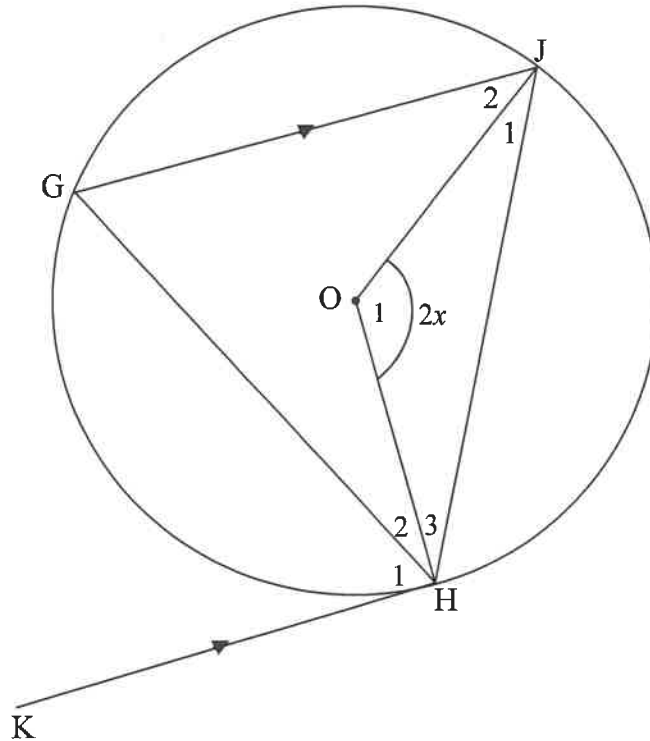
Die kaptein van 'n boot op die see, by punt Q, neem 'n vuurtoring PM direk noord van sy posisie waar. Hy bepaal dat die hoogtehoek van P, die toppunt van die vuurtoring, θ is vanaf Q en die hoogte van die vuurtoring x meter is. Vanaf punt Q seil die kaptein $12x$ meter in 'n rigting β grade oos van noord na punt R. Vanaf punt R neem hy waar dat die hoogtehoek van P ook θ is. Q, M en R lê in dieselfde horisontale vlak.



- 7.1 Skryf QM in terme van x en θ . (2)
- 7.2 Bewys dat $\tan \theta = \frac{\cos \beta}{6}$ (4)
- 7.3 Indien $\beta = 40^\circ$ en $QM = 60$ meter, bereken die hoogte van die vuurtoring tot die naaste meter. (3)
[9]

VRAAG 8

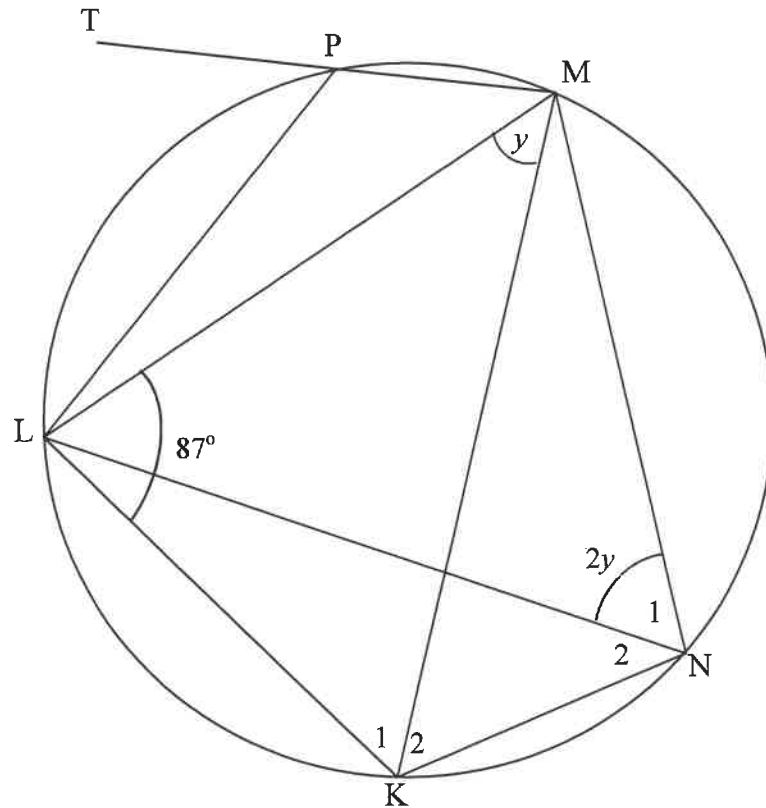
- 8.1 In die diagram is O die middelpunt van die sirkel. Radii OH en OJ word getrek. 'n Raaklyn word vanaf K getrek om die sirkel by H te raak. $\triangle HGJ$ word getrek sodat $GJ \parallel KH$. $\hat{O}_1 = 2x$.



8.1.1 Noem, met redes, DRIE hoeke wat elk aan x gelyk is. (5)

8.1.2 Bewys dat $\hat{H}_2 = \hat{H}_3$. (3)

8.2 In die diagram is $KLMN$ 'n koordevierhoek met $\hat{KLM} = 87^\circ$. Hoeklyne LN en MK word getrek. P is 'n punt op die sirkel en MP word verleng na T , 'n punt buite die sirkel. Koord LP word getrek. $\hat{LMK} = y$ en $\hat{N}_1 = 2y$.



8.2.1 Noem, met 'n rede, 'n ander hoek wat aan y gelyk is. (2)

8.2.2 Bereken, met redes, die grootte van:

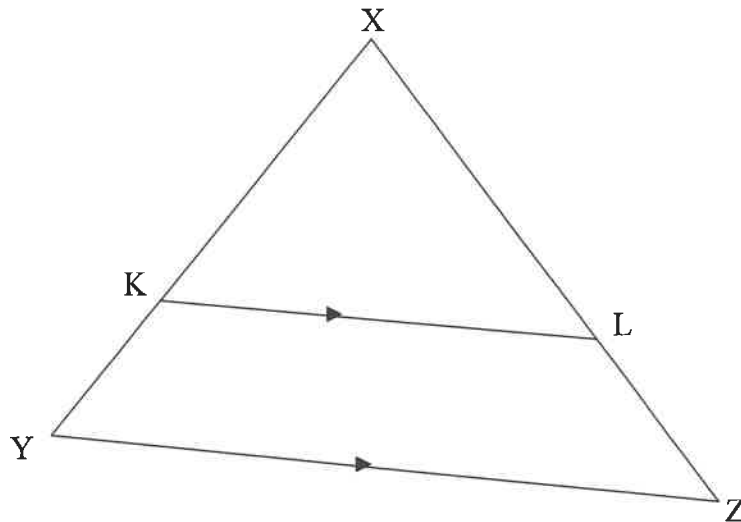
(a) y (3)

(b) \hat{TPL} (2)

[15]

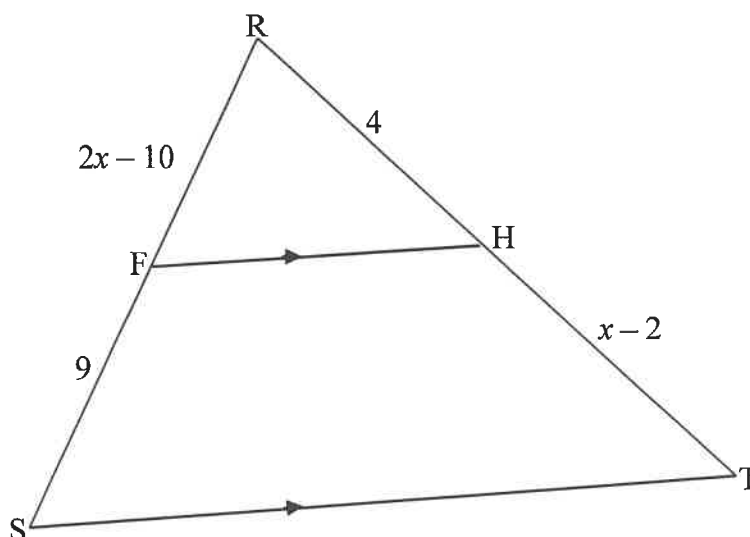
VRAAG 9

- 9.1 Gebruik die diagram om die stelling te bewys wat beweer dat 'n lyn wat ewewydig aan een sy van 'n driehoek getrek word, die ander twee sye eweredig verdeel. Bewys dus dat $\frac{XK}{KY} = \frac{XL}{LZ}$.



(5)

- 9.2 In $\triangle RST$ is F 'n punt op RS en H 'n punt op RT sodanig dat $FH \parallel ST$. $RF = 2x - 10$, $FS = 9$, $RH = 4$ en $HT = x - 2$.



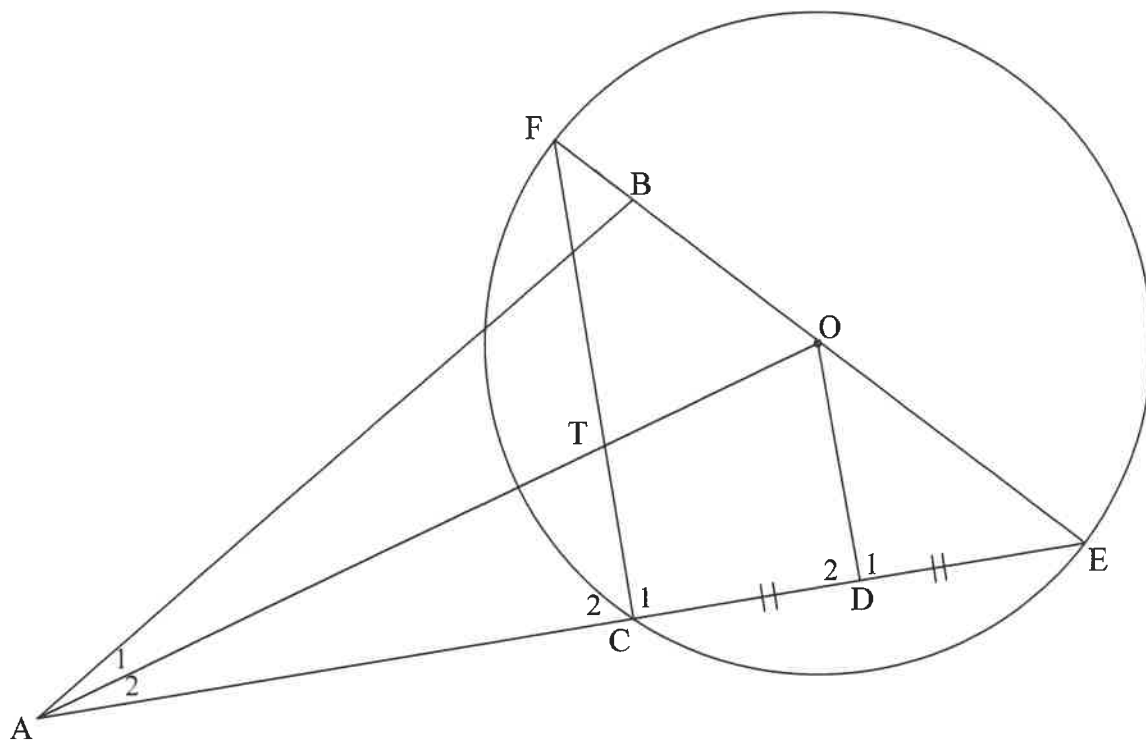
- 9.2.1 Bepaal, met 'n rede, die waarde van x . (5)

- 9.2.2 Bepaal die verhouding: $\frac{\text{oppervlakte } \triangle RFH}{\text{oppervlakte } \triangle RST}$. (4)

[14]

VRAAG 10

In die diagram is $FBOE$ 'n middellyn van 'n sirkel met middelpunt O . Koord EC verleng ontmoet lyn BA by A , buite die sirkel. D is die middelpunt van CE . OD en FC word getrek. $AFBC$ is 'n koordevierhoek.



10.1 Bewys, met redes, dat:

10.1.1 $FC \parallel OD$ (5)

10.1.2 $\hat{D}OE = \hat{B}AE$ (4)

10.1.3 $AB \times OF = AE \times OD$ (7)

10.2 As dit verder gegee word dat $AT = 3TO$, bewys dat $5CE^2 = 2BE \cdot FE$ (5)
[21]

TOTAAL: 150

INLICHTINGSBLAD: WISKUNDE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

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

$$m = \tan \theta$$

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

In ΔABC :

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

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

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

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

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

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

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

$$\bar{x} = \frac{\sum x}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

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

$$P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$$

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

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

PLEASE FOLLOW THESE INSTRUCTIONS CAREFULLY	VOLG ASSEBLIEF HIERDIE INSTRUKSIES NOUKEURIG
1. Clearly write your examination number and centre number in the space provided and attach your barcode label in the space provided.	1. Skryf jou eksamennommer en sentrumnummer duidelik in die ruimtes verskaf en plak jou stafieskodeplakker in die ruimte verskaf.
2. Remember that your own name (or the name of your school) may not appear anywhere on or in this answer book.	2. Onthou dat jou eie naam (of die naam van jou skool) nie op of in hierdie antwoordeboek mag voorkom nie.
3. Answer ALL questions in the spaces provided.	3. Beantwoord ALLE vrae in die ruimtes wat verskaf is.
4. No pages may be torn from this answer book.	4. Geen bladsye mag uit hierdie antwoordeboek geskeur word nie.
5. Read the instructions printed on your timetable carefully as well as any other instructions which may be given in each examination paper.	5. Lees die instruksies wat op jou eksamenrooster gedruk is, sorgvuldig deur, asook enige ander instruksies wat in elke eksamenvraestel gegee word.
6. Candidates may not retain an answer book or remove it from the examination room.	6. Geen antwoordeboek mag deur die kandidaat behou of uit die eksamenlokaal verwyder word nie.
7. Answers must be written in black/blue ink as distinctly as possible. Do not write in the margins.	7. Skryf die antwoorde so duidelik moontlik met swart/blou ink. Laat die kantlyne oop.
8. Write the numbers of the questions you have answered on the front cover of the answer book where marks are to be recorded.	8. Skryf die nommers van die vrae wat jy beantwoord het op die voorblad van die antwoordeboek waar die punte aangebring word.
9. If you require additional space for your answers:	9. Indien jy bykomende ruimte nodig het vir jou antwoorde:
9.1 Use the additional space provided at the end of the answer book.	9.1 Gebruik die bykomende ruimte wat aan die einde van die antwoordeboek verskaf word.
9.2 When answering a question in the additional space, indicate clearly the question number in the column on the LHS.	9.2 As 'n vraag in die bykomende ruimte beantwoord word, dui duidelik die vraagnommer in die kolom aan die LK aan.
9.3 Rule off after each answer.	9.3 Trek 'n lyn na elke antwoord.
10. Draw a neat line through any work/rough work that must not be marked.	10. Trek 'n netjiese lyn deur enige werk/rofwerk wat nie nagesien moet word nie.

QUESTION/VRAAG 1

110	112	156	164	167	169
171	176	192	228	278	360

	Solution/Oplissing	Marks Punte
1.1.1	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(3)
1.1.2	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(1)
1.2		(2)

	Solution/Oplissing	Marks Punte
1.3		(1)
1.4		(1)
1.5.1		(1)
1.5.2		(2)
		[11]

QUESTION/VRAAG 2

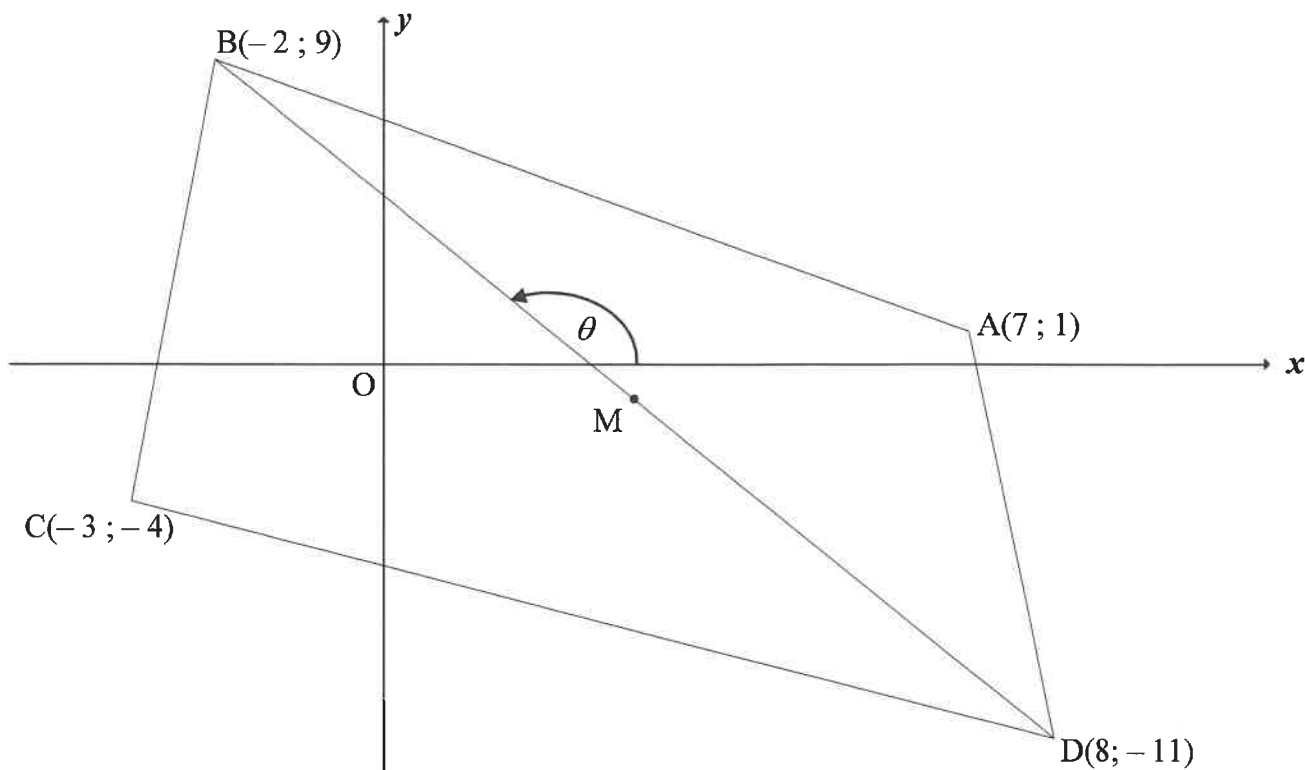
CHIRPS/TJIRPGELUIDE PER MINUTE/ PER MINUUT	AIR TEMPERATURE/ LUGTEMPERATUUR IN °C
32	8
40	10
52	12
76	15
92	17
112	20
128	25
180	28
184	30
200	35

	Solution/Oplissing	Marks Punte
2.1	<p style="text-align: center;">SCATTER PLOT/SPREIDIAGRAM</p>	

(3)

	Solution/Oplissing	Marks Punte
2.2		(1)
2.3		(3)
2.4		(2)
		[9]

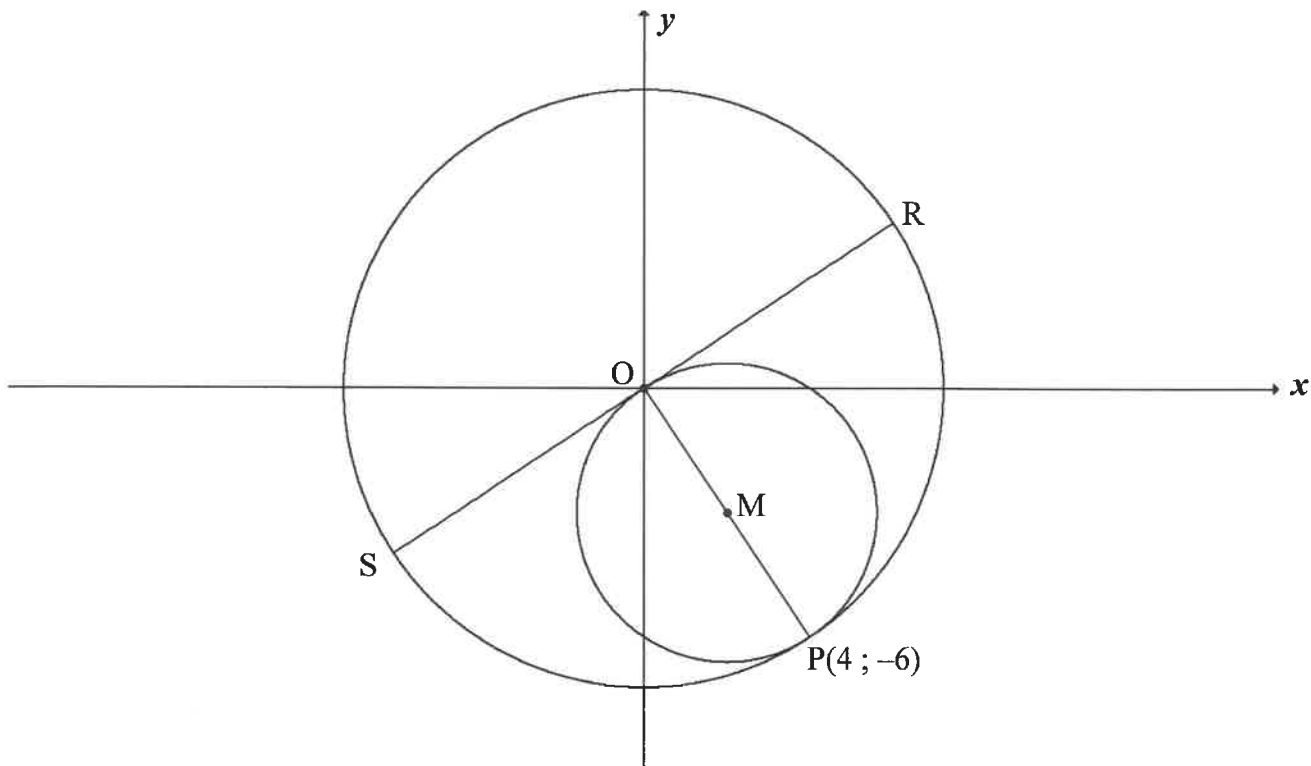
QUESTION/VRAAG 3



	Solution/Oplossing	Marks Punte
3.1		(2)
3.2.1		
		(2)

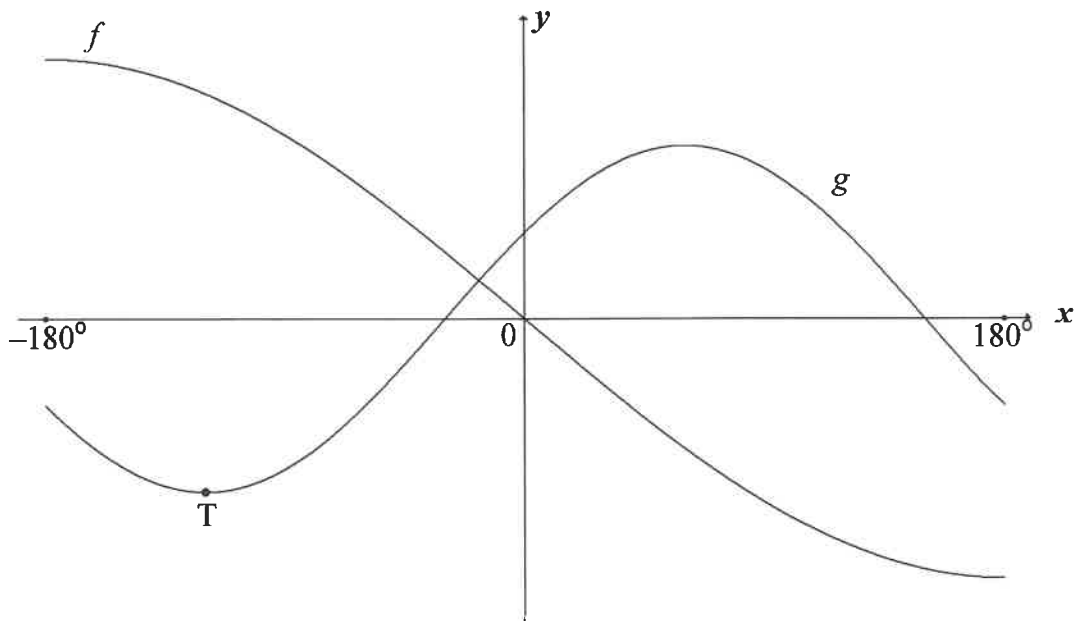
	Solution/Oplissing	Marks Punte
3.2.2		(4)
3.3		(3)
3.4.1		(2)
3.4.2		(3)

QUESTION/VRAAG 4



	Solution/Oplossing	Marks Punte
4.1	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(2)
4.2.1	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	(2)

QUESTION/VRAAG 6



	Solution/Oplissing	Marks Punte
6.1		(1)
6.2		(2)
6.3		(3)

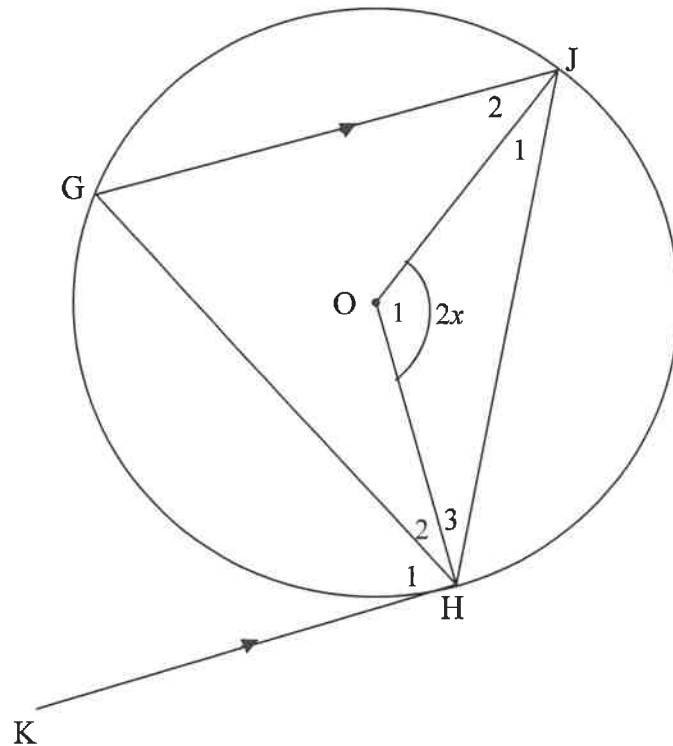
	Solution/Oplissing	Marks Punte
6.4.1		
		(3)
6.4.2		
		(4)
		[13]

	Solution/Oplissing	Marks Punte
7.2 cont.		(4)
7.3		(3)
		[9]

Provide reasons for your statements in QUESTIONS 8, 9 and 10.
 Verskaf redes vir jou bewerings in VRAAG 8, 9 en 10.

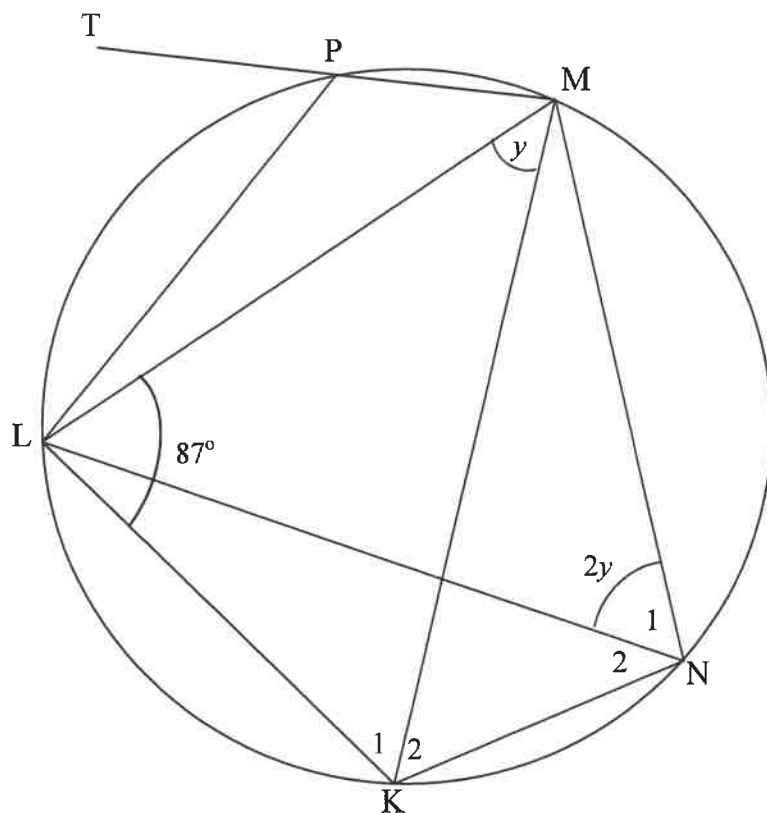
QUESTION/VRAAG 8

8.1



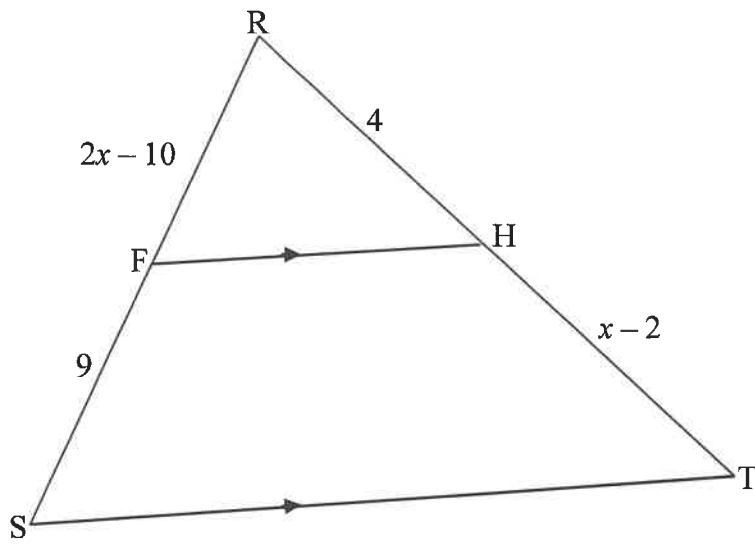
	Solution/Oplossing	Marks Punte
8.1.1		(5)
8.1.2		(3)

8.2



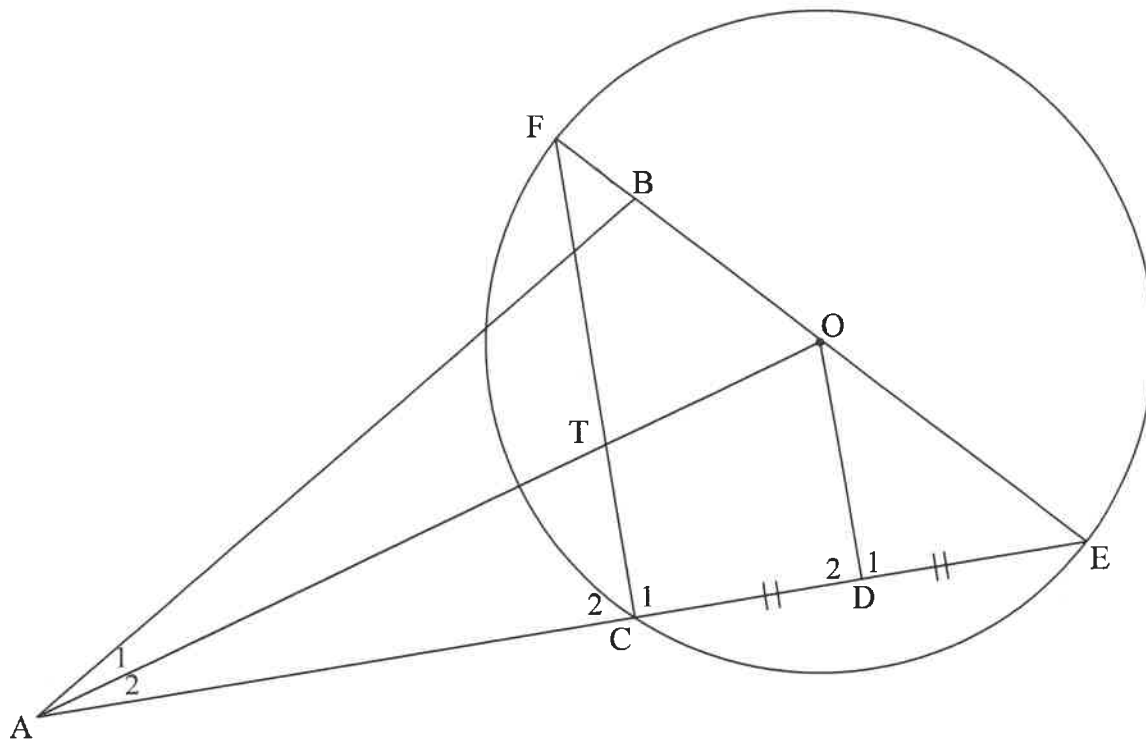
	Solution/Oplissing	Marks Punte
8.2.1		(2)
8.2.2(a)		(3)
8.2.2(b)		(2)
		[15]

9.2



	Solution/Oplissing	Marks Punte
9.2.1		
		(5)
9.2.2		
		(4)
		[14]

QUESTION/VRAAG 10



	Solution/Oplissing	Marks Punte
10.1.1		
		(5)
10.1.2		
		(4)



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SENIOR CERTIFICATE EXAMINATIONS
SENIORSERTIFIKAAT-EKSAMEN

MATHEMATICS P2/*WISKUNDE V2*

2018

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS: 150
PUNTE: 150

These marking guidelines consist of 21 pages.
Hierdie nasienriglyne bestaan uit 21 bladsye.

NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

LET WEL:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*

GEOMETRY	
S	A mark for a correct statement (A statement mark is independent of a reason.)
	'n Punt vir 'n korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede.)
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	'n Punt vir 'n korrekte rede ('n Punt word slegs vir die rede toegeken as die bewering korrek is.)
S/R	Award a mark if the statement AND reason are both correct.
	Ken 'n punt toe as beide die bewering EN rede korrek is.

QUESTION/VRAAG 1

110	112	156	164	167	169
171	176	192	228	278	360

1.1.1	$\text{Mean/Gemiddelde} = \frac{2283}{12}$ $= 190,25$ <p>Mean profit/Gemiddelde wins = R190 250,00 or 190,25 thousand rands</p>	<ul style="list-style-type: none"> ✓ sum/som ✓ answer ✓ answer in thousands of rands <p>(3)</p>
1.1.2	$\text{Median} = \frac{169 + 171}{2} = 170 \text{ thousand rands}$ $= \text{R}170\,000$	<ul style="list-style-type: none"> ✓ answer <p>(1)</p>
1.2		<ul style="list-style-type: none"> ✓ whiskers ✓ quartiles <p>(2)</p>
1.3	$\text{IQR} = Q_3 - Q_1$ $= 210 - 160 \text{ thousand rands}$ $= \text{R}50\,000$	<ul style="list-style-type: none"> ✓ answer <p>(1)</p>
1.4	Skewed to the right or positively skewed.	<ul style="list-style-type: none"> ✓ answer <p>(1)</p>
1.5.1	$\sigma = 67,04118759 \text{ thousand rands}$ $= \text{R}67\,041,19$	<ul style="list-style-type: none"> ✓ answer <p>(1)</p>
1.5.2	$\bar{x} - \sigma = 123,21 \text{ thousand rands}$ <p>For 2 months the profit was less than one standard deviation below the mean.</p>	<ul style="list-style-type: none"> ✓ lower limit ✓ answer <p>(2)</p>
		[11]

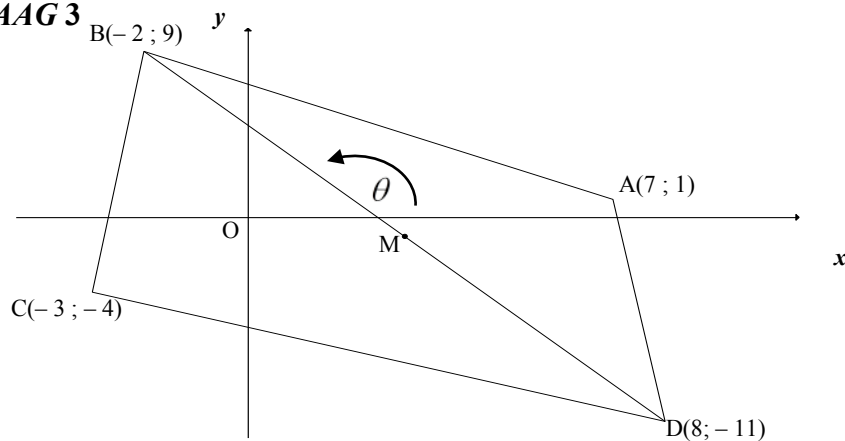
QUESTION/VRAAG 2

CHIRPS/TJIRPGELUIDE PER MINUTE/ PER MINUUT	AIR TEMPERATURE/ LUGTEMPERATUUR IN °C
32	8
40	10
52	12
76	15
92	17
112	20
128	25
180	28
184	30
200	35

<p>2.1</p>	<p style="text-align: center;">SCATTER PLOT/SPREIDIAGRAM</p>	<p>3 marks: All points correct</p> <p>2 marks: 6 – 9 points correct</p> <p>1 mark: 3 – 5 points correct</p> <p style="text-align: right;">(3)</p>
<p>2.2</p>	<p>The points lie almost in a straight line. This suggests a very strong positive relationship between the number of chirps per minute and the temperature of the air.</p> <p><i>Die punte lê amper in 'n reguitlyn, wat beteken dat daar 'n baie sterk positiewe verband tussen die aantal tjirpgeluide per minuut en die lugtemperatuur is.</i></p> <p>OR/OF</p> <p>$r = 0,99$ so there is a very strong positive relationship between the number of chirps per minute and the temperature of the air.</p> <p><i>$r = 0,99$, dus is daar 'n baie sterk positiewe verband tussen die aantal krieggeluide per minuut en die lugtemperatuur.</i></p>	<p>✓ justify with straight line / <i>Motivering mbv reguitlyn</i></p> <p style="text-align: right;">(1)</p> <p>✓ link with / <i>gebruik $r = 0,99$ om te motiveer</i></p> <p style="text-align: right;">(1)</p>

2.3	$a = 3,97$ $b = 0,15$ $\hat{y} = 3,97 + 0,15x$	✓ $a = 3,97$ ✓ $b = 0,15$ ✓ equation (3)
2.4	Air temperature $\approx 15,67^{\circ}\text{C}$ (calculator) OR $\hat{y} \approx 3,97 + 0,15(80)$ $\approx 15,97^{\circ}\text{C}$ OR Air temperature $\approx 16^{\circ}\text{C}$ (graph: Accept between 15°C and 17°C)	✓✓ answer (2) ✓ substitution ✓ answer (2) ✓✓ answer (2)
		[9]

QUESTION/VRAAG 3

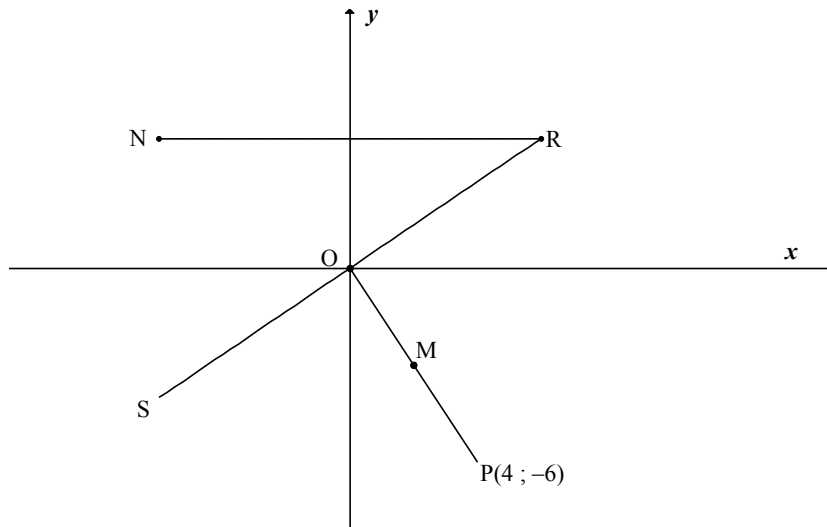


3.1	$m_{AC} = \frac{1 - (-4)}{7 - (-3)} \text{ OR } \frac{-4 - 1}{-3 - 7}$ $= \frac{5}{10} = \frac{1}{2}$	✓ substitution ✓ answer (2)
3.2.1	$y = \frac{1}{2}x + c$ $y - y_1 = \frac{1}{2}(x - x_1)$ $1 = \frac{1}{2}(7) + c$ $y - 1 = \frac{1}{2}(x - 7)$ $c = -\frac{5}{2}$ OR/OF $y - 1 = \frac{1}{2}x - \frac{7}{2}$ $y = \frac{1}{2}x - 2\frac{1}{2}$ $y = \frac{1}{2}x - 2\frac{1}{2}$ OR/OF $y = \frac{1}{2}x + c$ $y - y_1 = \frac{1}{2}(x - x_1)$ $-4 = \frac{1}{2}(-3) + c$ $y - (-4) = \frac{1}{2}(x - (-3))$ $c = -\frac{5}{2}$ OR/OF $y + 4 = \frac{1}{2}x + \frac{3}{2}$ $y = \frac{1}{2}x - 2\frac{1}{2}$ $y = \frac{1}{2}x - 2\frac{1}{2}$	✓ substitution M and A(7 ; 1) ✓ equation (2) ✓ substitution M and C(-3 ; -4) ✓ equation (2)

<p>3.2.2</p>	$M\left(\frac{-2+8}{2}; \frac{9+(-11)}{2}\right)$ <p>$\therefore M(3; -1)$</p> <p>Equation of AC: $y = \frac{1}{2}x - 2\frac{1}{2}$ OR/OF $y = \frac{1}{2}x - 2\frac{1}{2}$</p> $y = \frac{1}{2}(3) - 2\frac{1}{2} \qquad -1 = \frac{1}{2}x - 2\frac{1}{2}$ $y = -1 \qquad x = 3$ <p>$\therefore M$ lies on AC</p> <p>OR/OF</p> $M\left(\frac{-2+8}{2}; \frac{9+(-11)}{2}\right)$ <p>$\therefore M(3; -1)$</p> $m_{CM} = \frac{-4+1}{-3-3} = \frac{1}{2}$ <p>$\therefore m_{CM} = m_{AC}$ and C a common point</p> <p>$\therefore M$ lies on AC</p>	<p>✓ x coordinate ✓ y coordinate</p> <p>✓ substitution of x</p> <p>✓ conclusion (4)</p> <p>✓ x coordinate</p> <p>✓ y coordinate</p> <p>✓ gradient of CM</p> <p>✓ reasoning & conclusion (4)</p>
<p>3.3</p>	$m_{BD} = \frac{9-(-11)}{-2-8} \quad \text{OR} \quad \frac{(-11)-9}{8-(-2)}$ $= -2$ $m_{BD} \times m_{AC} = \frac{1}{2} \times -2$ $= -1$ <p>$\therefore BD \perp AC$</p>	<p>✓ correct substitution</p> <p>✓ m_{BD}</p> <p>✓ product of gradients = -1 (3)</p>
<p>3.4.1</p>	<p>$\tan \theta = m_{BD} = -2$</p> <p>$\therefore \theta = 116,57^\circ$</p>	<p>✓ $\tan \theta = m_{BD}$</p> <p>✓ answer (2)</p>
<p>3.4.2</p>	<p>$\tan \beta = m_{BC}$</p> $m_{BC} = \frac{9-(-4)}{-2-(-3)} \quad \text{OR} \quad \frac{-4-9}{-3-(-2)}$ $= 13$ <p>$\beta = 85,6^\circ$</p> <p>$\therefore \hat{C}BD = 116,57^\circ - 85,6^\circ$ [ext \angle of Δ]</p> $= 30,97^\circ$ <p>OR/OF</p> <p>$BD = \sqrt{500}$; $BC = \sqrt{170}$ & $CD = \sqrt{170}$</p> $CD^2 = BD^2 + BC^2 - 2BD \cdot BC \cdot \cos \hat{C}BD$ $170 = 500 + 170 - 2\sqrt{500} \cdot \sqrt{170} \cdot \cos \hat{C}BD$ $\cos \hat{C}BD = \frac{\sqrt{500}}{2\sqrt{170}} = 0,85749\dots$ <p>$\hat{C}BD = 30,96^\circ$</p>	<p>✓ $m_{BC} = 13$</p> <p>✓ value of β</p> <p>✓ answer (3)</p> <p>✓ subst into cos rule</p> <p>✓ value of $\cos \hat{C}BD$</p> <p>✓ answer (3)</p>

3.4.3	$AC = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ $= \sqrt{(7 - (-3))^2 + (1 - (-4))^2} \text{ OR } \sqrt{((-3) - 7)^2 + ((-4) - 1)^2}$ $= \sqrt{100 + 25}$ $= \sqrt{125} = 5\sqrt{5} = 11,58$	✓ correct substitution into distance formula ✓ answer (2)
3.4.4	$BM = \sqrt{((-2) - 3)^2 + (9 - (-1))^2} \text{ OR } \sqrt{(3 - (-2))^2 + ((-1) - 9)^2}$ $= \sqrt{125} = 5\sqrt{5}$ <p>Area of $\Delta ABC = \frac{1}{2} \text{ base} \times \perp \text{ height}$</p> $= \frac{1}{2} (\sqrt{125})(\sqrt{125})$ $= 62,5 \text{ square units}$ <p>Area of ABCD = $2 \times 62,5$</p> $= 125 \text{ square units}$	✓ correct substitution into distance formula ✓ BM ✓ substitution into area formula ✓ 62,5 ✓ $2 \times \Delta ABC$ (5)
		[23]

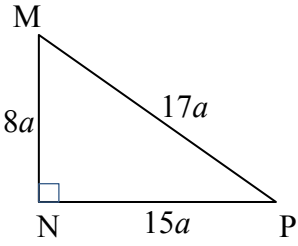
QUESTION/VRAAG 4



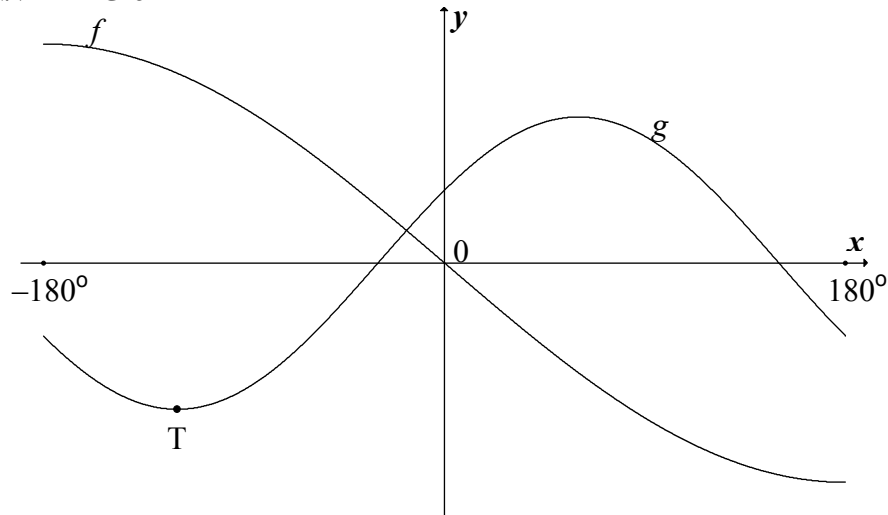
4.1	$M\left(\frac{0+4}{2}; \frac{0+(-6)}{2}\right)$ $\therefore M(2; -3)$	✓ 2 ✓ -3 (2)
4.2.1	$x^2 + y^2 = 4^2 + (-6)^2$ $= 52$ $\therefore x^2 + y^2 = 52$	✓ substitution ✓ equation (2)
4.2.2	$(x-2)^2 + (y+3)^2 = \left(\frac{\sqrt{52}}{2}\right)^2 = 13$ $x^2 - 4x + 4 + y^2 + 6y + 9 - 13 = 0$ $x^2 + y^2 - 4x + 6y = 0$	✓ substitution of M ✓ substitution of radius = $\frac{\sqrt{52}}{2}$ ✓ answer (3)
4.2.3	$m_{OP} = \frac{-6}{4} = -\frac{3}{2}$ $m_{RS} \times m_{OP} = -1 \quad [\text{radius} \perp \text{tangent} / \text{raaklyn}]$ $\therefore m_{RS} = \frac{2}{3}$ $\therefore y = \frac{2}{3}x$	✓ m_{OP} ✓ m_{RS} ✓ equation (3)

4.3	$x^2 + y^2 = 52 \text{ and } y = \frac{2}{3}x$ $x^2 + \left(\frac{2}{3}x\right)^2 = 52$ $x^2 + \frac{4}{9}x^2 = 52$ $1\frac{4}{9}x^2 = 52$ $x^2 = 36$ $x = 6$ $\therefore R(6 ; 4) \text{ and } N(-6 ; 4)$ $\therefore NR = 12 \text{ units}$	<p>✓ substitution</p> <p>✓ simplification</p> <p>✓ value of x</p> <p>✓ length of NR</p> <p style="text-align: right;">(4)</p>
4.4	<p>Let $T(x ; 0)$ be the other x intercept of the small circle Then OT is the common chord</p> $\therefore (x-2)^2 + (0+3)^2 = 13$ $(x-2)^2 = 13 - 9 = 4$ $x - 2 = \pm 2$ $x = 2 \pm 2$ $x = 4 \text{ or } 0$ $\therefore \text{length of common chord} = OT = 4 \text{ units}$	<p>✓ $y = 0$</p> <p>✓ x-values</p> <p>✓ answer</p> <p style="text-align: right;">(3) [17]</p>

QUESTION/VRAAG 5

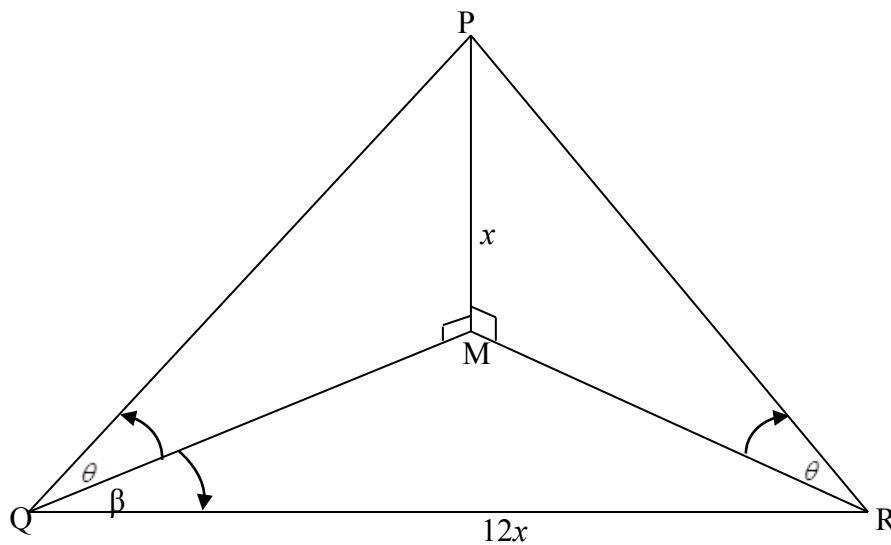
<p>5.1.1</p>	<p>Given : $\sin M = \frac{15}{17}$ $MN^2 = 17^2 - 15^2$ $= 64$ $MN = 8$ OR</p>  <p>$\therefore \tan M = \frac{15}{8}$</p>	<p>✓ sketch or Pyth ✓ $MN = 8$ ✓ answer (3)</p>
<p>5.1.2</p>	<p>$\sin M = \frac{NP}{MP}$ $\frac{NP}{51} = \frac{15a}{17a}$ $\therefore NP = 45$</p>	<p>✓ equating trig ratios ✓ answer (2)</p>
<p>5.2</p>	<p>$\cos(x - 360^\circ) \cdot \sin(90^\circ + x) + \cos^2(-x) - 1$ $= \cos x \cdot \cos x + \cos^2 x - 1$ $= \cos^2 x + \cos^2 x - 1$ $= 2 \cos^2 x - 1$ $= \cos 2x$</p>	<p>✓ $\cos x$ ✓ $\cos x$ ✓ $\cos^2 x$ ✓ identity (4)</p>
<p>5.3.1</p>	<p>$\sin(2x + 40^\circ) \cos(x + 30^\circ) - \cos(2x + 40^\circ) \sin(x + 30^\circ)$ $= \sin[(2x + 40^\circ) - (x + 30^\circ)]$ $= \sin(x + 10^\circ)$</p>	<p>✓ reduction ✓ answer (2)</p>
<p>5.3.2</p>	<p>$\sin(2x + 40^\circ) \cos(x + 30^\circ) - \cos(2x + 40^\circ) \sin(x + 30^\circ) = \cos(2x - 20^\circ)$ $\therefore \cos(2x - 20^\circ) = \sin(x + 10^\circ)$ $\cos(2x - 20^\circ) = \cos[90^\circ - (x + 10^\circ)]$ $2x - 20^\circ = 80^\circ - x + k \cdot 360^\circ$ or $2x - 20^\circ = 360^\circ - (80^\circ - x) + k \cdot 360^\circ$ $3x = 100^\circ + k \cdot 360^\circ$ or $2x - 20^\circ = 280^\circ + x + k \cdot 360^\circ$ $x = 33,33^\circ + k \cdot 120^\circ$ or $x = 300^\circ + k \cdot 360^\circ ; k \in Z$</p> <p>OR/OF</p> <p>$\therefore \cos(2x - 20^\circ) = \sin(x + 10^\circ)$ $\sin[90^\circ - (2x - 20^\circ)] = \sin(x + 10^\circ)$ $110^\circ - 2x = x + 10^\circ + k \cdot 360^\circ$ or $110^\circ - 2x = 180^\circ - (x + 10^\circ) + k \cdot 360^\circ$ $3x = 100^\circ - k \cdot 360^\circ$ or $110^\circ - 2x = 170^\circ - x + k \cdot 360^\circ$ $x = 33,33^\circ - k \cdot 120^\circ$ or $x = -60^\circ - k \cdot 360^\circ ; k \in Z$</p>	<p>✓ equating ✓ co ratio ✓ $80^\circ - x$ ✓ $280^\circ + x$ ✓ simplification/vereenv ✓ $x = 33,33^\circ + k \cdot 120^\circ$ ✓ $x = 300^\circ + k \cdot 360^\circ ; k \in Z$ (7)</p> <p>✓ equating ✓ co ratio ✓ $x + 10^\circ$ ✓ $170^\circ - x$ ✓ simplification/vereenv ✓ $x = 33,33^\circ - k \cdot 120^\circ$ ✓ $x = -60^\circ - k \cdot 360^\circ ; k \in Z$ (7)</p>
		<p>[18]</p>

QUESTION/VRAAG 6



6.1	Period = 720°	✓ answer (1)
6.2	$y \in [-2 ; 2]$ OR/OF $-2 \leq y \leq 2$	✓✓ answer (2) ✓✓ answer (2)
6.3	$f(-120^\circ) - g(-120^\circ)$ $= -3 \sin\left(-\frac{120^\circ}{2}\right) - 2 \cos(-120^\circ - 60^\circ)$ $= \frac{4 + 3\sqrt{3}}{2}$ or 4,60 (4,5980...)	✓ $x = -120^\circ$ ✓ substitution ✓ answer (3)
6.4.1	x-intercepts of g at $-90^\circ + 60^\circ = -30^\circ$ and $90^\circ + 60^\circ = 150^\circ$ $\therefore x \in (-30^\circ ; 150^\circ)$ OR/OF x-intercepts of g at $-90^\circ + 60^\circ = -30^\circ$ and $90^\circ + 60^\circ = 150^\circ$ $-30^\circ < x < 150^\circ$	✓ value ✓ value ✓ answer (3) ✓ value ✓ value ✓ answer (3)
6.4.2	$x \in [-180^\circ ; -120^\circ) \cup (-30^\circ ; 60^\circ) \cup (150^\circ ; 180^\circ]$ OR/OF $-180^\circ \leq x < -120^\circ$ or $-30^\circ < x < 60^\circ$ or $150^\circ < x \leq 180^\circ$	✓ $[-180^\circ ; -120^\circ)$ ✓ $(-30^\circ ; 60^\circ)$ ✓ $(150^\circ ; 180^\circ]$ ✓ notation for inclusive in the first/last interval (4) ✓ $-180^\circ \leq x < -120^\circ$ ✓ $-30^\circ < x < 60^\circ$ ✓ $150^\circ < x \leq 180^\circ$ 1 mark: each interval ✓ notation for inclusive in the first/last interval (4)
		[13]

QUESTION/VRAAG 7

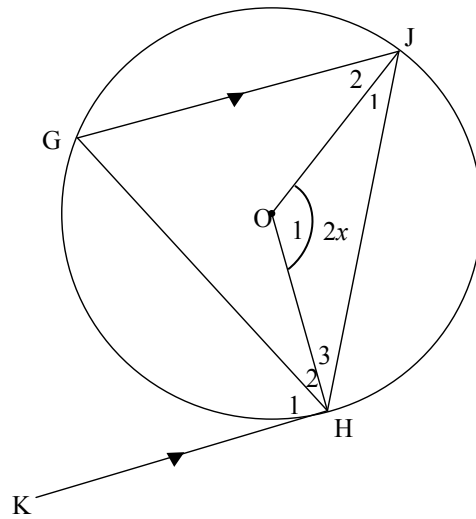


<p>7.1</p>	<p>In PMQ : $\tan \theta = \frac{x}{QM}$</p> <p>$\therefore QM = \frac{x}{\tan \theta}$</p> <p>OR/OF</p> $\frac{x}{\sin \theta} = \frac{MQ}{\sin P}$ $MQ = \frac{x \sin P}{\sin \theta}$ $= \frac{x \cos \theta}{\sin \theta}$ $= \frac{x}{\tan \theta}$	<p>✓ trig ratio</p> <p>✓ answer (2)</p> <p>✓ sine rule</p> <p>✓ answer (2)</p>
<p>7.2</p>	<p>In PMR : $\tan \theta = \frac{x}{MR}$ OR $PMQ \cong PMR$ [AAS/HHS]</p> <p>$\therefore MR = \frac{x}{\tan \theta} = QM$</p> <p>$\widehat{QMR} = 180^\circ - 2\beta$</p> $\frac{\sin \beta}{MR} = \frac{\sin \widehat{QMR}}{12x}$ $\sin \beta \times \frac{\tan \theta}{x} = \frac{\sin(180^\circ - 2\beta)}{12x}$ $\tan \theta = \frac{\sin 2\beta}{12x} \times \frac{x}{\sin \beta}$ $\tan \theta = \frac{2 \sin \beta \cos \beta}{12x} \times \frac{x}{\sin \beta}$ $\tan \theta = \frac{\cos \beta}{6}$ <p>OR</p>	<p>✓ $MR = QM$</p> <p>✓ correct substitution into the sine rule in ΔQMR</p> <p>✓ reduction</p> <p>✓ double angle (4)</p>

	<p>In $\triangle PMR$: $\tan \theta = \frac{x}{MR}$ OR $\triangle PMQ \cong \triangle PMR$ [AAS/HHS]</p> $MR^2 = QM^2 + QR^2 - 2QM \cdot QR \cos \beta$ $MR^2 = \left(\frac{x}{\tan \theta}\right)^2 + (12x)^2 - 2\left(\frac{x}{\tan \theta}\right)(12x)(\cos \beta)$ $\frac{x^2}{\tan^2 \theta} = \frac{x^2}{\tan^2 \theta} + 144x^2 - 24\left(\frac{x^2}{\tan \theta}\right)(\cos \beta)$ $24\left(\frac{x^2}{\tan \theta}\right)(\cos \beta) = 144x^2$ $\cos \beta = 6 \tan \theta$ $\tan \theta = \frac{\cos \beta}{6}$	<p>✓ correct substitution into the cosine rule in $\triangle QMR$</p> <p>✓ substitution</p> <p>✓ $MR = QM$</p> <p>✓ simplification</p> <p style="text-align: right;">(4)</p>
7.3	$\frac{x}{QM} = \frac{\cos \beta}{6}$ <p style="text-align: right;">[both equal $\tan \theta$]</p> $x = \frac{60 \cos 40}{6}$ $x = 7,66$ <p>The height of the lighthouse is 8 metres</p>	<p>✓ equating</p> <p>✓ subst. $QM = 60$ and $\beta = 40^\circ$</p> <p>✓ answer</p> <p style="text-align: right;">(3)</p>
		[9]

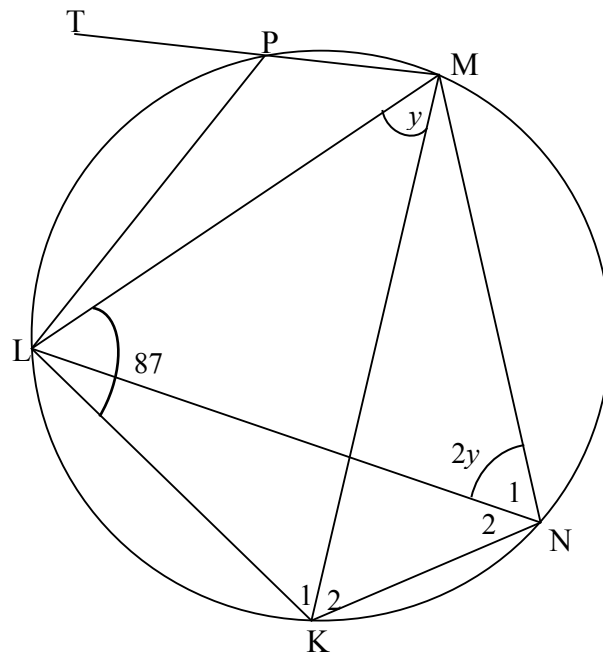
QUESTION/VRAAG 8

8.1



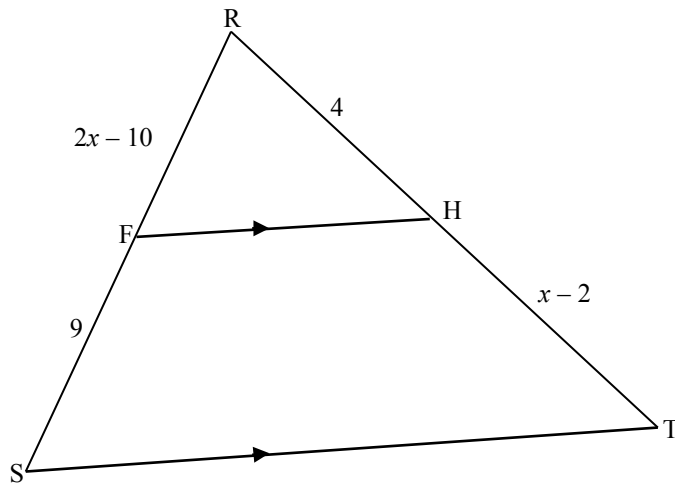
<p>8.1.1</p>	<p>$\hat{G} = x$ [\angle centre = $2 \times$ circumference / <i>midpts</i> $\angle = 2 \times$ <i>omtreks</i> \angle] $\hat{H}_1 = x$ [alt \angles / <i>verwiss</i> \anglee; $KH \parallel GJ$] $G\hat{J}H = x$ [tan chord theorem / <i>raaklyn koordstelling</i>]</p>	<p>✓S ✓R ✓S ✓S ✓R</p> <p style="text-align: right;">(5)</p>
<p>8.1.2</p>	<p>$\hat{J}_1 + \hat{H}_3 = 180^\circ - 2x$ [sum of \angles in Δ / <i>som van</i> \anglee in Δ] $\therefore \hat{J}_1 = \hat{H}_3 = 90^\circ - x$ [\angles opp equal sides / \anglee teenoor <i>gelyke sye</i>] $\therefore x + \hat{H}_2 = 90^\circ$ OR [tan \perp radius / <i>raaklyn</i> \perp <i>radius</i>] $\hat{H}_2 = 90^\circ - x$ $\therefore \hat{H}_2 = \hat{H}_3$</p>	<p>✓S ✓S ✓R</p> <p style="text-align: right;">(3)</p>

8.2



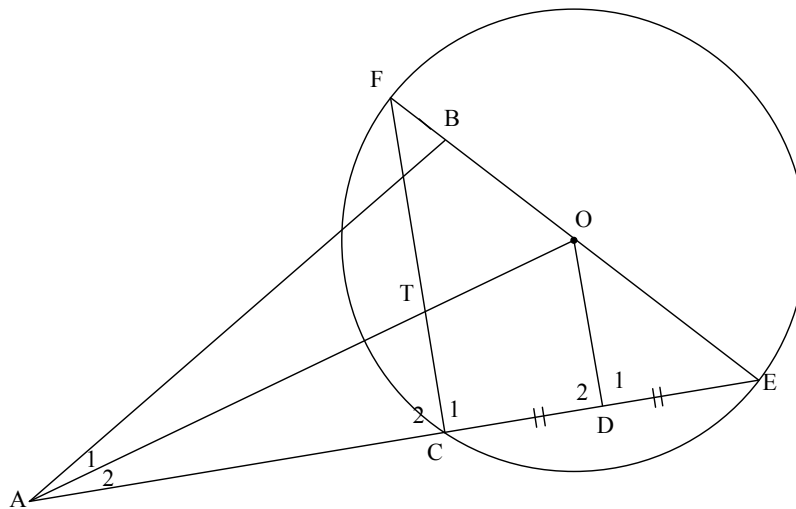
8.2.1	$\hat{N}_2 = y$	[\angle s in the same seg / \angle e in dieselfde segment]	✓S ✓R	(2)
8.2.2(a)	$2y + y + 87^\circ = 180^\circ$ $3y = 93^\circ$ $y = 31^\circ$	[opp \angle s of cyclic quad / teenoorst \angle e v kvh]	✓S ✓R ✓S	(3)
8.2.2(b)	$\hat{TPL} = 62^\circ$	[ext. \angle of cyclic quad / buite \angle v kvh]	✓S ✓R	(2)
				[15]

9.2



<p>9.2.1</p>	<p>$\frac{RF}{FS} = \frac{RH}{HT}$ [line one side of ΔOR prop theorem; FH ST] [Lyn een sy van ΔOF eweredigh. st; FH ST]</p> <p>$\frac{2x - 10}{9} = \frac{4}{x - 2}$ $(2x - 10)(x - 2) = 4 \times 9$ $2x^2 - 14x - 16 = 0$ $x^2 - 7x - 8 = 0$ $(x - 8)(x + 1) = 0$ $\therefore x = 8 \ (x \neq -1)$</p> <p>OR/OF</p> <p>$\frac{RF}{RS} = \frac{RH}{RT}$ [line one side of ΔOR prop theorem; FH ST] [Lyn een sy van ΔOF eweredigh. st; FH ST]</p> <p>$\frac{2x - 10}{2x - 1} = \frac{4}{x + 2}$ $(2x - 10)(x + 2) = 4(2x - 1)$ $2x^2 - 14x - 16 = 0$ $x^2 - 7x - 8 = 0$ $(x - 8)(x + 1) = 0$ $\therefore x = 8 \ (x \neq -1)$</p>	<p>✓S/R</p> <p>✓ substitution</p> <p>✓ standard form</p> <p>✓ factors</p> <p>✓ answer with rejection</p> <p>(5)</p> <p>✓S/R</p> <p>✓ substitution</p> <p>✓ standard form</p> <p>✓ factors</p> <p>✓ answer with rejection</p> <p>(5)</p>
<p>9.2.2</p>	<p>$\frac{\text{area } \Delta RFH}{\text{area } \Delta RST} = \frac{\frac{1}{2} RF \times RH \sin \hat{R}}{\frac{1}{2} RS \times RT \sin \hat{R}}$</p> <p>$= \frac{\frac{1}{2} \times 6 \times 4 \times \sin \hat{R}}{\frac{1}{2} \times 15 \times 10 \times \sin \hat{R}}$</p> <p>$= \frac{24}{150} = \frac{4}{25}$</p>	<p>✓ numerator/teller</p> <p>✓ denominator/noemer</p> <p>✓ substitution</p> <p>✓ answer</p> <p>(4)</p>
<p>[14]</p>		

QUESTION/VRAAG 10



<p>10.1.1</p>	<p>$\hat{C}_1 = 90^\circ$ [\angle in semi circle / \angle in halfsirkel] $\hat{D}_1 = 90^\circ$ [line from centre to midpt of chord / lyn vanaf midpt na midpt van koord] $\therefore \hat{C}_1 = \hat{D}_1$ $\therefore FC \parallel OD$ [corresp \angles = / ooreenkomstige \anglee =] OR/OF $FO = OE$ [radii] $CD = DE$ [given / gegee] $\therefore FC \parallel OD$ [midpoint theorem / middelpuntstelling]</p>	<p>✓ S ✓ R ✓ S ✓ R ✓ R ✓ S ✓ R ✓ S ✓✓ R (5)</p>
<p>10.1.2</p>	<p>$\hat{D}\hat{O}E = \hat{F}$ [corresp \angles =; $FC \parallel OD$] $\hat{B}\hat{A}E = \hat{F}$ [\angles in the same seg] $\therefore \hat{D}\hat{O}E = \hat{B}\hat{A}E$</p>	<p>✓ S ✓ R ✓ S ✓ R (4)</p>
<p>10.1.3</p>	<p>In $\triangle ABE$ and $\triangle FCE$: \hat{E} is common $\hat{B}\hat{A}E = \hat{F}$ [proved in 10.1.2] $\therefore \hat{A}\hat{B}E = \hat{C}_1$ [sum of \angles in \triangle] $\therefore \triangle ABE \parallel \triangle FCE$ [$\angle\angle\angle$] $\frac{AB}{FC} = \frac{AE}{FE}$ [$\parallel \triangle$s] $AB \times FE = AE \times FC$ But $FE = 2 OF$ [$d = 2r$] And $FC = 2 OD$ [midpoint theorem] $AB \times 2OF = AE \times 2OD$ $\therefore AB \times OF = AE \times OD$</p>	<p>✓ S ✓ S ✓ R ✓ S ✓ S ✓ S/R ✓ S (7)</p>

	<p>OR/OF In $\triangle ODE$ and $\triangle ABE$ 1. \widehat{E} is common 2. $\widehat{DOE} = \widehat{EAB}$ (proved in 10.1.2) 3. $\widehat{D}_1 = \widehat{ABE}$ (\angle sum \triangle) $\triangle ODE \parallel \triangle ABE$ ($\angle\angle\angle$) $\frac{EO}{EA} = \frac{OD}{AB} = \frac{ED}{EB}$ ($\parallel \triangle$s) $\therefore AB \cdot EO = OD \cdot EA$ but $OE = FO$ (radii) $\therefore AB \times OF = OD \times EA$</p>	<p>✓ S ✓ S ✓ R ✓ S ✓ S ✓ S ✓ R (7)</p>
<p>10.2</p>	<p>$\frac{AT}{TO} = \frac{AC}{CD} = \frac{3}{1}$ [line \parallel one side of $\triangle OR$ prop theorem; $FC \parallel OD$] But $CD = DE$ $\frac{AE}{CE} = \frac{5}{2} \therefore AE = \frac{5}{2}CE$ $\frac{BE}{CE} = \frac{AE}{FE}$ [$\parallel \triangle$s] $\frac{BE}{CE} = \frac{\frac{5}{2}CE}{FE}$ $BE \times FE = \frac{5}{2}CE^2$ $\therefore 5CE^2 = 2BE \cdot FE$</p>	<p>✓ S ✓ R ✓ S ✓ S ✓ substitute $AE = \frac{5}{2}CE$ (5)</p>
		<p>[21]</p>

TOTAL/TOTAAL: 150

MATHEMATICS P2: JUNE 2018 MARKING GUIDELINES NOTES

QUESTION 1

1.1.1	If left as 190, 25 then penalise 1 mark.
1.1.2	<p>If the position is used:</p> $\left[\frac{1}{4}(n+1) + \frac{3}{4}(n+1) \right] \div 2$ $= \frac{158 + 219}{2}$ $= \frac{377}{2}$ $= 188,5$

QUESTION 2

2.4	Do not accept estimation from the table.
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QUESTION 3

3.1	No ca if $\frac{x_2 - x_1}{y_2 - y_1}$	
3.3	$MD^2 + AM^2$ $= [(3-8)^2 + (-1+11)^2] + [(3-7)^2 + (-1-1)^2]$ $= 125 + 20$ $= 145$ AD^2 $= (7-8)^2 + (1+11)^2$ $= 145$ $MD^2 + AM^2 = AD^2$	<p>✓ $AM^2 + MD^2$</p> <p>✓ AD^2</p> <p>✓ $MD^2 + AM^2 = AD^2$</p> <p style="text-align: right;">(3)</p>

QUESTION 4

4.3	<p>Candidates can use the rotation of P through 90° to get to R(6 ; 4)</p> <p>If the candidate assumes that R(4 ; 6) : 1/4 marks</p>
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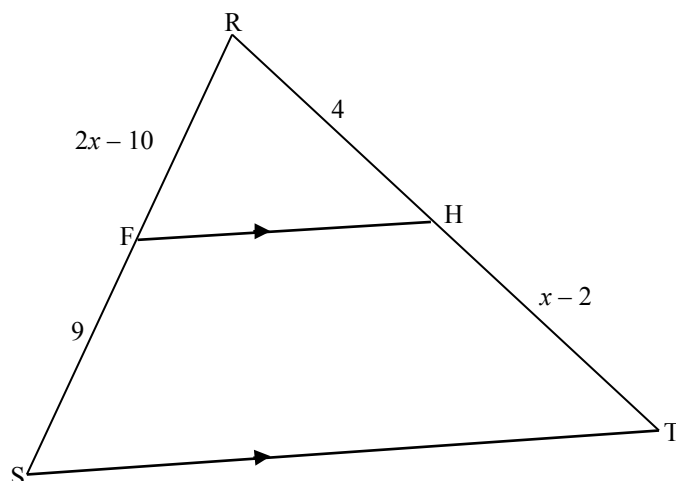
QUESTION 6

6.2	$y \in (-2 ; 2)$ 1/2 marks $-2 < y < 2$ 1/2 marks
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QUESTION 7

7.3	There is NO penalty for incorrect rounding.
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QUESTION 9



9.2.2

Join FT.

$$\text{area } \triangle RFH = \frac{4}{10} \times (\text{area } \triangle RFT)$$

$$\text{But area } \triangle RFT = \frac{6}{15} \times (\text{area } \triangle RST) \quad (\text{common vertex; } = \text{ heights})$$

$$\text{area } \triangle RFH = \frac{4}{10} \times \frac{6}{15} \times (\text{area } \triangle RST)$$

$$\frac{\text{area } \triangle RFH}{\text{area } \triangle RST} = \frac{4}{25}$$