

GRADE 10  
NOVEMBER PAPER 2  
MATHEMATICS  
EXAM PAPERS  
2012-2019

Compiled by L Emery

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**QUESTION 1** No data handling for 2020

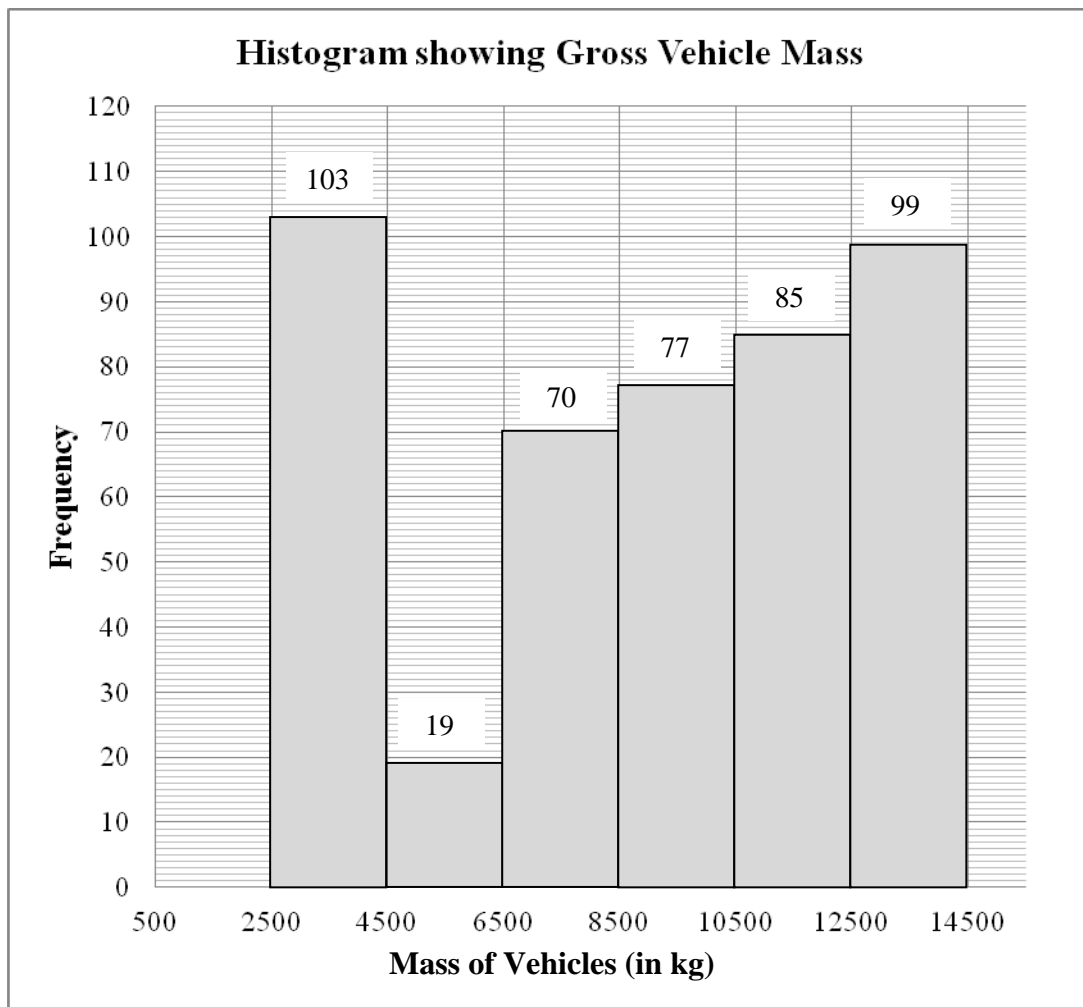
A baker keeps a record of the number of scones that he sells each day. The data for 19 days is shown below.

31	36	62	74	65	63	60	34	46	56
37	46	40	52	48	39	43	31	66	

- 1.1 Determine the mean of the given data. (2)
  - 1.2 Rearrange the data in ascending order and then determine the median. (2)
  - 1.3 Determine the lower and upper quartiles for the data. (2)
  - 1.4 Draw a box and whisker diagram to represent the data. (2)
- [8]**

**QUESTION 2** No data handling for 2020

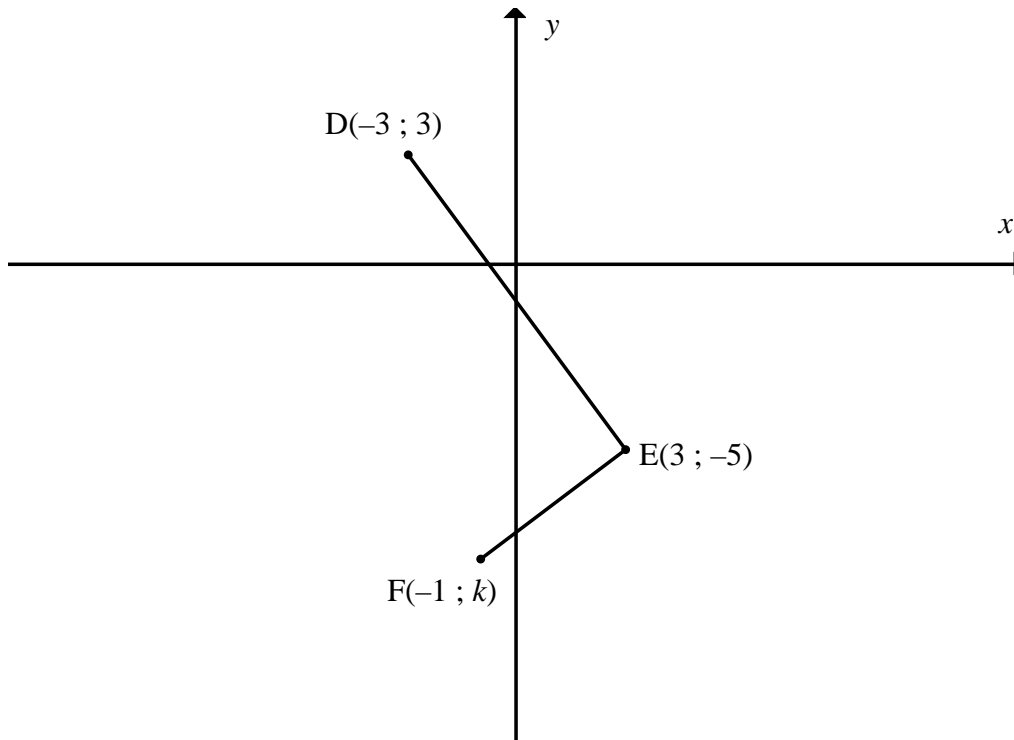
Traffic authorities are concerned that heavy vehicles (trucks) are often overloaded. In order to deal with this problem, a number of weighbridges have been set up along the major routes in South Africa. The gross (total) vehicle mass is measured at these weigh bridges. The histogram below shows the data collected at a weighbridge over a month.



- 2.1 Write down the modal class of the data. (1)
  - 2.2 Estimate the mean gross vehicle mass for the month. (5)
  - 2.3 Which of the measures of central tendency, the modal class or the estimated mean, will be most appropriate to describe the data set? Explain your choice. (1)
- [7]**

**QUESTION 3** No analytical geometry for 2020

- 3.1 In the diagram below,  $D(-3 ; 3)$ ,  $E(3 ; -5)$  and  $F(-1 ; k)$  are three points in the Cartesian plane.

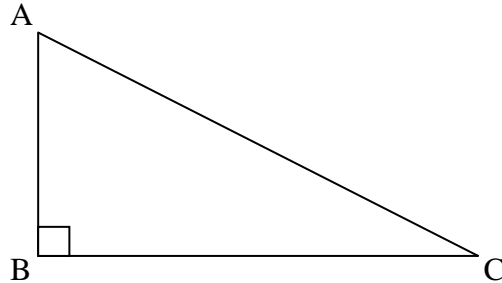


- 3.1.1 Calculate the length of DE. (2)
- 3.1.2 Calculate the gradient of DE. (2)
- 3.1.3 Determine the value of  $k$  if  $\hat{D}EF = 90^\circ$ . (4)
- 3.1.4 If  $k = -8$ , determine the coordinates of M, the midpoint of DF. (2)
- 3.1.5 Determine the coordinates of a point G such that the quadrilateral DEFG is a rectangle. (4)
- 3.2 C is the point  $(1 ; -2)$ . The point D lies in the second quadrant and has coordinates  $(x ; 5)$ . If the length of CD is  $\sqrt{53}$  units, calculate the value of  $x$ . (4)

**[18]**

**QUESTION 4**

4.1 In the diagram below,  $\triangle ABC$  is right-angled at B.



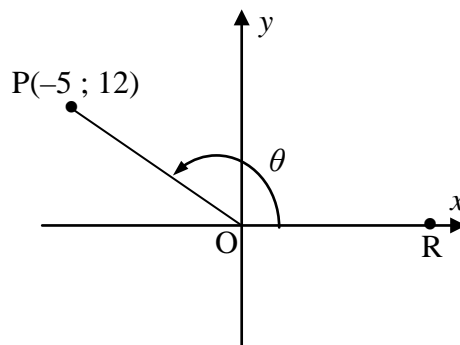
Complete the following statements:

4.1.1  $\sin C = \frac{AB}{\dots}$  (1)

4.1.2  $\dots A = \frac{AB}{BC}$  (1)

4.2 **Without using a calculator**, determine the value of:  $\frac{\sin 60^\circ \cdot \tan 30^\circ}{\sec 45^\circ}$  (4)

4.3 In the diagram,  $P(-5 ; 12)$  is a point in the Cartesian plane and  $\widehat{R\hat{O}P} = \theta$ .



Determine the value of:

4.3.1  $\cos \theta$  (3)

4.3.2  $\operatorname{cosec}^2 \theta + 1$  (3)  
[12]

**QUESTION 5**

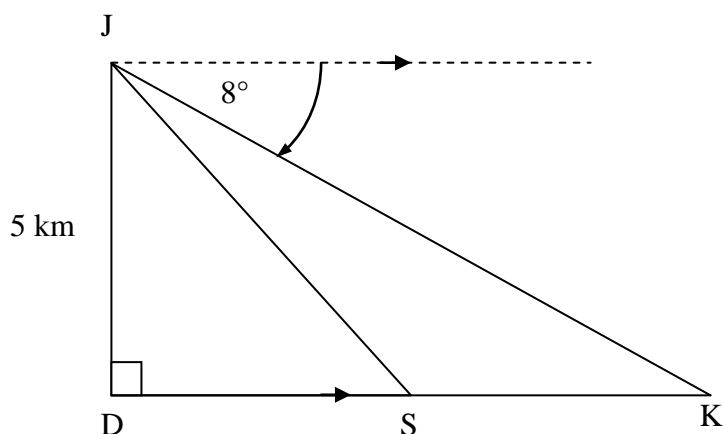
5.1 Solve for  $x$ , correct to ONE decimal place, in each of the following equations where  $0^\circ \leq x \leq 90^\circ$ .

5.1.1  $5 \cos x = 3$  (2)

5.1.2  $\tan 2x = 1,19$  (3)

5.1.3  $4 \sec x - 3 = 5$  (4)

5.2 An aeroplane at J is flying directly over a point D on the ground at a height of 5 kilometres. It is heading to land at point K. The angle of depression from J to K is  $8^\circ$ . S is a point along the route from D to K.



5.2.1 Write down the size of  $\hat{JKD}$ . (1)

5.2.2 Calculate the distance DK, correct to the nearest metre. (3)

5.2.3 If the distance SK is 8 kilometres, calculate the distance DS. (1)

5.2.4 Calculate the angle of elevation from point S to J, correct to ONE decimal place. (2)

**[16]**

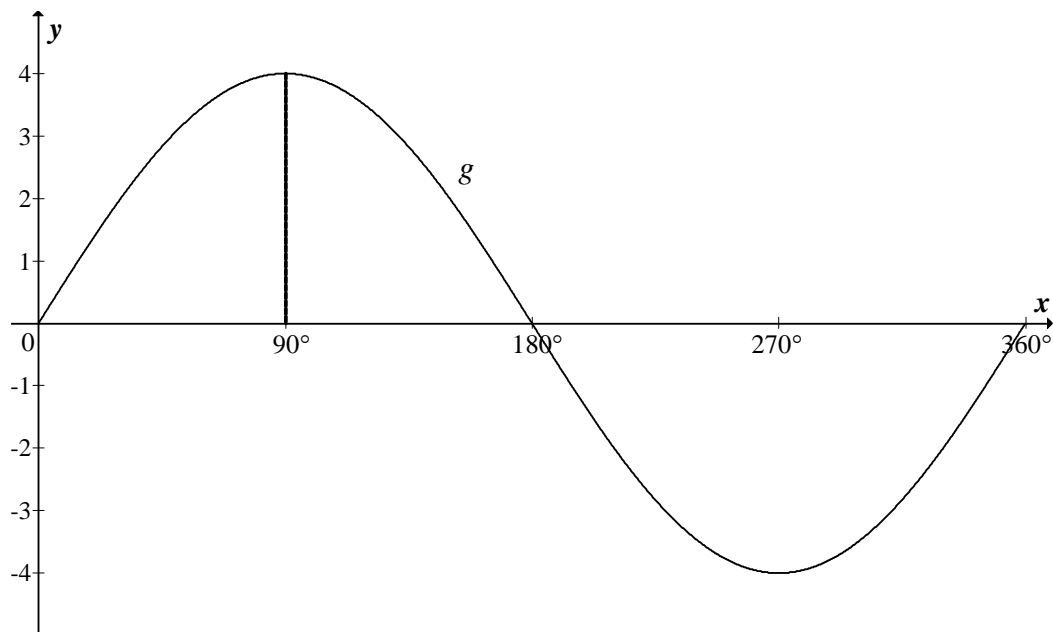
**QUESTION 6**

6.1 Consider the function  $y = 2 \tan x$ .

6.1.1 Make a neat sketch of  $y = 2 \tan x$  for  $0^\circ \leq x \leq 360^\circ$  on the axes provided on DIAGRAM SHEET 1. Clearly indicate on your sketch the intercepts with the axes and the asymptotes. (4)

6.1.2 If the graph of  $y = 2 \tan x$  is reflected about the  $x$ -axis, write down the equation of the new graph obtained by this reflection. (1)

6.2 The diagram below shows the graph of  $g(x) = a \sin x$  for  $0^\circ \leq x \leq 360^\circ$ .



6.2.1 Determine the value of  $a$ . (1)

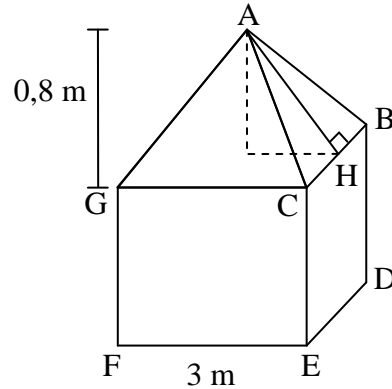
6.2.2 If the graph of  $g$  is translated 2 units upwards to obtain a new graph  $h$ , write down the range of  $h$ . (2)

**[8]**



**QUESTION 7**

- 7.1 The roof of a canvas tent is in the shape of a right pyramid having a perpendicular height of 0,8 metres on a square base. The length of one side of the base is 3 metres.



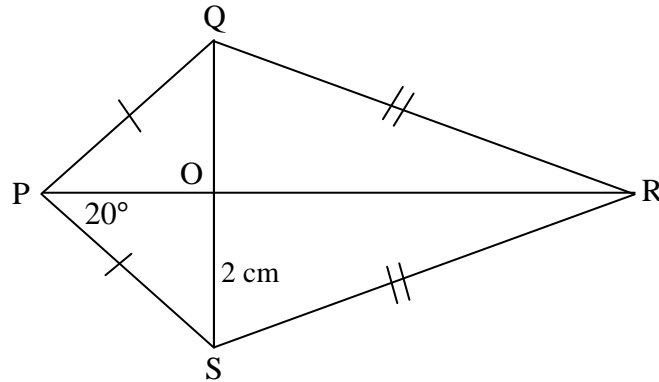
- 7.1.1 Calculate the length of AH. (2)
- 7.1.2 Calculate the surface area of the roof. (2)
- 7.1.3 If the height of the walls of the tent is 2,1 metres, calculate the total amount of canvas required to make the tent if the floor is excluded. (2)
- 7.2 A metal ball has a radius of 8 millimetres.
- 7.2.1 Calculate the volume of metal used to make this ball, correct to TWO decimal places. (2)
- 7.2.2 If the radius of the ball is doubled, write down the ratio of the new volume : the original volume. (2)
- 7.2.3 You would like this ball to be silver plated to a thickness of 1 millimetre. What is the volume of silver required? Give your answer correct to TWO decimal places. (2)

**[12]**

Give reasons for your statements in the answers to QUESTIONS 8 and 9.

**QUESTION 8**

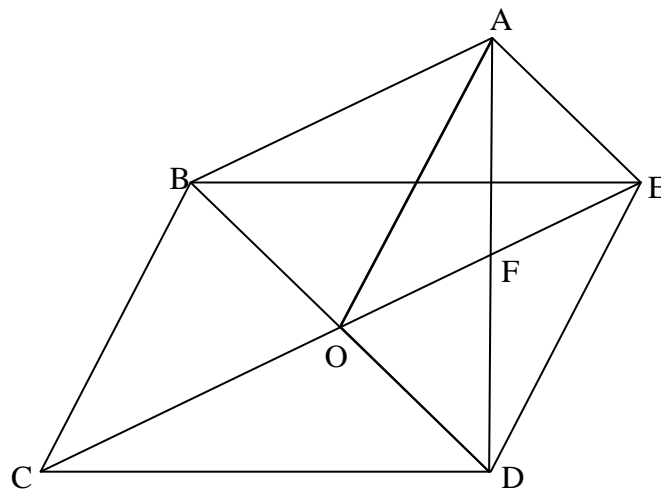
PQRS is a kite such that the diagonals intersect in O.  
OS = 2 cm and  $\hat{OPS} = 20^\circ$ .



- 8.1 Write down the length of OQ. (2)
  - 8.2 Write down the size of  $\hat{POQ}$ . (2)
  - 8.3 Write down the size of  $\hat{QPS}$ . (2)
- [6]

**QUESTION 9**

In the diagram, BCDE and AODE are parallelograms.



- 9.1 Prove that OF || AB. (4)
  - 9.2 Prove that ABOE is a parallelogram. (4)
  - 9.3 Prove that  $\triangle ABO \cong \triangle EOD$ . (5)
- [13]

**TOTAL: 100**

**CENTRE NUMBER:**

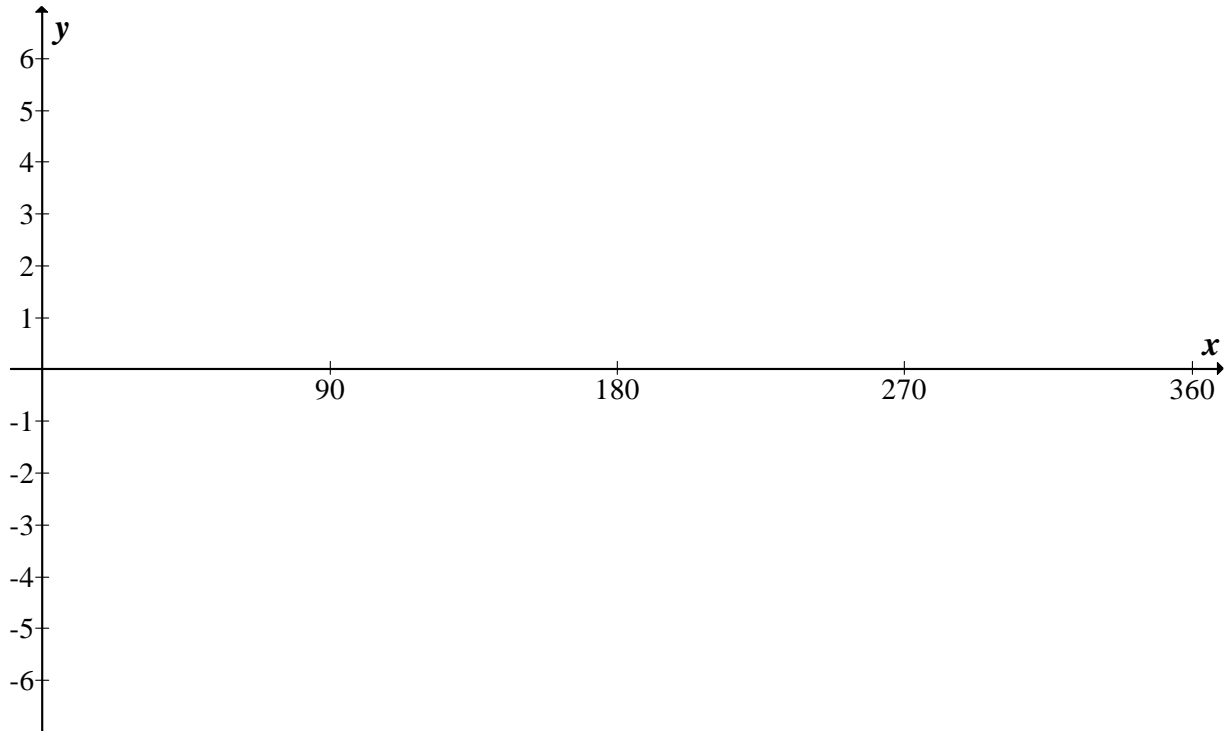
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**EXAMINATION NUMBER:**

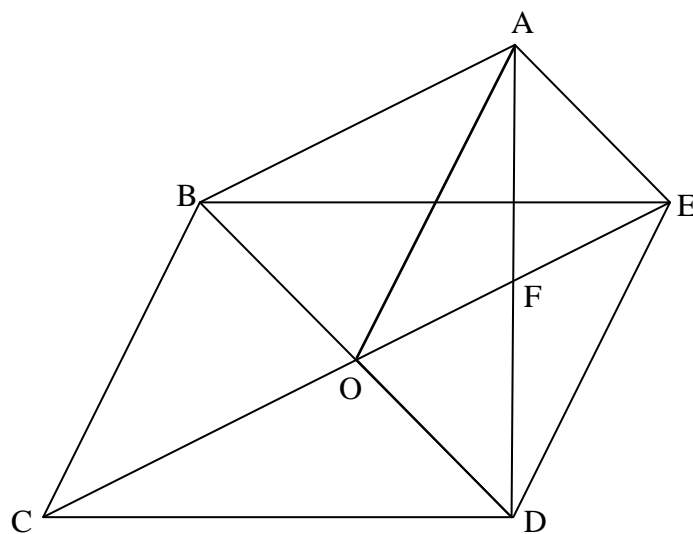
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**DIAGRAM SHEET 1**

**QUESTION 6.1.1**



**QUESTION 9**





## NOV 2013 PAPER 2

GRADE 10  
HD

ALEXANDER ROAD HIGH SCHOOL  
MATHEMATICS  
PAPER 2

NOVEMBER 2013  
2 HOURS  
100 MARKS

**INSTRUCTIONS :**

All questions to be answered in the correct order.  
Rule off after each question.  
Answers to be rounded off, where appropriate, to 2 decimal places.  
Calculators may be used in all questions, unless stated otherwise.

**QUESTION 1** No data handling for 2020

- 1.1 Look at the table below that shows the average playing time of a large number of CDs.

Playing time ( in minutes ) of CD	Frequency (f)	Midpoint (x)	f(x)
$40 \leq x < 45$	2		
$45 \leq x < 50$	5		
$50 \leq x < 55$	10		
$55 \leq x < 60$	18		
$60 \leq x < 65$	28		
$65 \leq x < 70$	22		
$70 \leq x < 75$	11		
$75 \leq x < 80$	4		

In which interval would you find the :

- 1.1.1 median (2)
- 1.1.2 modal value (1)
- 1.2 Redraw and complete the last two columns of the table and hence calculate the estimated mean playing time of the CDs. (5)

1.2 The capacity of 10 soccer stadiums in South Africa is given below :

Stadium name	Capacity ( in thousands )	Location
Green Point	70	Cape Town
Moses Mahbida	70	Durban
Ellis Park	61	Johannesburg
Soccer City	94,7	Johannesburg
Free State	48	Bloemfontein
Nelson Mandela Bay	48	Port Elizabeth
Mbombela	46	Nelspruit
Peter Mokaba	46	Polokwane
Royal Bafokeng	42	Rustenburg
Loftus Versveld	50	Pretoria

1.2.1 Determine the 5 – number summary for the above. (4)

1.2.2 Use the 5 – number summary to draw a box-and-whisker plot for the above. (3)

[15]

**QUESTION 2** No analytical geometry for 2020

You are given points A ( 2 ; 4 ) , B ( - 4 ; - 1 ) , C ( - 1 ; - 7 ) and D ( p ; q ).

2.1 Determine the length of AC. (2)

2.2 Calculate p and q, if ABCD is a parallelogram. (2)

2.3 Is  $\hat{A}BC = 90^\circ$  ? Justify your answer. (3)

2.4 If J and K are the midpoints of AB and AC respectively :

2.4.1 calculate the coordinates of J and K. (4)

2.4.2 prove that JK  $\parallel$  BC. (5)

[16]

**QUESTION 3**

3.1 If  $\sin \theta = -\frac{12}{13}$  and  $90^\circ \leq \theta \leq 270^\circ$ , use a suitable sketch to calculate the value of  $1 - \cos^2 \theta$ . NO CALCULATORS TO BE USED. (3)

3.2 Calculate the value of the following expression, WITHOUT THE USE OF A CALCULATOR. ALL WORKING AND SPECIAL TRIANGLES MUST BE SHOWN.

$$\sin 30^\circ \cdot \tan 45^\circ - \cos 60^\circ \quad (4)$$

3.3 Solve for  $x$ ,  $x \in [0^\circ; 90^\circ]$ :

3.3.1  $\cos 2x = 0,75$  (2)

3.3.2  $\tan(x + 40^\circ) = 5$  (2)

3.4 Use a calculator to determine the value of the following :

$$\frac{\operatorname{cosec} 50^\circ}{2 \cdot \sin^2 25^\circ} \quad (2)$$

3.5 If it is given that  $\tan x = \frac{\sin x}{\cos x}$ , simplify the following and give your answer as a single ratio of  $x$  :

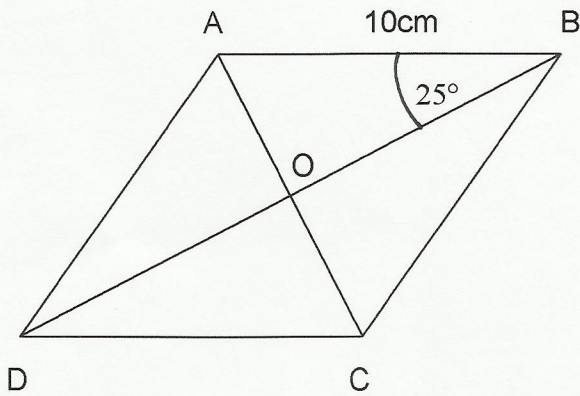
$$\frac{\sin(180^\circ - x)}{\cos(180^\circ + x)} \quad (3)$$

- 3.6.1 Sketch the graph of  $f(x) = \sin x - 1$  in the interval  $-180^\circ \leq x \leq 180^\circ$  (3)
- 3.6.2 Write down the range of  $f(x)$  (1)
- 3.6.3 Give the period of  $f(x)$ . (1)

[21]

**QUESTION 4**

Given ABCD is a rhombus. Diagonals AC and BD cut at O.  $\hat{ABD} = 25^\circ$  and  $AB = 10$  cm

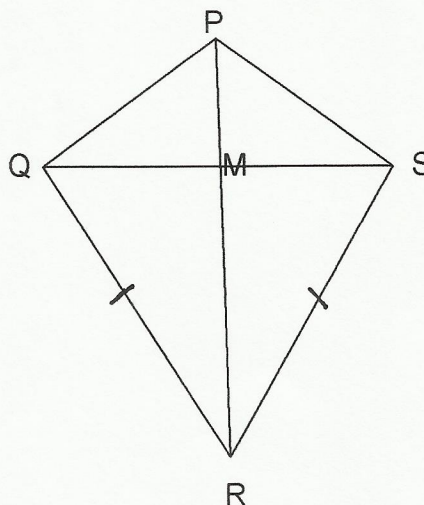


- 4.1 State the size of  $\hat{AOB}$ , giving a reason. (2)
- 4.2 Why is  $AO = OC$ ? (1)
- 4.3 Determine the length of AC. (4)

[7]

**QUESTION 5**

PQRS is a kite.



5.1 Complete with a reason :

5.1.1  $PQ = \dots\dots\dots$  (2)

5.1.2  $QM = \dots\dots\dots$  (2)

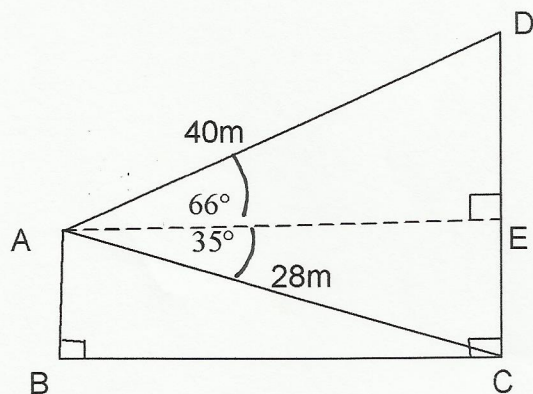
5.1.3  $\hat{PMS} = \dots\dots\dots$  (2)

5.2 NOW if it is given that  $PQ = 10$  cm and  $QS = 12$  cm, determine the size of  $\hat{PSM}$ . (3)

[9]

**QUESTION 6**

In the figure below, AB and CD represent the heights of two buildings that lie in the same horizontal plane. The angle of elevation from A to D is  $66^\circ$  and the angle of depression from A to C is  $35^\circ$ .



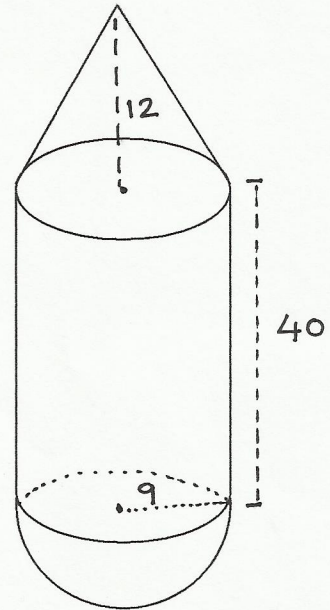
Determine the height of each building to the nearest metre.

[7]



**QUESTION 7**

Look at the diagram on the right, with the perpendicular height of the cone = 12 cm, the radius of the cylinder = 9 cm and the height of the cylinder = 40 cm.



Determine the :

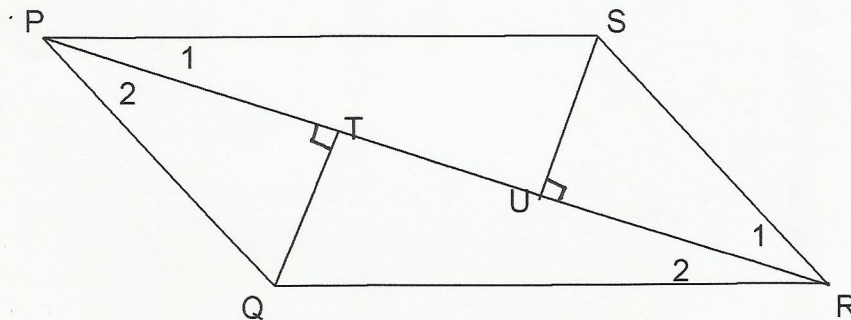
- 7.1 volume of the solid (4)  
 7.2 surface area of the solid. (6)

[10]

**QUESTION 8**

In the diagram below, PQRS is a parallelogram with  $QT \perp PR$  and  $SU \perp PR$ .

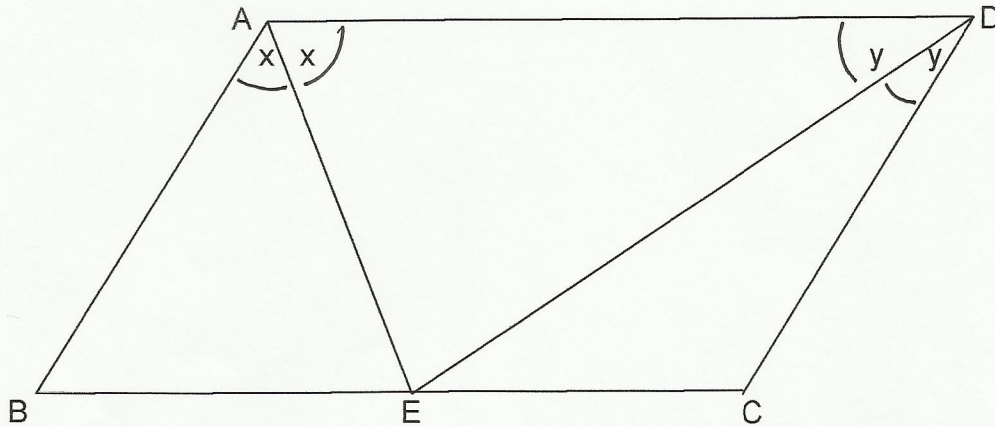
Prove that  $\triangle PTQ \cong \triangle RUS$  (5)



[5]

**QUESTION 9**

ABCD is a parallelogram, where AE and DE bisect  $\hat{BAD}$  and  $\hat{CDA}$  respectively.



9.1 Prove that :

9.1.1  $\hat{AED} = 90^\circ$  (3)

9.1.2  $\triangle ABE$  is an isosceles triangle. (2)

9.1.3  $EC = AB$  (4)

9.2 What is the relationship between AB and BC ? (1)

[10]

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TOTAL 100



ALEXANDER ROAD HIGH SCHOOL

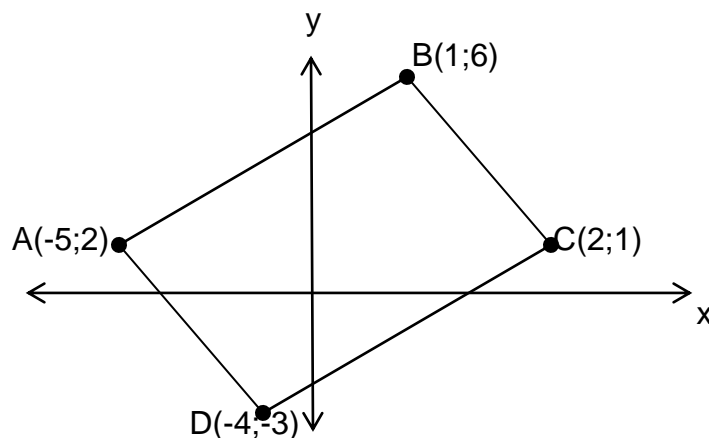
NOVEMBER 2014

GRADE 10  
HDMATHEMATICS  
PAPER 2TIME : 2 HOURS  
MARKS : 100**INSTRUCTIONS :**

1. Clearly show ALL the calculations, diagrams, graphs, etc. you have used in determining the answers.
2. A calculator may be used, unless stated otherwise.
3. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
4. Number the answers EXACTLY as the questions are numbered.
5. Diagrams are NOT necessarily drawn to scale.
6. It is in your own interest to write legibly and to present the work neatly.

**QUESTION 1** No analytical geometry for 2020

Given points A( -5 ; 2 ), B( 1 ; 6 ), C( 2 ; 1 ) and D( -4 ; -3 ) in the Cartesian co-ordinate plane, answer the questions below.



1.1 Calculate the following :

1.1.1 the gradients of AB and DC (4)

1.1.2 the lengths of AB and DC (6)

1.2.1 “A quadrilateral is a parallelogram if both pairs of opposite angles of the quadrilateral are equal.”  
Using sides only, name 3 other ways in which we can prove that a quadrilateral is a parallelogram. (3)

1.2.2 Using one of the ways stated in 1.2.1, prove that ABCD is a parallelogram. (3)

1.3.1 Calculate M, the midpoint of AC. (3)

1.3.2 Hence prove that M is the point of intersection of the diagonals of parallelogram ABCD. (4)

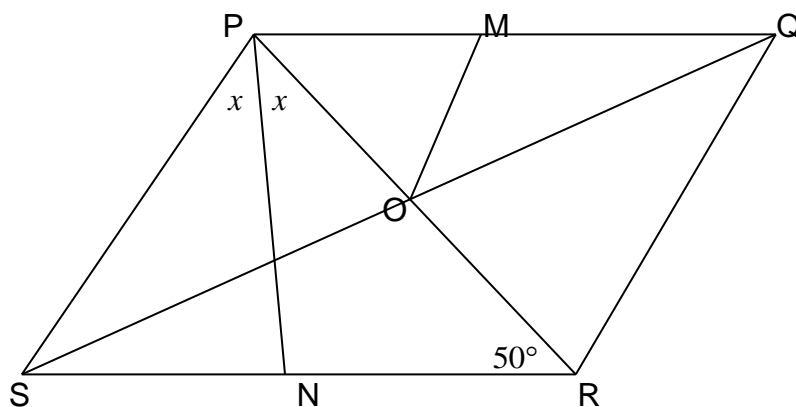
[23]

## QUESTION 2

2.1 Prove the theorem that states that both pairs of opposite sides of a parallelogram are equal. (5)

2.2 State 3 properties of a rhombus with specific reference to the diagonals. (3)

2.3



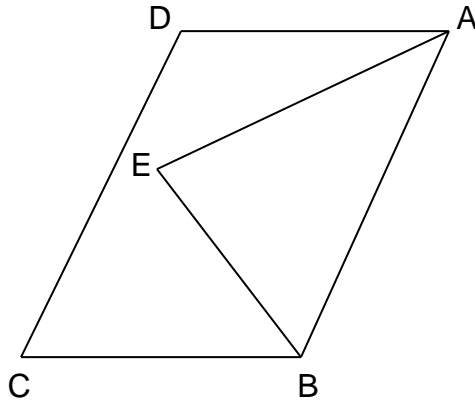
PQRS is rhombus. PR and SQ cut one another at O.  $SQ = 20$  cm  
 $\hat{P}RS = 50^\circ$  and  $\hat{SPN} = \hat{NPR} = x$ .

2.3.1 Determine the value of  $x$ , giving all necessary reasons. (4)

2.3.2 Determine the length of QR. Give all necessary reasons. (5)

2.3.3 If it is given that  $PM = MQ$ , determine the length of MO. (3)

- 2.4 Given parallelogram ABCD with AE and BE the bisectors of  $\hat{DAB}$  and  $\hat{ABC}$  respectively. Prove that  $\hat{AEB} = 90^\circ$ . (5)

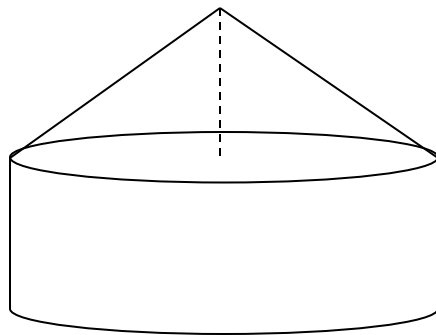


[25]

### QUESTION 3

- 3.1 A container of 'Liquifruit' is in the shape of a rectangular prism. The container holds  $1500 \text{ cm}^3$  of juice. The base of the container measures 9 cm by 6 cm. If the container is changed so that the length of the base is doubled but the width of the base and the height stay the same, calculate the new volume of the container. (2)

3.2



The figure above consists of a cylinder with a cone attached above it. The radius of the cone is 5 cm ; the height of the cylinder is 6 cm and the slant height of the cone is 13 cm. Determine the total surface area of the solid. (5)

[7]

**QUESTION 4**

4.1 Use a calculator to determine the value of the following expression :

$$\operatorname{cosec} \theta - \cos 2\theta \quad \text{if } \theta = 50^\circ \quad (2)$$

4.2 If  $5\sin \theta = -4$  and  $180^\circ \leq \theta \leq 270^\circ$ , use a suitable sketch to calculate the value of  $5\cos \theta - 3\sec \theta$ . NO CALCULATORS TO BE USED. (6)

4.3 Calculate the value of the following expression, WITHOUT THE USE OF A CALCULATOR. ALL WORKING AND DIAGRAMS MUST BE SHOWN.

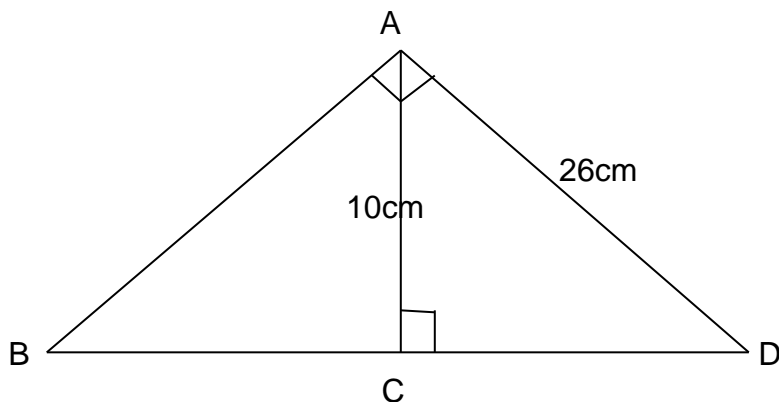
$$\sin^2 30^\circ \cdot \cot 45^\circ \cdot \cos 60^\circ \quad (4)$$

4.4 Solve for  $x$ ,  $x \in [0^\circ; 90^\circ]$ :

$$4.4.1 \quad \cos(x - 10^\circ) = \sin 50^\circ \quad (3)$$

$$4.4.2 \quad 3\tan 5x + 1 = 6 \quad (4)$$

4.5



Given :  $AD = 26 \text{ cm}$  and  $AC = 10 \text{ cm}$ .  $\hat{BAD} = 90^\circ$ . Calculate, correct to two places,

4.5.1 the size of  $\hat{D}$  (3)

4.5.2 the length of  $BC$ . (4)

4.6.1 On the same system of axes for  $-180^\circ \leq x \leq 180^\circ$ , sketch :  
 $f : y = 2\sin x$  and  $g : y = \cos x + 1$  (4)

4.6.2 State the period of  $f$ . (1)

[31]

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**QUESTION 5** No data handling for 2020

Consider the following data representing points scored by a basketball player.

33 11 27 13 42 49 35 11 49 42  
 10 3 21 47 32 29 6 18 10 25

5.1 Organise the data into a stem-and-leaf plot. (2)

5.2 Calculate the inter-quartile range for the data. (5)

5.3 Draw the box and whisker diagram for the above data. (3)

5.4 Transfer the data to a frequency table as shown below .

Class Interval	Frequency
0 – 9	
10 – 19	
20 – 29	
30 – 39	
40 – 49	

(1)

5.5 Determine the ESTIMATED mean from the FREQUENCY TABLE ABOVE. (3)

[14]

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## NOV 2015 PAPER 2

**VRAAG 1** No data handling for 2020

Negentien dogters is gevra om 'n legkaart so gou as moontlik te voltooi. Hulle tye (in sekondes) is aangeteken en word in die tabel hieronder getoon:

14	15	16	16	17	17	18	18	19	19
19	20	21	21	22	23	24	24	29	

- 1.1 Identifiseer die mediaantyd wat die dogters geneem het om die legkaart te voltooi. (1)
- 1.2 Bepaal die onderste en boonste kwartiele vir die data. (2)
- 1.3 Teken 'n mond-en-snordigram om die data voor te stel. (2)
- 1.4 Die vyfgetalopsomming van die tyd (in sekondes) wat dit 19 seuns geneem het om dieselfde legkaart te voltooi, is (15 ; 19 ; 23 ; 26 ; 30).
- 1.4.1 Bereken die interkwartielvariasiewydte (-omvang) vir die tyd wat dit die seuns geneem het. (2)
- 1.4.2 Indien slegs een seun 19 sekondes geneem het om die legkaart te voltooi, watter persentasie van die seuns het ten minste 19 sekondes geneem om die legkaart te voltooi? (1)
- 1.5 In watter groep, die seuns of die dogters, het 'n groter getal leerders die legkaart in minder as 23 sekondes voltooi? Motiveer jou antwoord. (2)
- [10]**

**VRAAG 2** No data handling for 2020

Die tabel hieronder toon inligting oor die getal uur wat 120 leerders in die afgelope week op hulle selfone spandeer het.

GETAL UUR ( $h$ )	FREKWENSIE
$0 < h \leq 2$	10
$2 < h \leq 4$	15
$4 < h \leq 6$	30
$6 < h \leq 8$	35
$8 < h \leq 10$	25
$10 < h \leq 12$	5

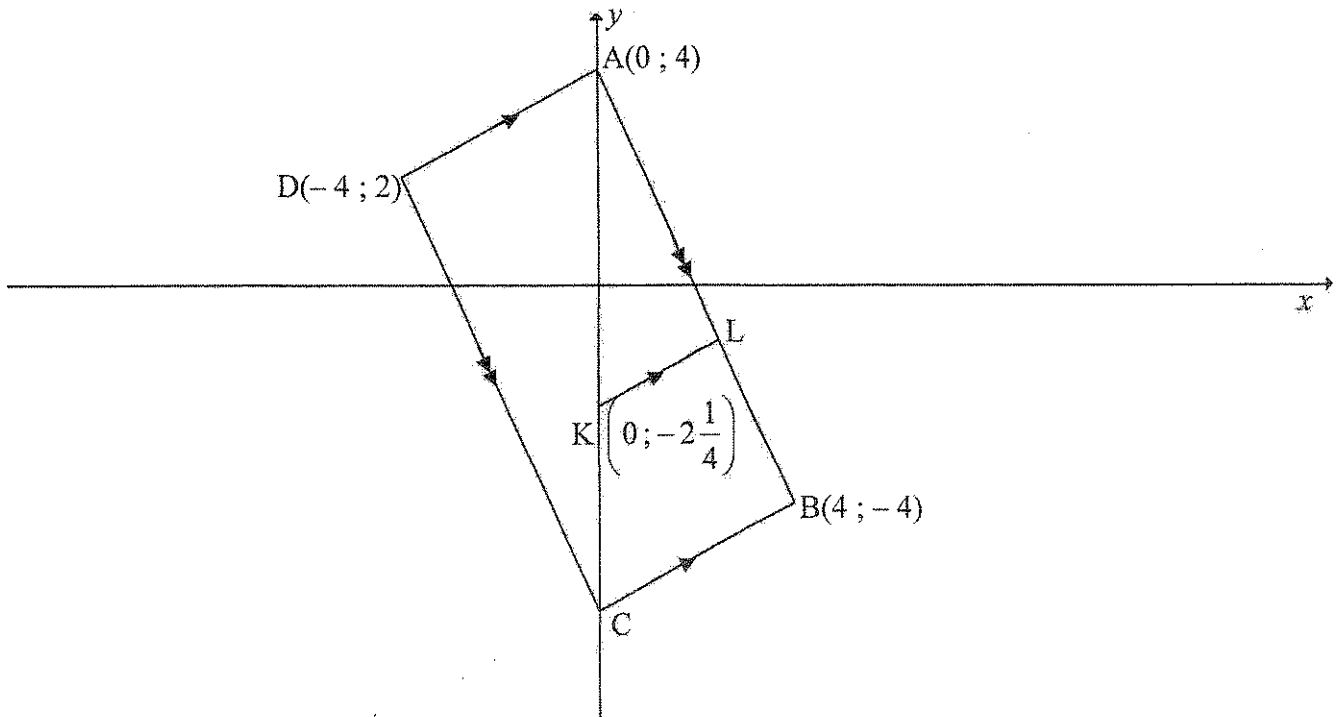
- 2.1 Identifiseer die modale klas vir die data. (1)
- 2.2 Skat die gemiddelde getal uur wat hierdie leerders in die afgelope week op hul selfone spandeer het. (3)
- [4]**





**VRAAG 3** No analytical geometry for 2020

In die diagram is C 'n punt op die  $y$ -as sodat  $A(0; 4)$ ,  $B(4; -4)$ , C en  $D(-4; 2)$  hoekpunte van parallellogram ABCD is. K is die punt  $\left(0; -2\frac{1}{4}\right)$  en L is 'n punt op AB sodat  $KL \parallel CB$ .



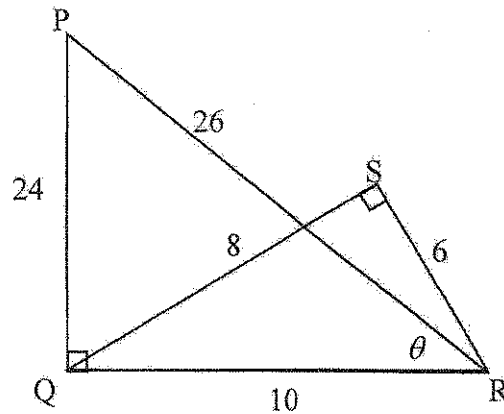
- 3.1 Bereken die lengte van hoeklyn DB. (3)
- 3.2 Bereken die koördinate van M, die middelpunt van DB. (3)
- 3.3 Bereken die gradiënt van AD. (3)
- 3.4 Bewys dat  $AD \perp AB$ . (3)
- 3.5 Gee 'n rede waarom parallellogram ABCD 'n reghoek is. (1)
- 3.6 Bepaal die vergelyking van KL in die vorm  $y = mx + c$ . (2)
- 3.7 Skryf, met redes, die koördinate van C neer. (3)
- [18]**



**VRAAG 4**

$\triangle PQR$  en  $\triangle SQR$  is reghoekige driehoeke soos in die diagram hieronder aangetoon.

$PR = 26$ ,  $PQ = 24$ ,  $QS = 8$ ,  $SR = 6$ ,  $QR = 10$  en  $\widehat{PRQ} = \theta$ .



4.1 Verwys na die diagram hierbo en, SONDER om 'n sakrekenaar te gebruik, skryf die waarde neer van:

4.1.1  $\tan \hat{P}$  (1)

4.1.2  $\sin \hat{SQR}$  (1)

4.1.3  $\cos \theta$  (1)

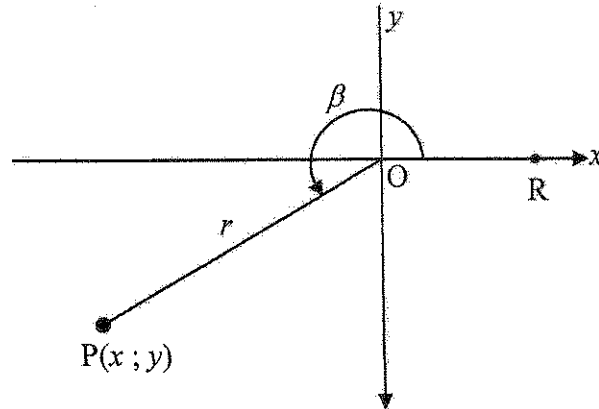
4.1.4  $\sec \hat{SRQ}$  (1)

4.2 SONDER om 'n sakrekenaar te gebruik, bepaal die waarde van  $\frac{\cot \theta}{\operatorname{cosec} \hat{QRS}}$ . (3)  
[7]



## VRAAG 5

- 5.1 In die diagram hieronder is  $P(x; y)$  'n punt in die derde kwadrant.  $\widehat{R\hat{O}P} = \beta$  en  $17 \cos \beta + 15 = 0$ .

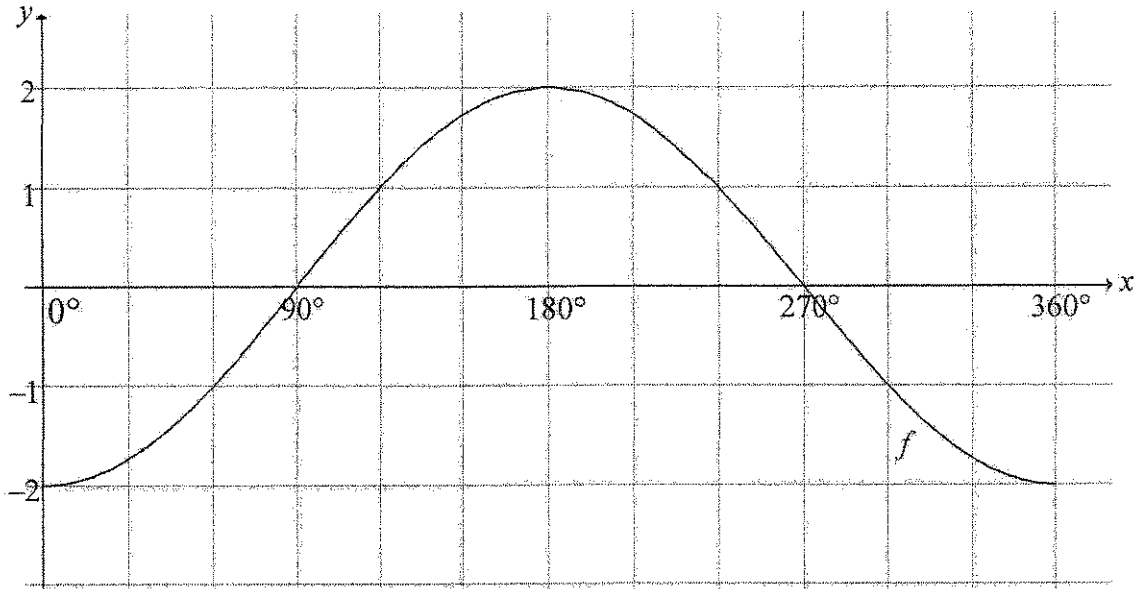


- 5.1.1 Skryf die waardes van  $x$ ,  $y$  en  $r$  neer. (4)
- 5.1.2 SONDER om 'n sakrekenaar te gebruik, bepaal die waarde van:
- (a)  $\sin \beta$  (1)
- (b)  $\cos^2 30^\circ \cdot \tan \beta$  (3)
- 5.1.3 Bereken die grootte van  $\widehat{R\hat{O}P}$  korrek tot TWEE desimale plekke. (2)
- 5.2 Los vir  $x$  op in elk van die volgende vergelykings, waar  $0^\circ \leq x \leq 90^\circ$ . Gee jou antwoorde korrek tot TWEE desimale plekke.
- 5.2.1  $\tan x = 2,22$  (2)
- 5.2.2  $\sec(x + 10^\circ) = 5,759$  (3)
- 5.2.3  $\frac{\sin x}{0,2} - 2 = 1,24$  (3)
- [18]**



**VRAAG 6**

In die diagram hieronder is die grafiek van  $f(x) = -2\cos x$  geskets vir die interval  $0^\circ \leq x \leq 360^\circ$



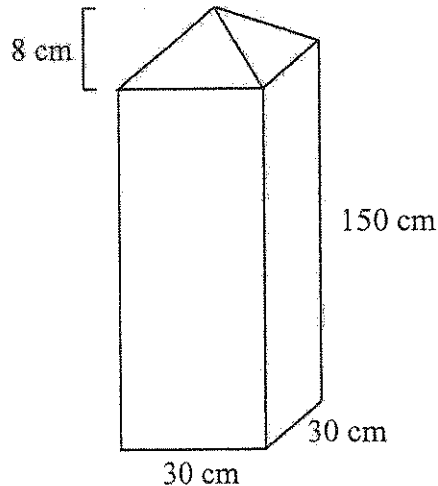
- 6.1 Skryf die amplitude van  $f$  neer. (1)
- 6.2 Skryf die minimum waarde van  $f(x) + 3$  neer. (1)
- 6.3 Op dieselfde assstelsel, skets die grafiek van  $g$ , waar  $g(x) = \sin x + 1$  vir die interval  $0^\circ \leq x \leq 360^\circ$ . (3)
- 6.4 Gebruik die grafieke om die volgende te bepaal:
- 6.4.1 Die waarde van  $f(180^\circ) - g(180^\circ)$  (2)
- 6.4.2 Vir watter waarde(s) van  $x$  sal  $f(x) \cdot g(x) > 0$  wees (2)
- 6.5 Die grafiek van  $f$  word om die  $x$ -as gereflekteer en dan met 3 eenhede afwaarts geskuif om die grafiek van  $h$  te vorm. Bepaal:
- 6.5.1 Die vergelyking van  $h$  (2)
- 6.5.2 Die waardeversameling van  $h$  vir die interval  $0^\circ \leq x \leq 360^\circ$  (2)

**[13]**

## VRAAG 7

## NOV 201 PAPER 2

'n Betonhekpilaar bestaan uit 'n regte reghoekige prisma met 'n vierkantige basis en 'n piramide aan die bokant, soos in die diagram hieronder getoon. Die lengte van die sye van die basis is 30 cm en die hoogte van die reghoekige gedeelte is 150 cm. Die loodregte hoogte van die piramidegedeelte is 8 cm.



Volume van 'n piramide =  $\frac{1}{3}$  oppervlakte van die basis  $\times$  hoogte

Totale buite-oppervlakte van 'n piramide =

oppervlakte van die basis +  $\frac{1}{2}$  (omtrek van die basis  $\times$  skuinshoogte)

- 7.1 Bereken die volume beton wat benodig word om EEN pilaar te maak. (3)
- 7.2 Bereken die buite-oppervlakte van die piramidegedeelte van die pilaar. (3)
- 7.3 Indien die lengte van die sye van die basis gehalveer word, hoeveel pilare met dieselfde ontwerp as die oorspronklike, kan met dieselfde volume beton as die oorspronklike pilaar gemaak word? (2)

[8]

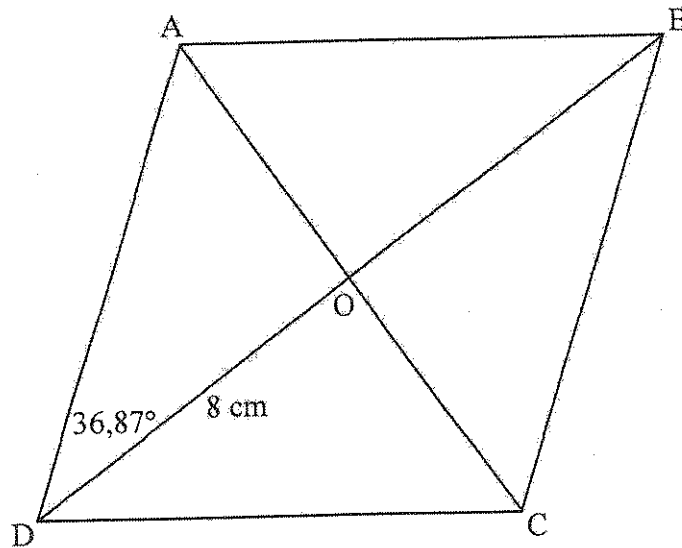


Gee redes vir jou bewerings in VRAAG 8 en 9.

### VRAAG 8

In die diagram is ABCD 'n ruit met hoeklyne AC en BD wat in O sny.

$\hat{A}DO = 36,87^\circ$  en  $DO = 8$  cm.



8.1 Skryf die groottes van die volgende hoeke neer:

8.1.1  $\hat{C}DO$  (1)

8.1.2  $\hat{A}OD$  (1)

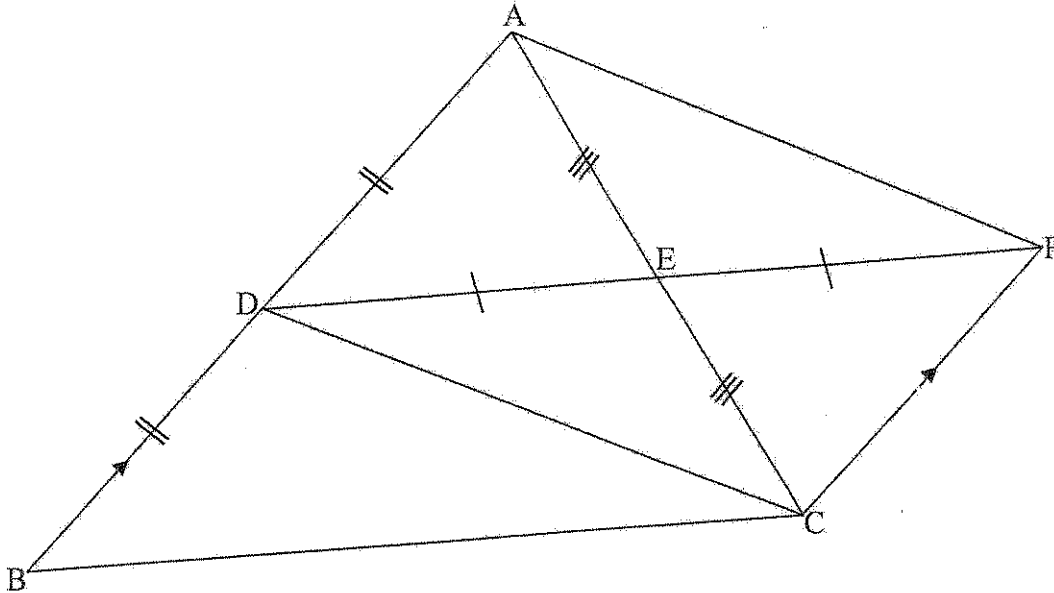
8.2 Bereken die lengte van AO. (2)

8.3 As E 'n punt op AB is met  $OE \parallel DA$ , bereken die lengte van OE. (4)  
[8]



**VRAAG 9**

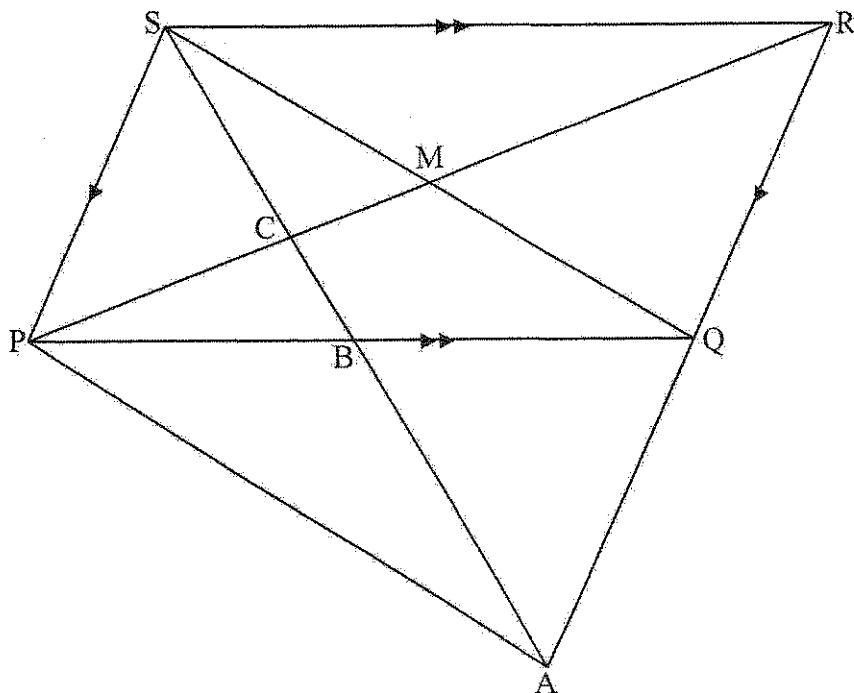
9.1 In die diagram hieronder is D die middelpunt van sy AB van  $\triangle ABC$ . E is die middelpunt van AC. DE is verleng na F sodat  $DE = EF$ .  $CF \parallel BA$ .



- 9.1.1 Skryf 'n rede neer waarom  $\triangle ADE \equiv \triangle CFE$ . (1)
- 9.1.2 Skryf 'n rede neer waarom DBCF 'n parallelogram is. (1)
- 9.1.3 Bewys vervolgens die stelling wat beweer dat  $DE = \frac{1}{2}BC$ . (2)



- 9.2 In die diagram hieronder is PQRS 'n parallelogram met hoeklyne PR en QS wat in M sny. B is 'n punt op PQ sodat SBA en RQA reguitlyne is en  $SB = BA$ . SA sny PR in C en PA word getrek.



- 9.2.1 Bewys dat  $SP = QA$ . (4)
- 9.2.2 Bewys dat SPAQ 'n parallelogram is. (2)
- 9.2.3 Bewys dat  $AR = 4MB$ . (4)

[14]

**TOTAAL: 100**



## NOV 2016 PAPER 2

No data handling for 2020

1. The heights of 20 children were measured (in cm) and the results were recorded below.

127	128	129	130	131	133	134	134	135	136	
137	138	139	140	141	142	142	143	144	145	

- 1.1 Write down the median height measured. (1)
- 1.2 Determine:
- 1.2.1 The mean height (2)
- 1.2.2 The range (1)
- 1.2.3 The interquartile range (3)
- 1.3 Draw a box and whisker diagram to represent the data. (2)

[9]

No data handling for 2020

2. The intelligence quotient score (IQ) of a Grade 10 class is summarised in the table below.

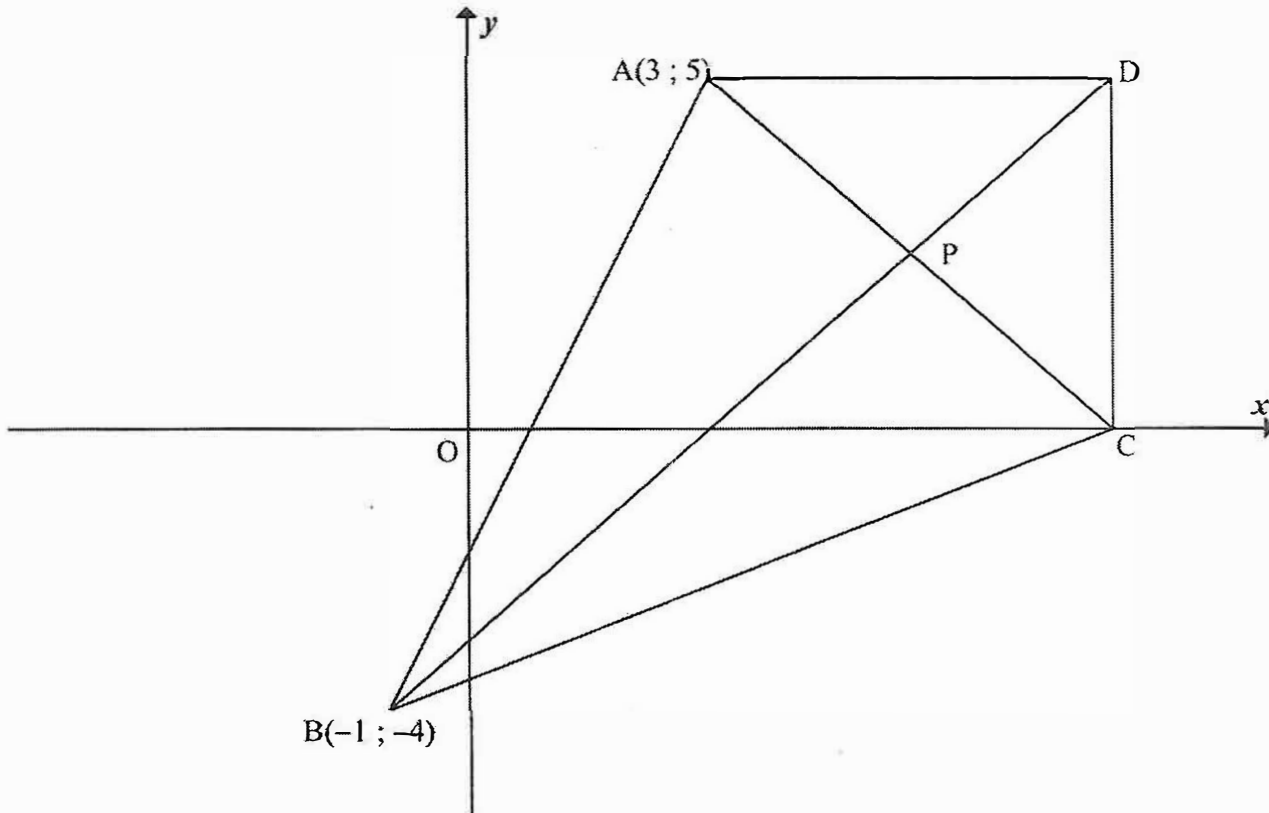
IQ INTERVAL	FREQUENCY
$90 < x < 100$	4
$100 < x < 110$	8
$110 < x < 120$	7
$120 \leq x < 130$	5
$130 \leq x < 140$	4
$140 \leq x < 150$	2

- 2.1 Write down the modal class of the data. (1)
- 2.2 Determine the interval in which the median lies. (2)
- 2.3 Estimate the mean IQ score of this class of learners. (3)

[6]

**QUESTION 3** No analytical geometry for 2020

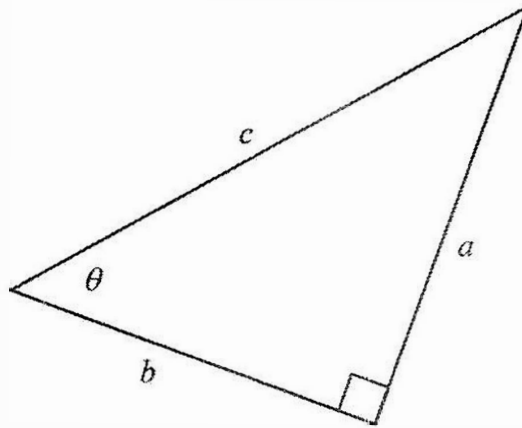
- 3.1 Show that a triangle  $ABC$ , with vertices  $A(1 ; 1)$ ;  $B(3 ; 6)$  and  $C(6 ; 3)$ , is an isosceles triangle. (4)
- 3.2 In the diagram below,  $ADCB$  is a kite with  $A(3 ; 5)$  and  $B(-1 ; -4)$ .  $AD = DC$  and  $AB = BC$ .  $D$  is a point such that  $AD$  is parallel to the  $x$ -axis and  $AD = 5$  units.  $CD$  is perpendicular to the  $x$ -axis. The diagonals intersect at  $P$ .



- 3.2.1 Show that the coordinates of  $C$  are  $(8 ; 0)$ . (2)
- 3.2.2 Write down the coordinates of point  $P$ . (2)
- 3.2.3 Calculate the gradient of line  $BD$ . (2)
- 3.2.4 Calculate the length of line  $AC$ . (2)
- 3.2.5 Calculate the area of the kite  $ADCB$ . (3)
- [15]

**QUESTION 4**

4.1 A right-angled triangle has sides  $a$ ,  $b$  and  $c$  and the angle  $\theta$ , as shown below.



4.1.1 Write the following in terms of  $a$ ,  $b$  and  $c$ :

(a)  $\cos\theta$  (1)

(b)  $\tan\theta$  (1)

(c)  $\sin(90^\circ - \theta)$  (2)

4.1.2 If it is given that  $a = 5$  and  $\theta = 50^\circ$ , calculate the numerical value of  $b$ . (2)

4.2 Given that  $\hat{A} = 38,2^\circ$  and  $\hat{B} = 146,4^\circ$ .

Calculate the value of  $2\operatorname{cosec}A + \cos 3B$ . (3)

4.3 Simplify fully, WITHOUT the use of a calculator:

$$\frac{\sin 45^\circ \cdot \tan^2 60^\circ}{\cos 45^\circ} \quad (4)$$

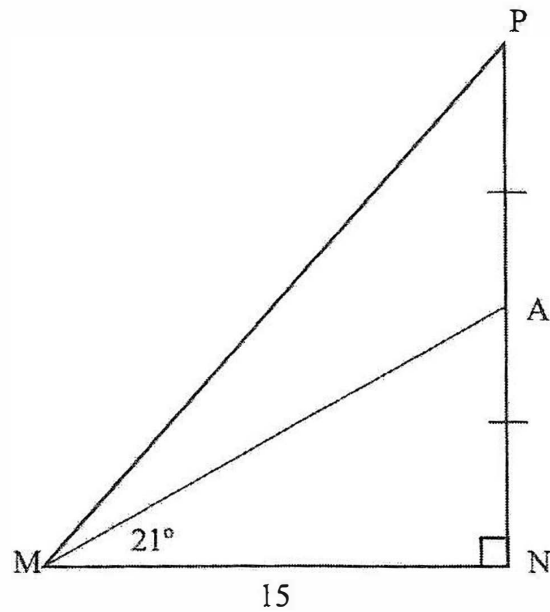
4.4 Given that  $5\cos\beta - 3 = 0$  and  $0^\circ < \beta < 90^\circ$ .

If  $\alpha + \beta = 90^\circ$  and  $0^\circ < \alpha < 90^\circ$ , calculate the value of  $\cot\alpha$ . (4)

[17]

**QUESTION 5**

- 5.1 In the sketch below,  $\triangle MNP$  is drawn having a right angle at N and  $MN = 15$  units. A is the midpoint of PN and  $\hat{A}MN = 21^\circ$ .



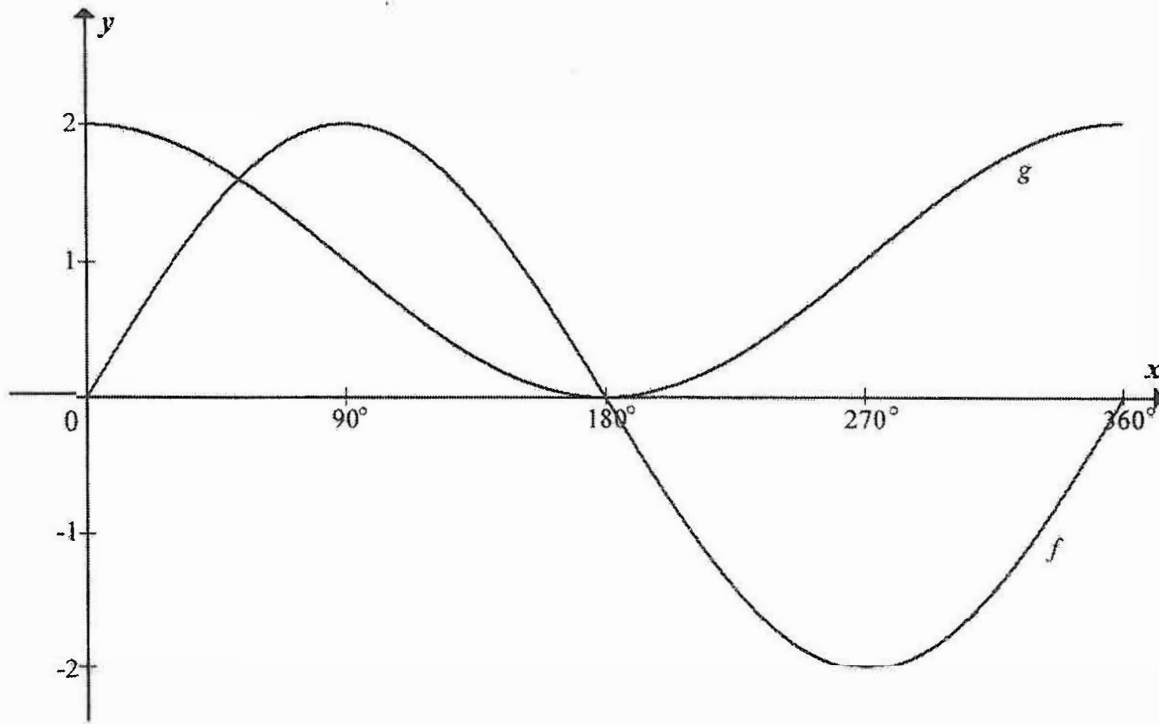
Calculate:

- 5.1.1 AN (3)
- 5.1.2  $\hat{P}MN$  (3)
- 5.1.3 MP (3)
- 5.2 Calculate  $\theta$  if  $2\sin(\theta + 15^\circ) = 1,462$  and  $0^\circ \leq \theta \leq 90^\circ$ . (3)

**[12**

**QUESTION 6**

The graphs of  $f(x) = a \sin x$  and  $g(x) = \cos x + 1$  for  $x \in [0 ; 360]$  are sketched below.



- 6.1 Write down the value of  $a$ . (1)
- 6.2 Write down the period of  $f$ . (1)
- 6.3 Write down the range of  $g$ . (2)
- 6.4 For which values of  $x$  for  $x \in [0^\circ ; 360^\circ]$  will  $f(x) \cdot g(x) > 0$ ? (2)
- 6.5 The graph  $g$  is reflected about the  $x$ -axis and then shifted 2 units upwards to obtain the graph  $h$ . Write down the equation of  $h$ . (2)

**[8]**

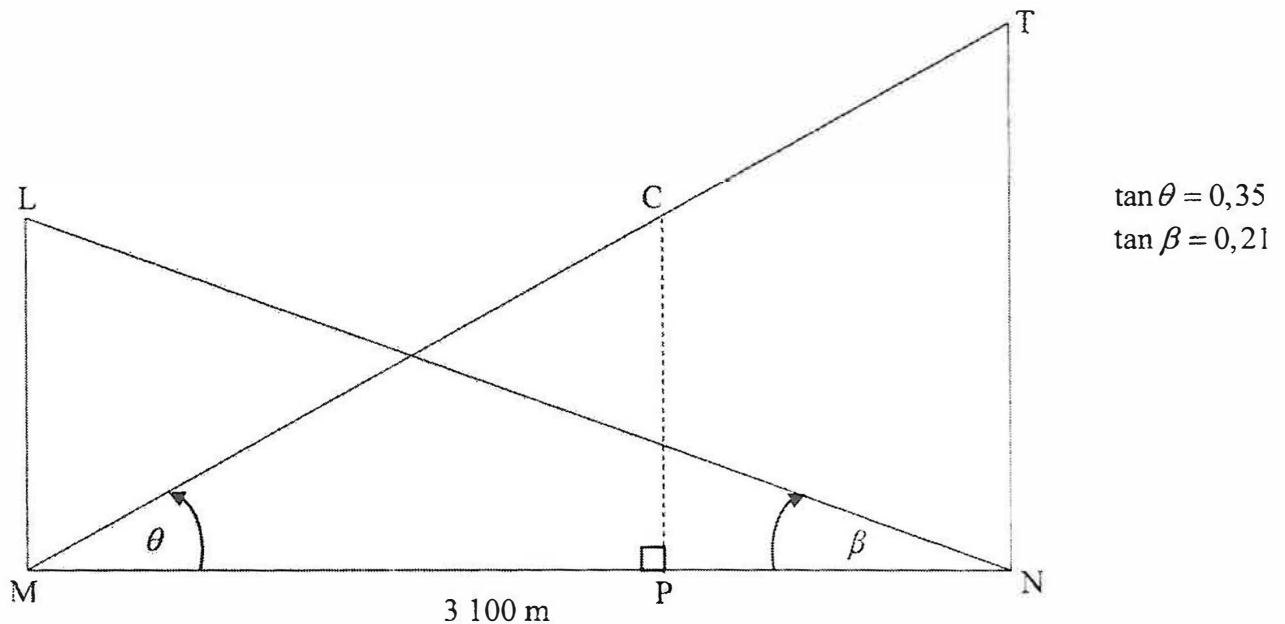
**QUESTION 7**

The diagram below represents a cross-section of the peaks of Table Mountain, T, and Lions Head, L, above sea level. Points M and N are directly below peaks L and T respectively, such that MPN lies on the same horizontal plain at sea level and P is directly below C.

$MN = 3\,100$  m.

The angle of elevation of L from N is  $\beta$  and the angle of elevation of T from M is  $\theta$ .

It is given that  $\tan \theta = 0,35$  and  $\tan \beta = 0,21$ .



- 7.1 Calculate the ratio of  $LM : TN$ . (4)
- 7.2 A cable car, C, travelling from the top of Table Mountain, T, follows a path along TCM.
- 7.2.1 Calculate the angle formed ( $\hat{MTN}$ ) between the cable and the vertical height TN. (2)
- 7.2.2 If the cable car, C, travels along the cable, such that  $TC = 400$  m, calculate the height of the cable car above sea level at that instant. (5)

[11]

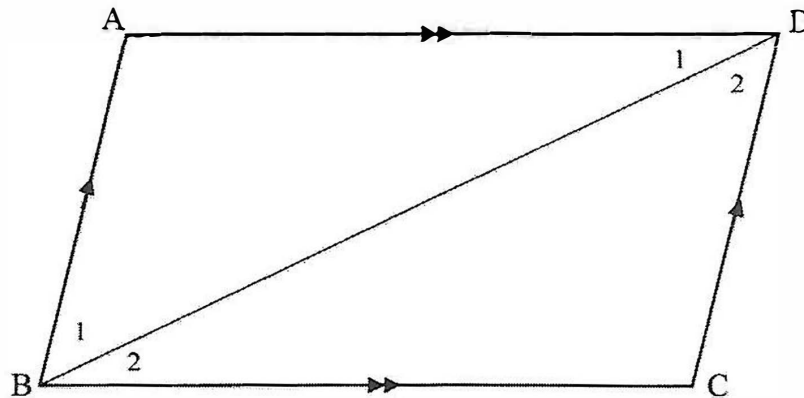
Give reasons for your statements in QUESTIONS 8 and 9.

**QUESTION 8**

8.1 Complete the following statement:

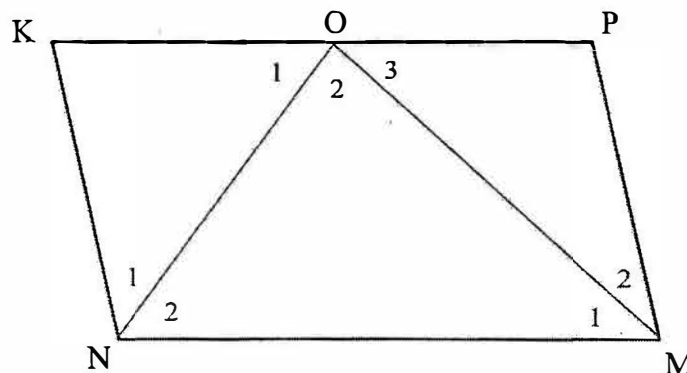
If the opposite angles of a quadrilateral are equal, then the quadrilateral ... (1)

8.2 Use the sketch below to prove that the opposite sides of a parallelogram are equal.



(6)

8.3 In the sketch below, KPMN is a parallelogram. ON bisects  $\hat{K}NM$  and OM bisects  $\hat{N}MP$ .



8.3.1 Show that  $\hat{N}OM = 90^\circ$ . (3)

8.3.2 Prove that O is the midpoint of KP. (6)

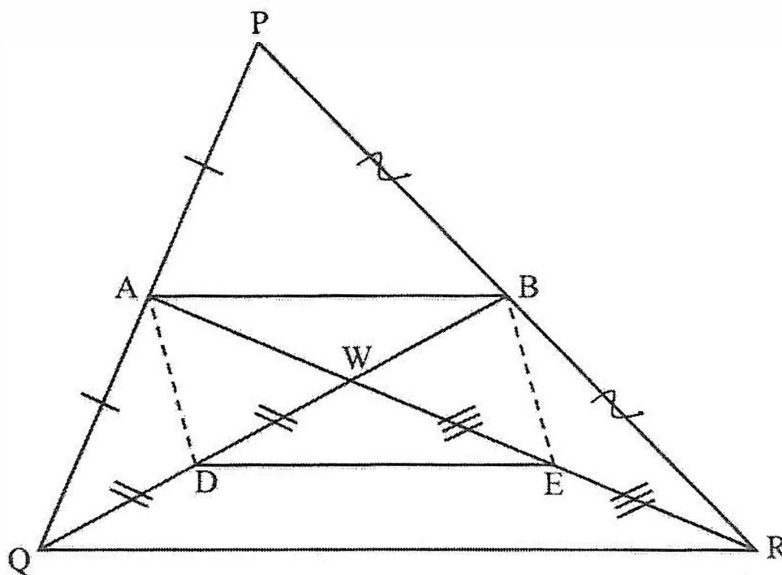
[16]

**QUESTION 9**

9.1 Complete the following statement:

The line through the midpoint of two sides in a triangle is parallel to and ... the third side. (1)

9.2 In  $\triangle PQR$ , A and B are the midpoints of sides PQ and PR respectively. AR and BQ intersect at W. D and E are points on WQ and WR respectively such that  $WD = DQ$  and  $WE = ER$ .



Prove that ADEB is a parallelogram.

(5)  
[6]

**TOTAL: 100**



## QUESTION 1      No data handling for 2020

The data below shows the number of laptops sold by 15 sales agents during the last financial year.

43    48    62    52    46    90    58    37    48    73    84    68    54    34    78

- 1.1 Determine the median of the number of laptops sold. (2)
  - 1.2 Calculate the range of the data. (2)
  - 1.3 Calculate the interquartile range (IQR). (3)
  - 1.4 Draw a box and whisker diagram for the data above. (3)
- [10]**

## QUESTION 2      No data handling for 2020

A learner did a project on climate change. At 14:00 each day, she recorded the temperature (in °C) for a certain town. The information is given in the frequency table below.

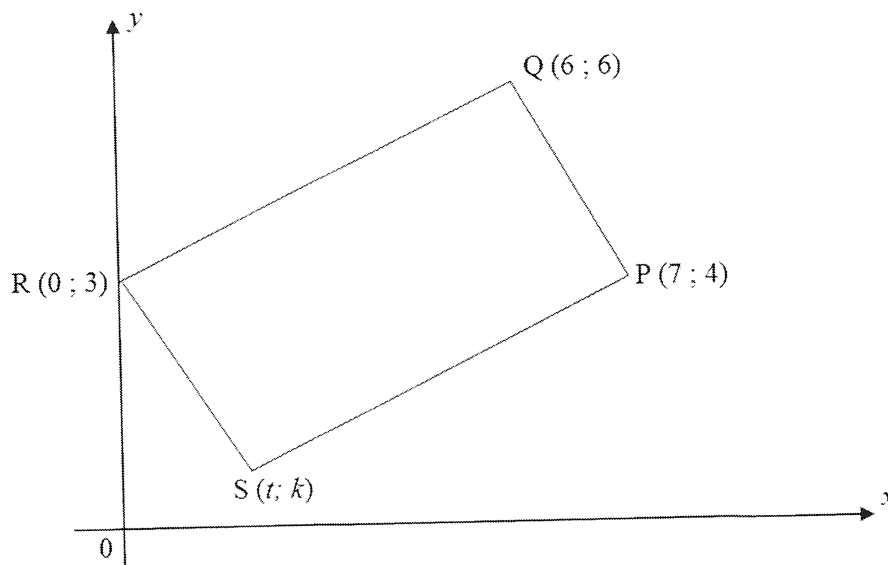
TEMPERATURE (IN °C)	FREQUENCY
$20 \leq T < 24$	2
$24 \leq T < 28$	4
$28 \leq T < 32$	9
$32 \leq T < 36$	5
$36 \leq T < 40$	7
$40 \leq T < 44$	3

- 2.1 For how many days did the learner collect the data? (1)
  - 2.2 Write down the modal class for the data. (1)
  - 2.3 Estimate the mean of the data. (3)
  - 2.4 Calculate the percentage of days on which the temperature was at least 28 °C. (2)
- [7]**



**QUESTION 3****No analytical geometry for 2020**

In the diagram below,  $P(7 ; 4)$ ,  $Q(6 ; 6)$ ,  $R(0 ; 3)$  and  $S(t ; k)$  are the vertices of quadrilateral PQRS.



- 3.1 Calculate the length of PQ. Leave your answer in surd form. (2)
- 3.2 If  $T\left(\frac{7}{2}; \frac{7}{2}\right)$  is the midpoint of QS, determine the coordinates of S. (3)
- 3.3 If the coordinates of S are  $(1 ; 1)$ , show that  $PR = QS$ . (2)
- 3.4 Show that  $QR \perp RS$ . (4)
- 3.5 Hence, what type of special quadrilateral is PQRS? Motivate your answer. (2)
- 3.6 Calculate the size of  $\hat{RSQ}$ . (3)

**[16]**

**QUESTION 4**

4.1 Given  $4 \cot \theta + 3 = 0$  and  $0^\circ < \theta < 180^\circ$ .

4.1.1 Use a sketch to determine the value of the following. DO NOT use a calculator.

(a)  $\cos \theta$  (4)

(b)  $\frac{3 \sin \theta \sec \theta}{\tan \theta}$  (4)

4.1.2 Hence, show that  $\sin^2 \theta - 1 = -\cos^2 \theta$ . (3)

4.2 Simplify the following expression WITHOUT using a calculator:

$$\cos 30^\circ \tan 60^\circ + \operatorname{cosec}^2 45^\circ \sin^2 60^\circ$$
 (3)

4.3 Solve for  $\theta$  correct to TWO decimal places, if

$$\frac{4}{3} \sin \theta = \cos 37^\circ \text{ and } 0^\circ \leq \theta \leq 90^\circ.$$
 (2)  
[16]

**QUESTION 5**

Given  $f(x) = \sin x - 1$  and  $g(x) = 2 \cos x$  for  $0^\circ \leq x \leq 270^\circ$ .

5.1 Sketch, on the grid provided in the ANSWER BOOK, the graph of  $f$  and  $g$  for  $0^\circ \leq x \leq 270^\circ$ . (6)

5.2 Write down the following:

5.2.1 Amplitude of  $g$  (1)

5.2.2 Range of  $f$  (2)

5.3 Use your graph to determine the following:

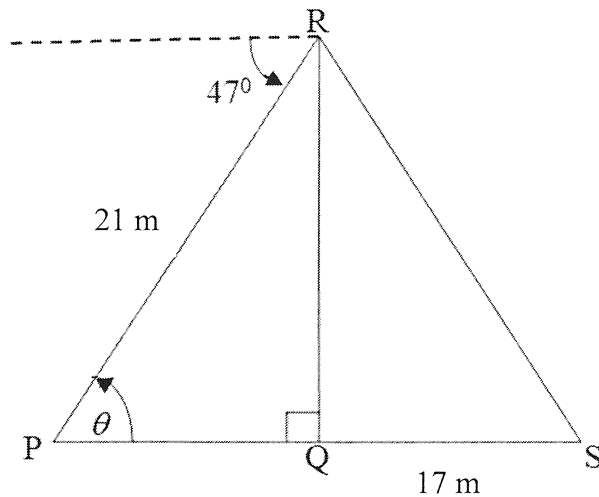
5.3.1 Number of solutions to  $f(x) = g(x)$  in the interval  $0^\circ \leq x \leq 270^\circ$  (1)

5.3.2 Value(s) of  $x$  in the interval  $0^\circ \leq x \leq 180^\circ$  for which  $\sin x = 2 + 2 \cos x$  (3)  
[13]



**QUESTION 6**

RQ is a vertical pole. The foot of the pole, Q, is on the same horizontal plane as P and S. The pole is anchored with wire cables RS and RP. The angle of depression from the top of the pole to point P is  $47^\circ$ . PR is 21 m and QS is 17 m.  $\hat{R}PQ = \theta$ .

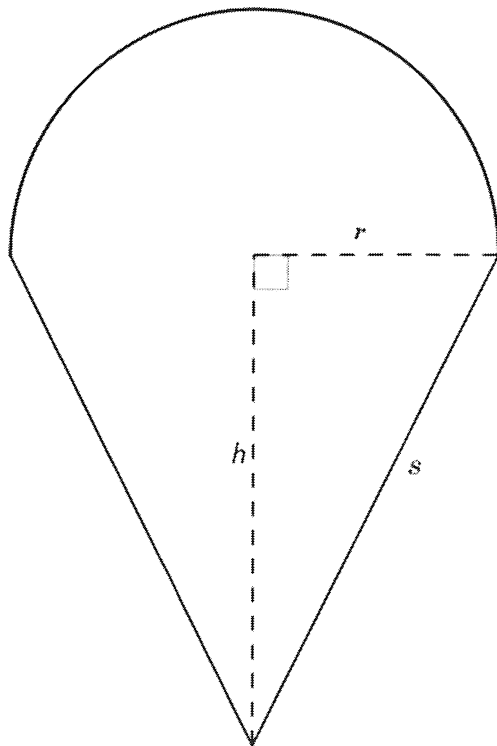


- 6.1 Write down the size of  $\theta$ . (1)
- 6.2 Calculate the length of RQ. (3)
- 6.3 Hence, calculate the size of  $\hat{S}$ . (2)
- 6.4 If P, Q and S lie in a straight line, how far apart are the anchors of the wire cables? (4)
- [10]**



**QUESTION 7**

The diagram below shows the cross-section of a solid made up of a hemisphere placed on top of a right circular cone with radius  $r$  and slant height  $s$ . The perpendicular height of the cone,  $h$ , is 6,5 cm and the volume of the cone is  $83,38 \text{ cm}^3$ .

**Formulae:**

$$\text{Surface area of sphere} = 4\pi r^2$$

$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

$$\text{Surface area of cone} = \pi r^2 + \pi r s$$

$$\text{Volume of cone} = \frac{1}{3}\pi r^2 h$$

Calculate, correct to TWO decimal places:

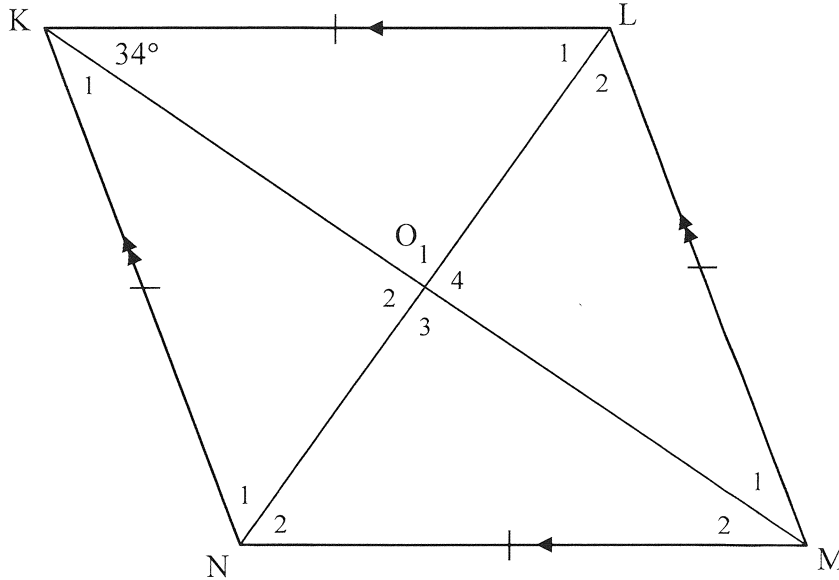
- 7.1 The radius,  $r$ , of the cone (2)
- 7.2 The slant height,  $s$ , of the cone (2)
- 7.3 The surface area of the solid (2)
- [6]



Give reasons for ALL statements in QUESTIONS 8 and 9.

**QUESTION 8**

8.1 KLMN is a rhombus with diagonals intersecting at O.  $\hat{LKM} = 34^\circ$ .

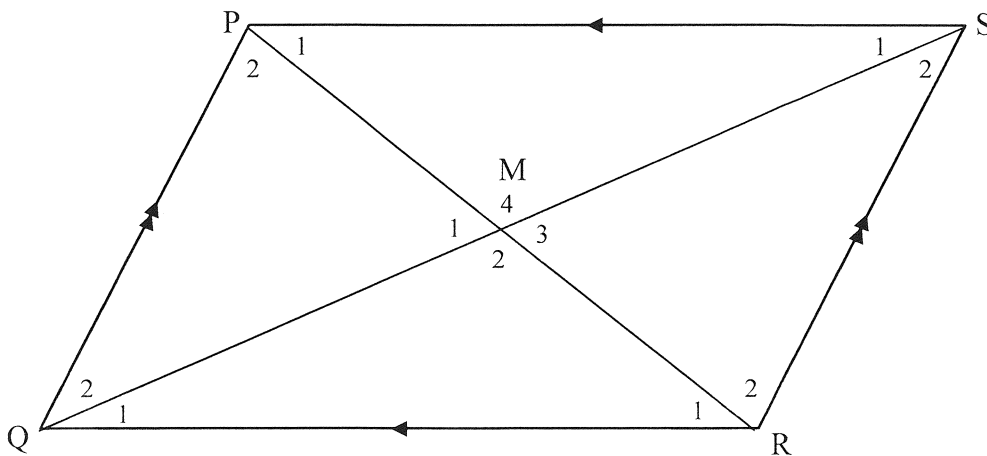


8.1.1 Write down the size of  $\hat{O}_1$ . (1)

8.1.2 Calculate the size of  $\hat{L}_1$ . (2)

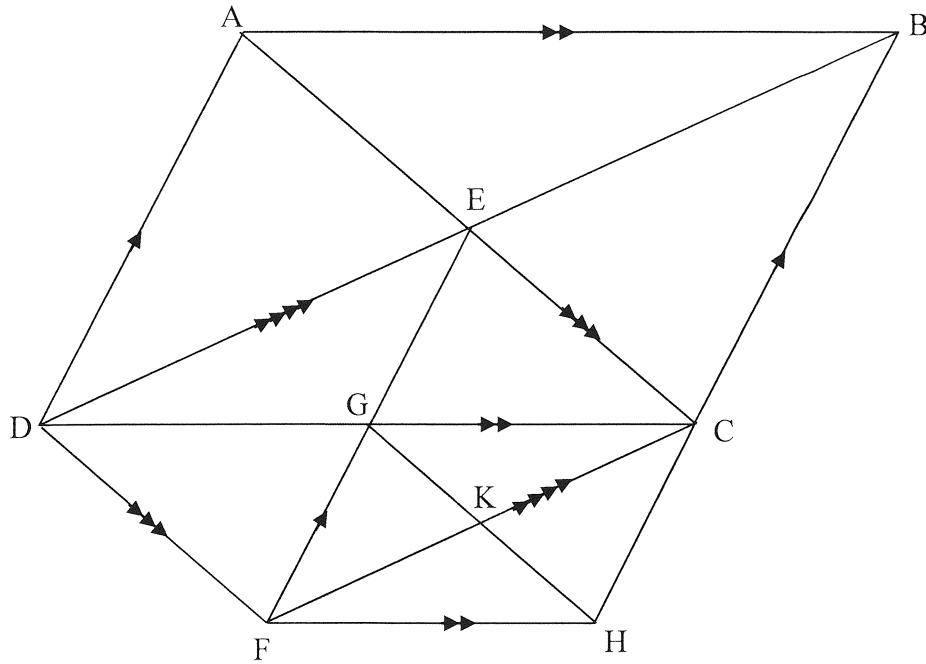
8.1.3 Calculate the size of  $\hat{KNM}$ . (2)

8.2 Given parallelogram PQRS with diagonals PR and QS intersecting at M.



Prove that the diagonals bisect each other. (4)

- 8.3 In the diagram, ABCD is a parallelogram with diagonals intersecting at E. The diagonals of parallelogram DECF intersect at G. The diagonals of parallelogram FGCH intersect at K.

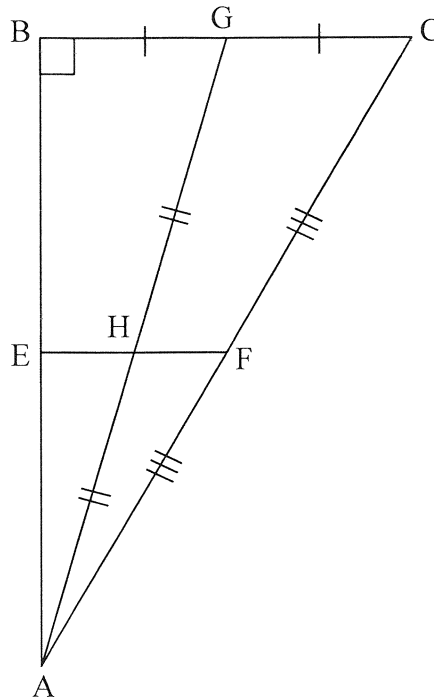


Prove that  $DB = 4KC$ .

(4)  
[13]

**QUESTION 9**

$\triangle ABC$  is right-angled at B. F and G are the midpoints of AC and BC respectively. H is the midpoint of AG. E lies on AB such that FHE is a straight line.



- 9.1 Prove that E is the midpoint of AB. (3)
- 9.2 If  $EH = 3,5 \text{ cm}$  and the area of  $\triangle AEH = 9,5 \text{ cm}^2$ , calculate the length of AB. (3)
- 9.3 Hence, calculate the area of  $\triangle ABC$ . (3)

[9]

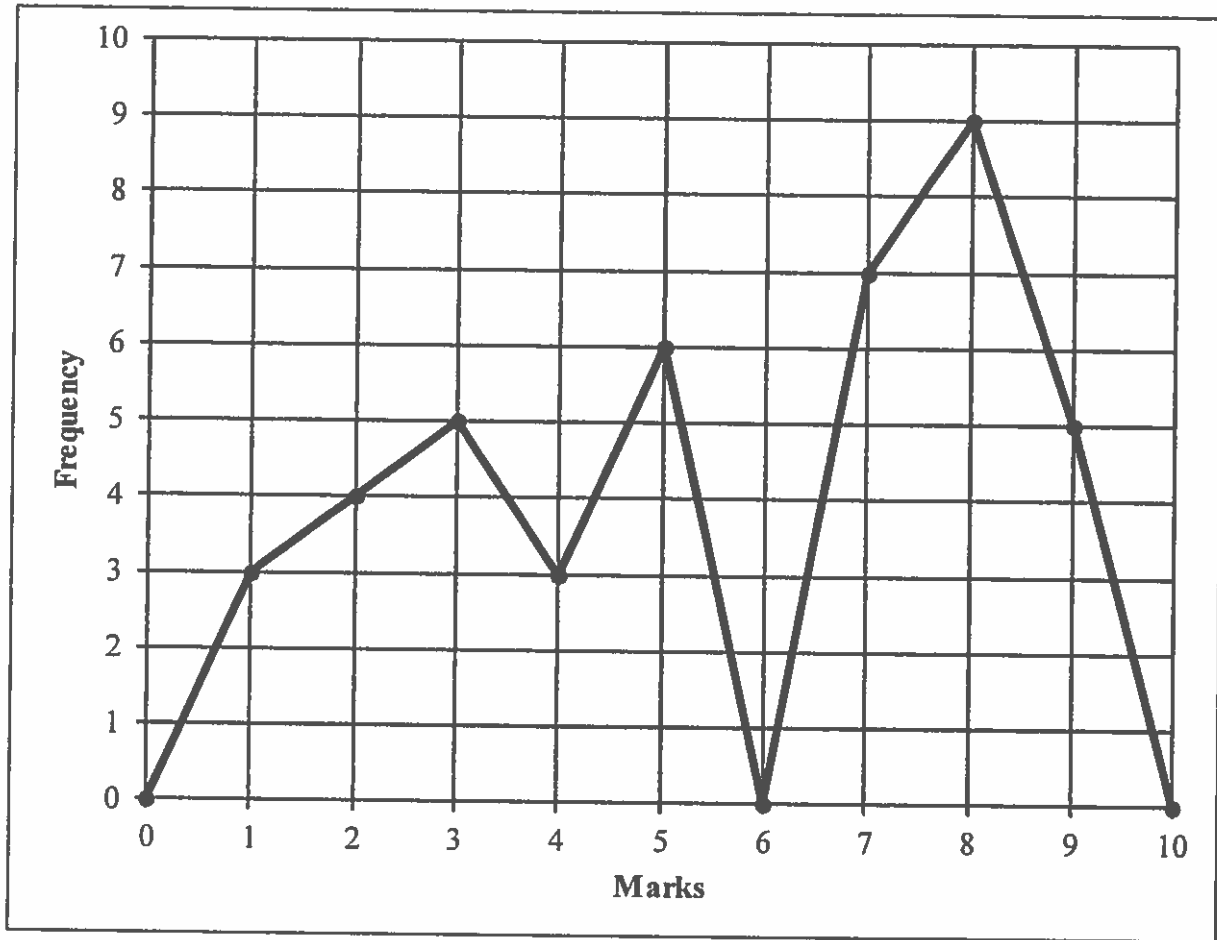
**TOTAL: 100**





**QUESTION 1** No data handling for 2020

The line graph below shows test marks out of 10 obtained by a Grade 10 class.

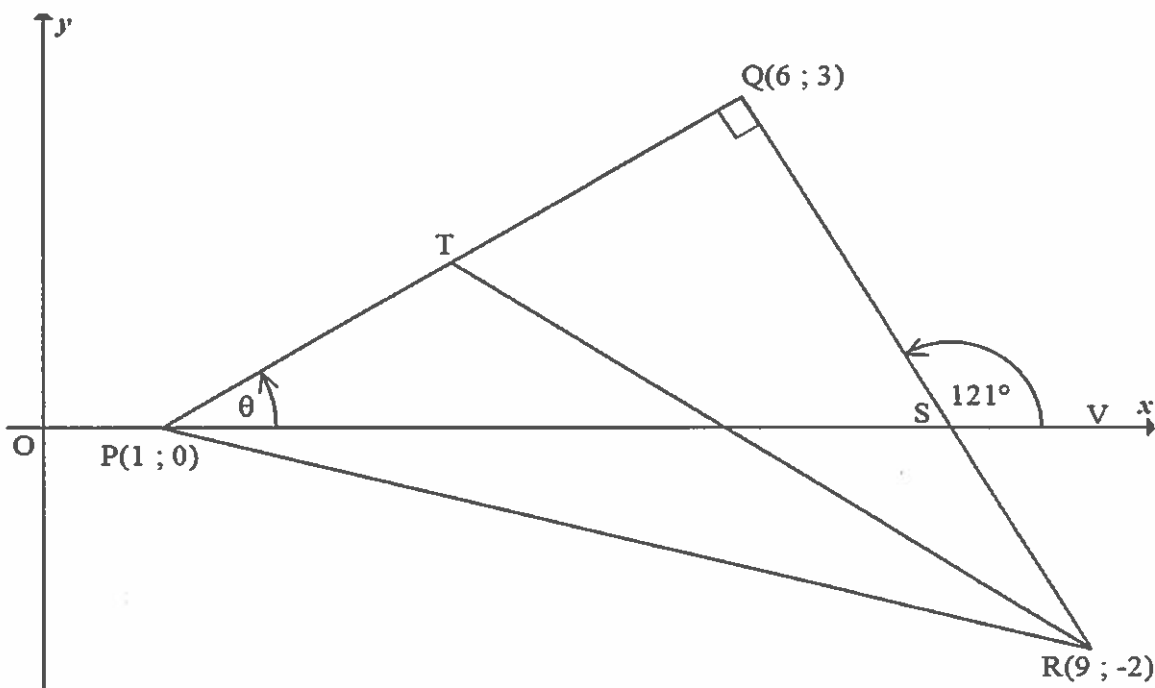


- 1.1 Complete the frequency column in the table provided in the ANSWER BOOK. (2)
  - 1.2 How many learners wrote the test? (1)
  - 1.3 Calculate the:
    - 1.3.1 Range for the data (2)
    - 1.3.2 Mean for the test (3)
  - 1.4 Determine the median for the data. (3)
  - 1.5 Draw a box and whisker diagram for the data. (3)
- [14]**



**QUESTION 2** No analytical geometry for 2020

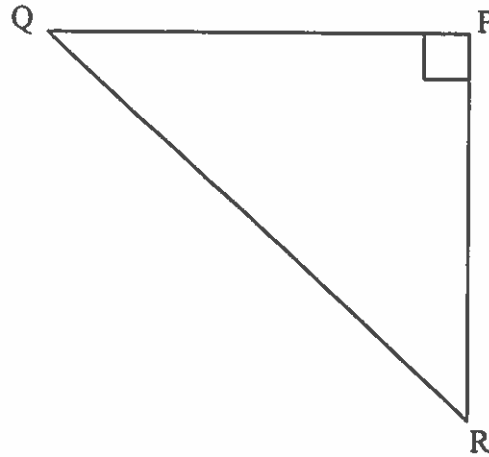
In the diagram below,  $P(1 ; 0)$ ,  $Q(6 ; 3)$  and  $R(9 ; -2)$  are the vertices of a triangle such that  $PQ = QR$  and  $PQ \perp QR$ .  $T$  is a point on  $PQ$  such that  $T$  is the midpoint of  $PQ$ .  $S$  is the point of intersection of  $RQ$  and the  $x$ -axis.  $V$  is a point on the  $x$ -axis such that  $\widehat{QSV} = 121^\circ$ .  $\widehat{QPS} = \theta$



- 2.1 Determine the:
    - 2.1.1 Length of  $PQ$ . Leave your answer in surd form. (2)
    - 2.1.2 Gradient of  $PQ$  (2)
    - 2.1.3 Coordinates of  $T$  (2)
  - 2.2 Calculate the:
    - 2.2.1 Area of  $\Delta QTR$  (3)
    - 2.2.2 Size of  $\theta$ , with reasons (2)
    - 2.2.3 Coordinates of  $S$  (3)
  - 2.3 Determine, with reasons, the gradient of the line through  $T$  and the midpoint of  $PR$ . (3)
- [17]**

**QUESTION 3**

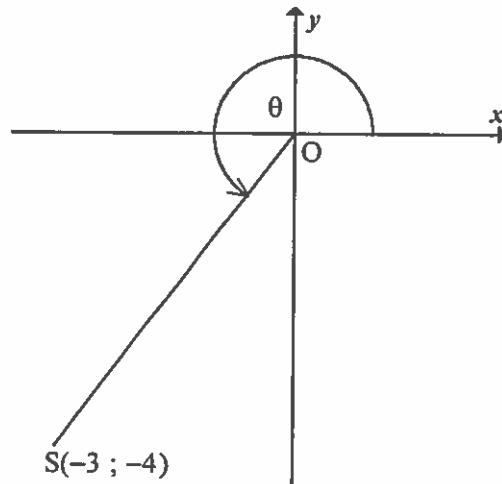
3.1 In the diagram below,  $\Delta QPR$  is a right-angled triangle with  $\hat{Q}PR = 90^\circ$ .



3.1.1 Use the sketch to determine the ratio of  $\tan(90^\circ - R)$ . (1)

3.1.2 Write down the trigonometric ratio that is equal to  $\frac{QR}{QP}$ . (1)

3.2  $S(-3 ; -4)$  is a point on the Cartesian plane such that  $OS$  makes an angle of  $\theta$  with the positive  $x$ -axis.



Calculate the following **WITHOUT** using a calculator:

3.2.1 The length of  $OS$  (2)

3.2.2 The value of  $\sec \theta + \sin^2 \theta$  (3)

3.3 Determine the value of the following **WITHOUT** using a calculator:

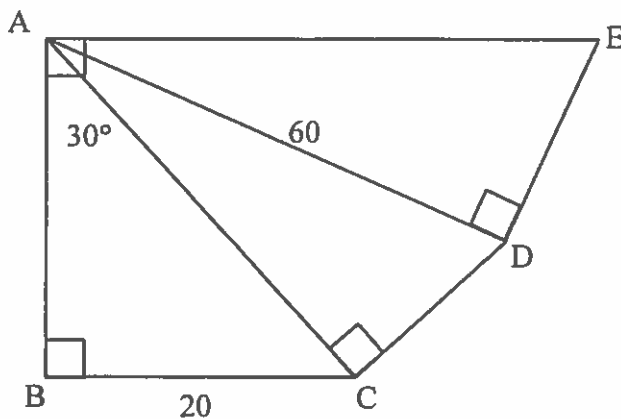
$$\frac{\operatorname{cosec} 45^\circ}{\sin 90^\circ \cdot \tan 60^\circ} \quad (4)$$

[11]



**QUESTION 4**

- 4.1 In the diagram below, ABC, ACD and ADE are right-angled triangles.  
 $\hat{BAE} = 90^\circ$  and  $\hat{BAC} = 30^\circ$ . BC = 20 units and AD = 60 units.



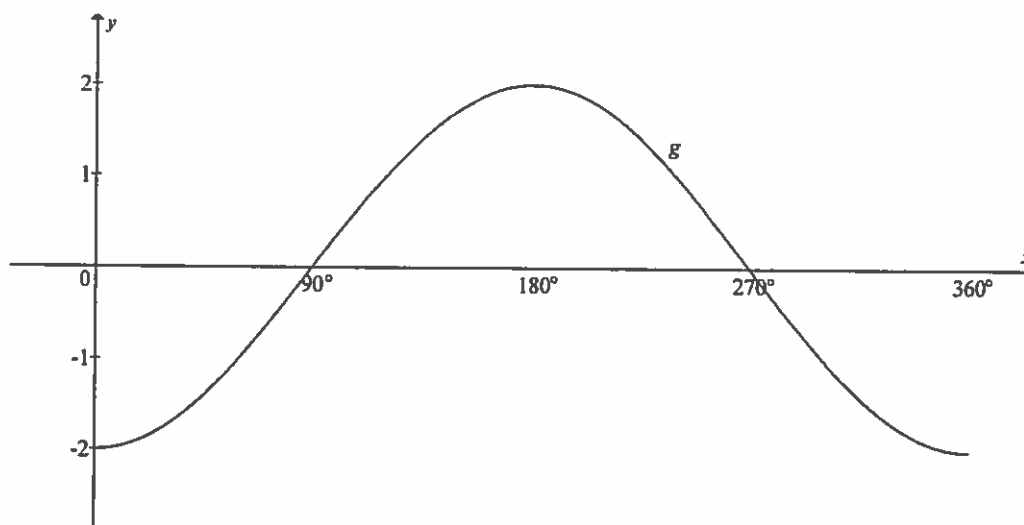
Calculate the:

- 4.1.1 Length of AC (2)
- 4.1.2 Size of  $\hat{CAD}$  (2)
- 4.1.3 Length of DE (3)
- 4.2 Solve for  $x$ , correct to ONE decimal place, where  $0^\circ \leq x \leq 90^\circ$ :
- 4.2.1  $\tan x = 2,01$  (2)
- 4.2.2  $5 \cos x + 2 = 4$  (3)
- 4.2.3  $\frac{\operatorname{cosec} x}{2} = 3$  (3)
- [15]

**QUESTION 5**

- 5.1 Consider the function  $f(x) = -3 \tan x$ .
- 5.1.1 Sketch, on the grid provided in the ANSWER BOOK, the graph of  $f$  for  $0^\circ \leq x \leq 360^\circ$ . Clearly show ALL the intercepts and asymptotes. (3)
- 5.1.2 Hence, or otherwise, write down the:
- (a) Period of  $f$  (1)
- (b) Equation of  $h$  if  $h$  is the reflection of  $f$  about the  $x$ -axis (1)

5.2 Sketched below is the graph of  $g(x) = a \cdot \cos b\theta$



5.2.1 Write down the values of  $a$  and  $b$ . (2)

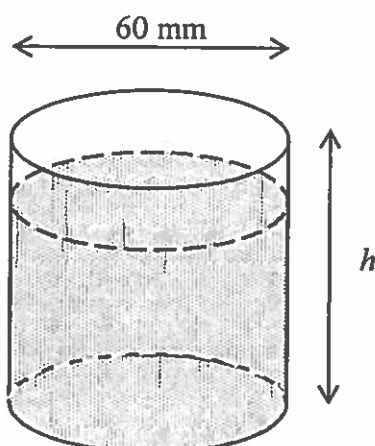
5.2.2 Use the graph to determine the value(s) of  $x$  for which  $g(x) > 0$ . (1)

5.2.3 Determine the range of  $h$  if  $h$  is the image of  $g$  if  $g$  is shifted down TWO units. (2)

5.2.4 Determine, using the graph, the value of:  
 $-2(\cos 0^\circ + \cos 1^\circ + \cos 2^\circ + \dots + \cos 358^\circ + \cos 359^\circ + \cos 360^\circ)$  (2)  
**[12]**

**QUESTION 6**

The diagram below shows a cup with a volume of  $117\pi \text{ cm}^3$  and an inner diameter of 60 mm. Ignore the thickness of the cup.



Calculate the:

6.1 Height of the cup (3)

6.2 Total surface area of the water that touches the cup if the cup is 80% full with water (4)  
**[7]**



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

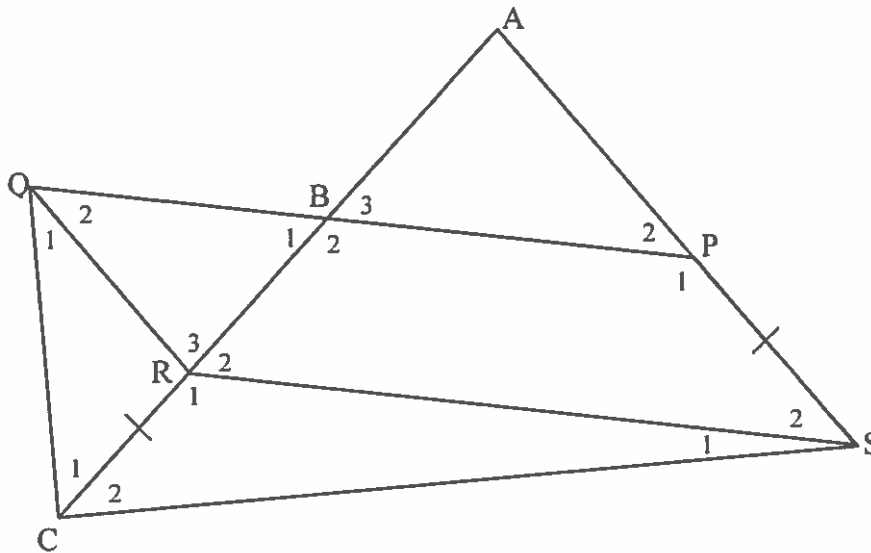
QUESTION 7

7.1 Complete the statement so that it is TRUE:

The line drawn from the midpoint of the one side of a triangle, parallel to the second side, ...

(1)

7.2 ACS is a triangle. P is a point on AS and R is a point on AC such that PSRQ is a parallelogram. PQ intersects AC at B such that B is the midpoint of AR. QC is joined. Also,  $CR = PS$ ,  $\hat{C}_1 = 50^\circ$  and  $BP = 60$  mm.

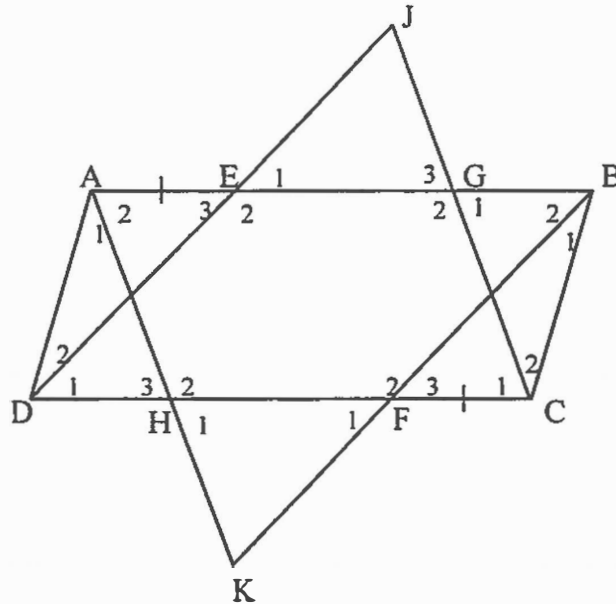


7.2.1 Calculate the size of  $\hat{A}$ . (5)

7.2.2 Determine the length of QP. (3)  
[9]

**QUESTION 8**

8.1 ABCD is a parallelogram. E and F are points on AB and DC respectively such that AE = CF. DE is produced to J and CJ is drawn. BF is produced to K and AK is drawn.

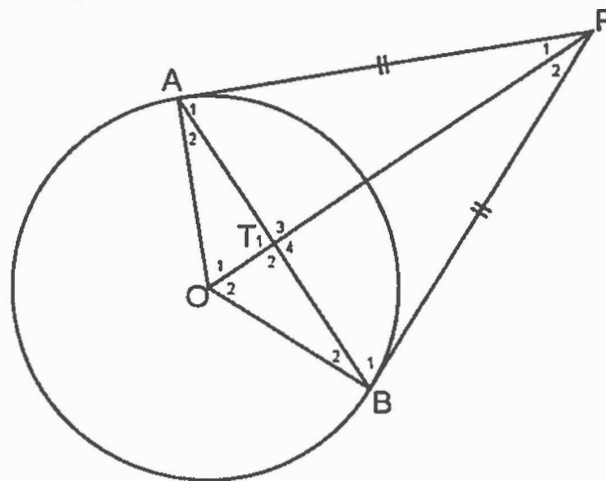


Prove that:

8.1.1  $DJ \parallel BK$  (5)

8.1.2  $\hat{E}_1 = \hat{F}_1$  (4)

8.2 In the diagram below O is the centre of the circle. A and B lie on the circumference of the circle.  $AP = BP$ .



Prove that:

8.2.1  $AT = BT$  (5)

8.2.2  $\hat{O}TA = 90^\circ$  (1)  
[15]

**TOTAL: 100**

**QUESTION 1** No data handling for 2020

1.1 A tuck shop at a particular school sells soft drink cans. The economic friendly club of this school collected soft drink cans for recycling for a period of 20 days. The number of cans collected was recorded and the data is given below:

48	50	52	59	60	68	73	76	76	76
78	79	80	81	82	82	84	91	92	98

- 1.1.1 Determine the median of the cans collected. (1)
  - 1.1.2 Determine the value of the upper and lower quartiles. (2)
  - 1.1.3 Calculate the interquartile (IQR) range of the data. (2)
  - 1.1.4 Write down the minimum and maximum value of the data. (1)
  - 1.1.5 Represent the 5 number summary on a box and whisker diagram. (3)
  - 1.1.6 Comment on the box and whisker diagram. (1)
- 1.2 Telkom conducted a survey regarding the duration of telephone calls made by people in a certain community. The information was then tabulated as indicated below:

Duration (min)	No of calls ( $f_1$ )	Midpoint ( $x_1$ )	$(f_1) \times (x_1)$
$2 \leq t < 5$	47	3,5	164,5
$5 \leq t < 8$	139	6,5	903,5
$8 \leq t < 11$	211	9,5	2004,5
$11 \leq t < 14$	102	12,5	1275
$14 \leq t < 17$	58	15,5	899
$17 \leq t < 20$	19	<b>A</b>	<b>B</b>

- 1.2.1 Calculate the values of **A** and **B**. (2)
- 1.2.2 Determine the approximate mean for the duration of the telephone calls. (3)
- 1.2.3 In which interval does the 75<sup>th</sup> percentile lie? (2)

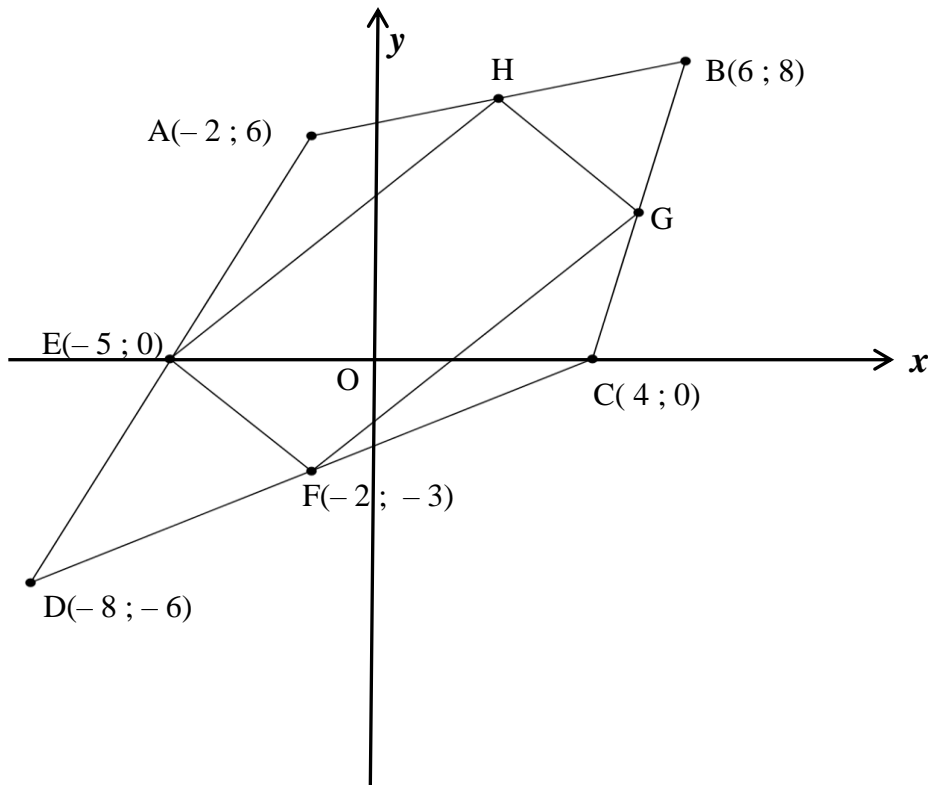
[17]



## QUESTION 2

No analytical geometry for 2020

In the diagram below, H and G are the midpoints of AB and BC respectively. The coordinates of A(-2 ; 6) , B(6 ; 8) , C(4 ; 0) , D(-8 ; -6) , E (-5 ; 0) and F(-2 ; -3) are given. The diagram is not necessarily drawn to scale.

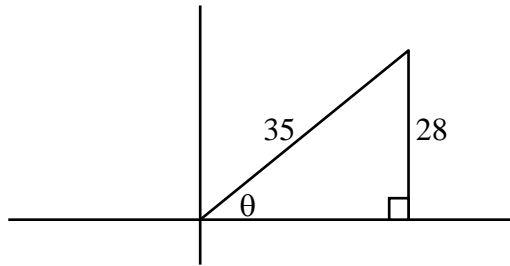


- 2.1 Show by calculation that  $AB = BC$ . (5)
- 2.2 If it is further given that  $AD = DC$ , what type of quadrilateral is ABCD? Motivate your answer. (2)
- 2.3 Determine the coordinates of G and H. (5)
- 2.4 If line BD is drawn and it is also given that  $EH \parallel BD$ , prove that  $\triangle AEH \parallel \triangle CDB$ . (4)

**[16]**

**QUESTION 3**

3.1 In the diagram below, the value of  $\sin \theta = \frac{28}{35}$



3.1.1 Without calculating the value of  $\theta$ , determine the value of  $\cos \theta$ . (3)

3.1.2 Hence, or otherwise, prove that:  $\sin^2 \theta + \cos^2 \theta = 1$  (3)

3.2 If  $37 \sin \theta + 35 = 0$  and  $\tan \theta > 0$ , determine with the help of a diagram, the value of  $24 \sec \theta - 70 \cot \theta$ . (6)

3.3 Solve for  $x$ , if  $x \in [0^\circ; 90^\circ]$ . Give your answer correct to 1 decimal place.

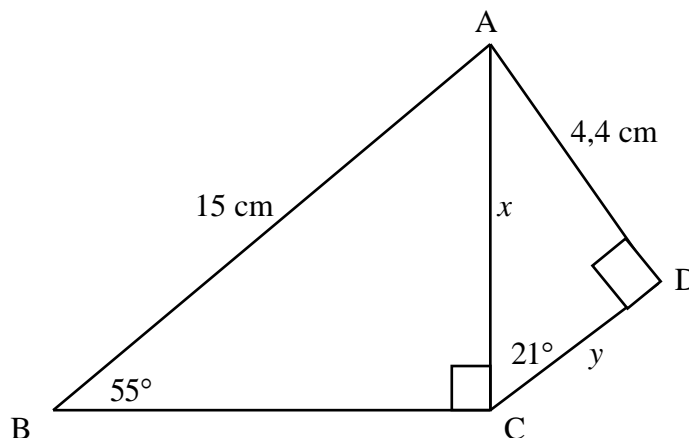
3.3.1  $8 \cos(x+10^\circ) = 5$  (3)

3.3.2  $\operatorname{cosec} 2x = 2$  (3)

3.4 Prove the following without the use of a calculator:

$$\frac{\sin 30^\circ \times \tan 60^\circ}{\tan 30^\circ \times \cos 60^\circ} = 3 \quad (5)$$

3.5 In the diagram below,  $\hat{A}CB = 90^\circ$ ,  $AB = 15 \text{ cm}$ ,  $AD = 4,4 \text{ cm}$ ,  $\hat{B} = 55^\circ$ ,  $\hat{A}CD = 21^\circ$  and  $\hat{A}DC = 90^\circ$ .



Determine the value of:

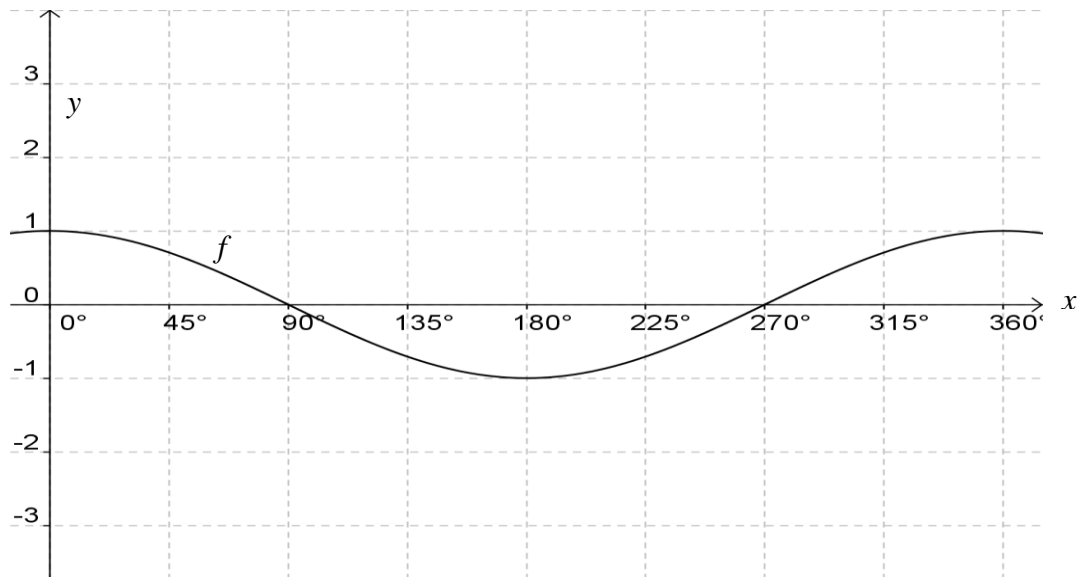
3.5.1  $x$  (2)

3.5.2  $y$  (2)

**[27]**

## QUESTION 4

In the diagram below, the graph of  $f(x) = \cos x$  is drawn for  $x \in [0^\circ; 360^\circ]$



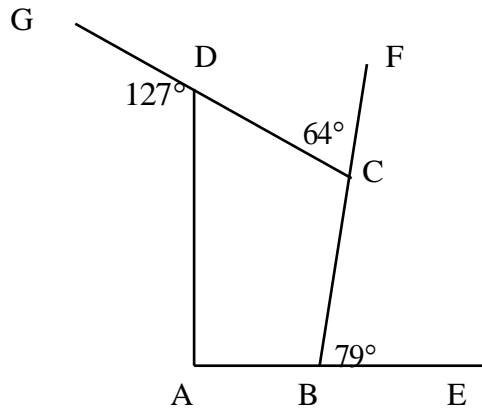
- 4.1 Sketch on the same axis the graph of  $g(x) = 2\sin x$  for  $x \in [0^\circ; 360^\circ]$ . (3)
- 4.2 Write down the period of  $g$ . (1)
- 4.3 Write down the range of  $m(x)$  if  $m(x) = -3f(x) + 1$ . (3)
- 4.4 For which value(s) of  $x$  is  $g$  decreasing? (2)
- 4.5 For which value(s) of  $x$  is  $f(x) \times g(x) < 0$ ? (3)

**[12]**

Give reasons for all statements and calculations in QUESTIONS 5 and 6.

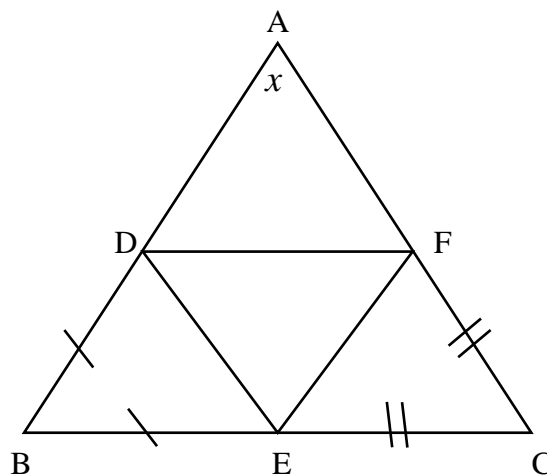
QUESTION 5

5.1 The sides of a quadrilateral ABCD are produced such that AB is produced to E, BC is produced to F and CD is produced to G.



If  $\hat{EBC} = 79^\circ$ ,  $\hat{FCD} = 64^\circ$  and  $\hat{GDA} = 127^\circ$ , calculate the value of  $\hat{BAD}$ . (4)

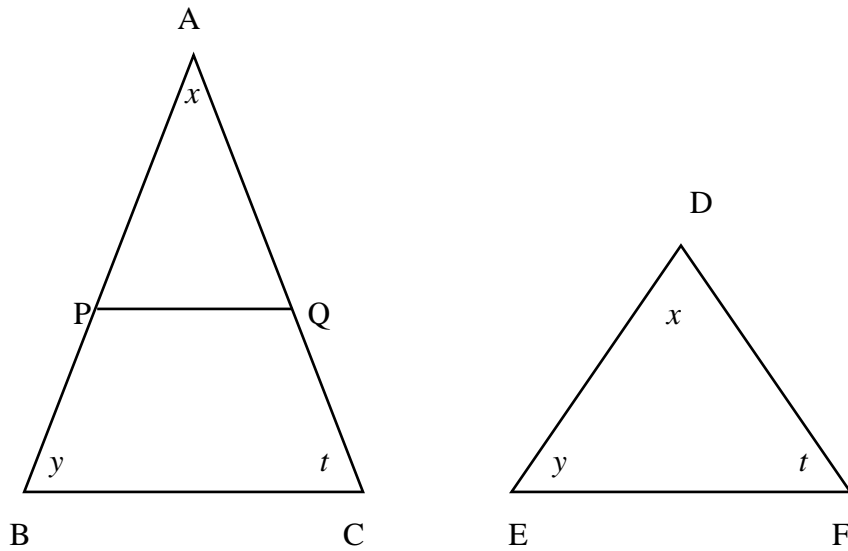
5.2 In  $\triangle ABC$ , D, E and F lie on sides AB, BC and CA respectively, so that  $BD = BE$  and  $CE = CF$ .



If  $\hat{A} = x$ , showing all calculations, determine the size of  $\hat{DEF}$  in terms of  $x$ . (4)  
[8]

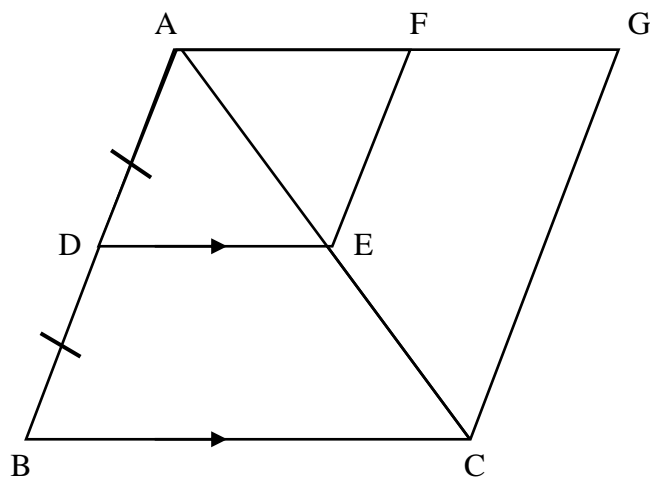
## QUESTION 6

6.1 In the diagram below,  $\triangle ABC \parallel \triangle DEF$ . ( $\hat{A} = \hat{D} = x$ ,  $\hat{B} = \hat{E} = y$  and  $\hat{C} = \hat{F} = t$ ).



- 6.1.1 If it is further given that  $AP = DE$  and  $AQ = DF$ , prove that  $\triangle APQ \cong \triangle DEF$ . (3)
- 6.1.2 Hence, or otherwise, prove that  $PQ \parallel BC$ . (3)
- 6.1.3 If it is further given that  $AP = 3,5$  cm,  $PB = 4$  cm and  $AC = 8$ cm, determine the length of  $DF$ . (4)

6.2 In the diagram below, D is the midpoint of AB and  $DE \parallel BC$ .

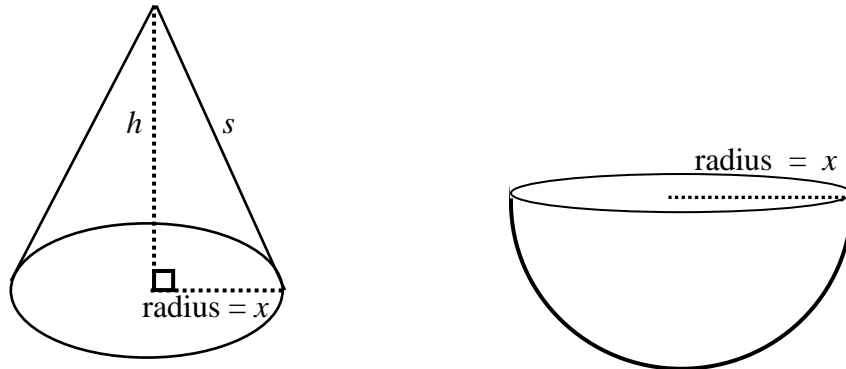


- 6.2.1 Give a reason why E is the midpoint of AC. (1)
- 6.2.2 If it is further given that F is the midpoint of AG, ADEF is a parallelogram and that  $BD = \sqrt{32}$ , determine the length of CG. (5)

[16]

**QUESTION 7**

A fowl run is designed in the shape of a cone. A hemispherical bowl of water is placed close by for the chickens to drink from it. The cone and the hemisphere are drawn as shown below.



Total surface area of a cone =  $\pi r^2 + \pi rs$ , where  $s$  is the slant height of the cone.

Total surface area of the hemisphere =  $3\pi r^2$ .

The radius of both the cone and the hemisphere is given as  $x$  units and it is further given that the total surface area of the cone = total surface area of the hemisphere .

Find an expression for  $h$ , the height of the cone, in terms of  $x$ .

(4)

[4]

**TOTAL: 100**



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 10**

**NOVEMBER 2020**

**MATHEMATICS P2  
(EXEMPLAR)**

**MARKS: 100**

**TIME: 2 hours**

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This question paper consists of 10 pages and an answer book of 14 pages.

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**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

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



**QUESTION 1**

1.1 The following mathematics test marks were recorded for a Grade 10A class of 28 students.

MARKS	FREQUENCY	MIDPOINTS	MIDPOINT $\times$ FREQUENCY
$0 < x \leq 30$	2	15	30
$30 < x \leq 40$	3	35	105
$40 < x \leq 50$	11	45	495
$50 < x \leq 60$	7	55	
$60 < x \leq 70$	3		195
$70 < x \leq 80$	2	75	150
$80 < x \leq 100$	0	90	0

1.1.1 Complete the table above by filling in the two missing numbers. (2)

1.1.2 Calculate an estimate of the mean mark. (2)

1.1.3 Represent the data on a frequency polygon. (3)

1.1.4 In which interval does the

(a) median lie? (2)

(b) 80<sup>th</sup> percentile lie? (2)

1.2 The following Mathematics test marks of a Grade 10B class are recorded below:

45	49	50	51	51	53	54	57	57	59	60	64
65	66	70	71	73	74	75	76	83	89	89	

1.2.1 Write down the median mark for this class. (1)

1.2.2 Calculate the interquartile range mark for this class. (3)

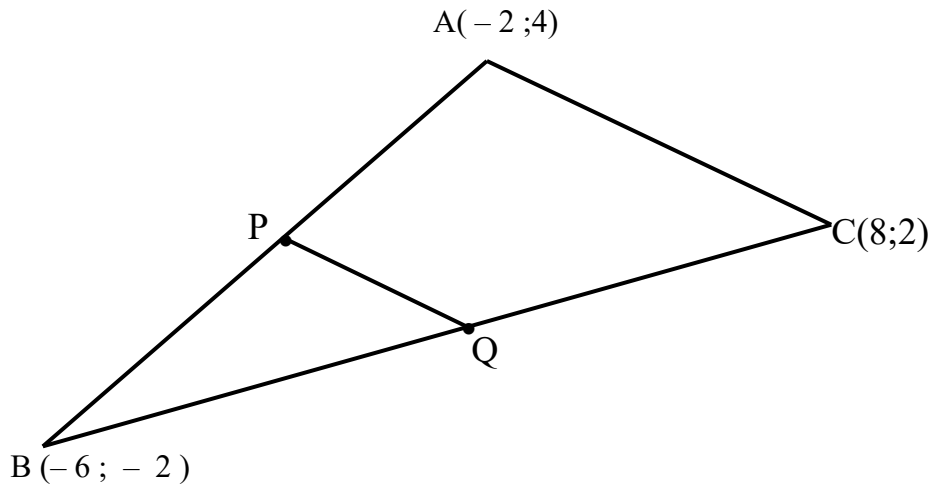
1.2.3 Represent the data on a box and whisker diagram. (3)

1.2.4 Comment on the distribution of the data with reference to the box and whisker diagram. (2)

**[20]**

**QUESTION 2**

In the diagram below, the coordinates of  $\triangle ABC$  are given as  $A(-2; 4)$ ,  $B(-6; -2)$  and  $C(8; 2)$ .  $P$  and  $Q$  are the midpoints of  $AB$  and  $BC$  respectively.



- 2.1 Calculate the coordinates of  $P$  and  $Q$ . (4)
- 2.2 Show that:
- 2.2.1  $PQ \parallel AC$  (4)
- 2.2.2  $PQ = \frac{1}{2} AC$  (4)
- 2.3 Calculate, to two decimal places, the perimeter of  $\triangle ABC$ . (4)

**[16]**

**QUESTION 3**

3.1 If  $x = 229,5^\circ$  and  $y = 117,6^\circ$ , determine to two decimal places the values of:

3.1.1  $\sin(x + y)$  (2)

3.1.2  $\cos 2y$  (2)

3.1.3  $\operatorname{cosec} x$  (2)

3.2 Determine the value of  $x$  to one decimal place:

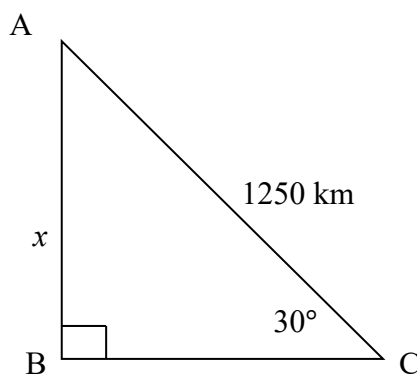
3.2.1  $\cos 2x = 0,50$  (2)

3.2.2  $7 \sec x - 11 = 0$  (3)

3.3 If  $\cos x = \frac{3}{4}$  and  $0^\circ < x < 90^\circ$ , determine the value of  $\tan x$ . (3)

3.4 If  $\tan \theta = \frac{6}{8}$  and  $\sin \theta < 0$ , determine the value of  $\sec \theta - \operatorname{cosec} \theta$  (5)

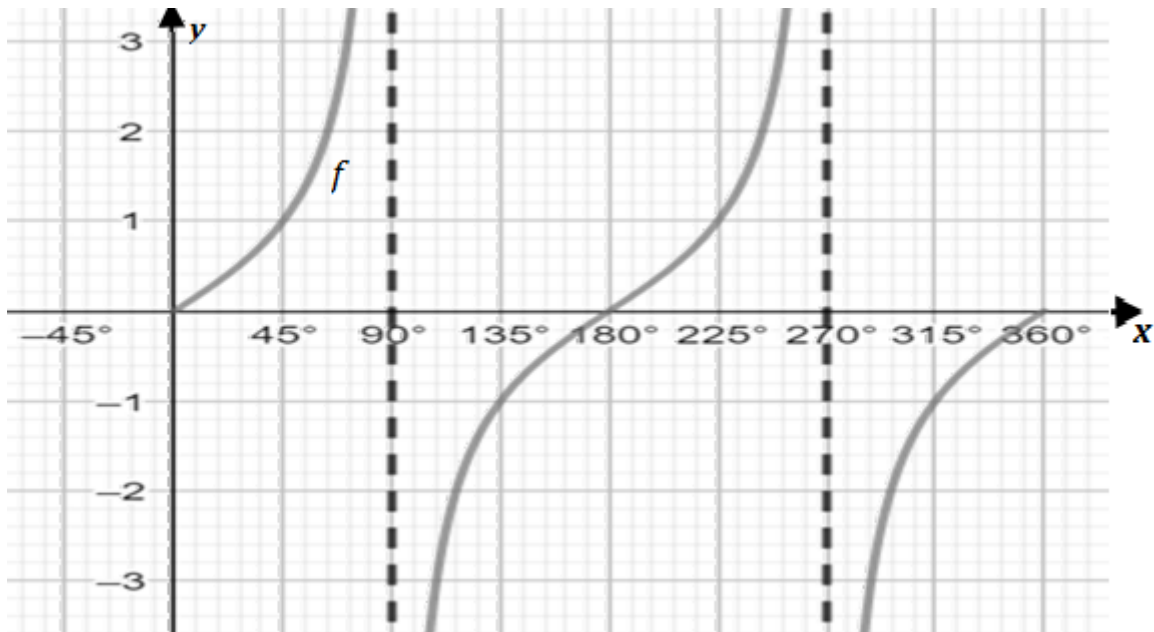
3.5 Without using a calculator, determine the value of  $x$  in the diagram below.



(2)  
[21]

## QUESTION 4

In the diagram below, the graph of  $f(x) = \tan x$  is drawn for  $x \in [0^\circ ; 360^\circ]$ .



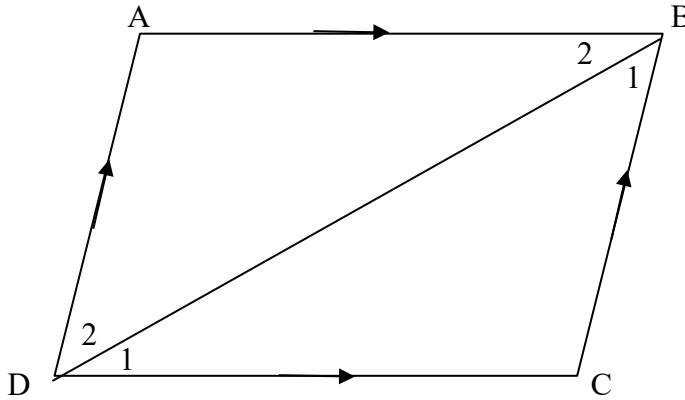
- 4.1 Sketch on the same axis the graph of  $g(x) = \sin 2x$  for  $x \in [0^\circ ; 360^\circ]$ . (4)
- 4.2 What is the amplitude of  $f$ ? (1)
- 4.3 Write down the period of  $g$ . (1)
- 4.4 For which value(s) of  $x$  is:
- 4.4.1  $f(x) < 0$  (2)
- 4.4.2  $f(x) \cdot g(x) < 0$  (2)
- 4.5 Write down the range of  $k(x)$  if  $k(x) = g(x) - 1$ . (2)

[12]

**QUESTION 5**

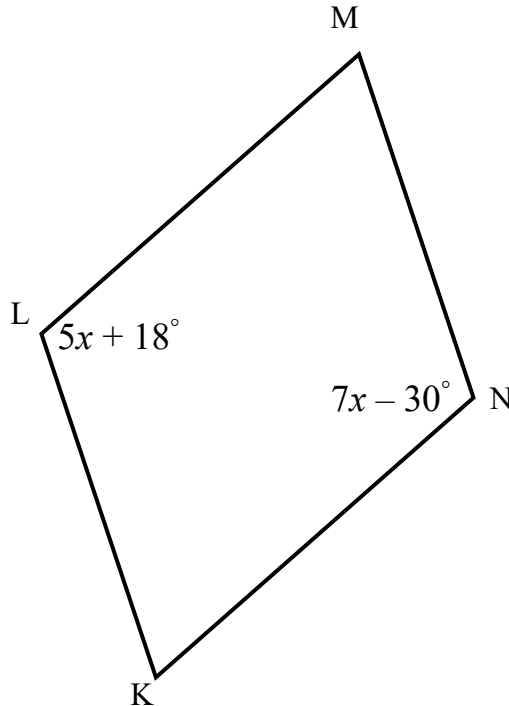
5.1 Use the diagram below to prove that the opposite sides of a parallelogram are equal, i.e.  $AB = CD$  and  $AD = BC$ .

Hint: Prove that  $\triangle ABD \cong \triangle CDB$



(4)

5.2 In the diagram below, KLMN is a parallelogram with  $\hat{N} = 7x - 30^\circ$  and  $\hat{L} = 5x + 18^\circ$ .

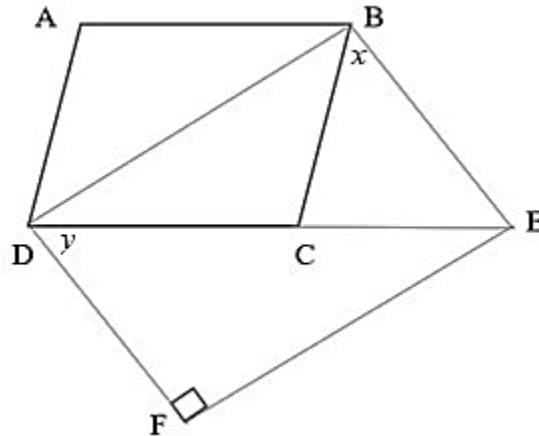


5.2.1 Calculate the value of  $x$ . (4)

5.2.2 If it is further given that  $\hat{LKN} = 4y$ , determine the value of  $y$ . (3)

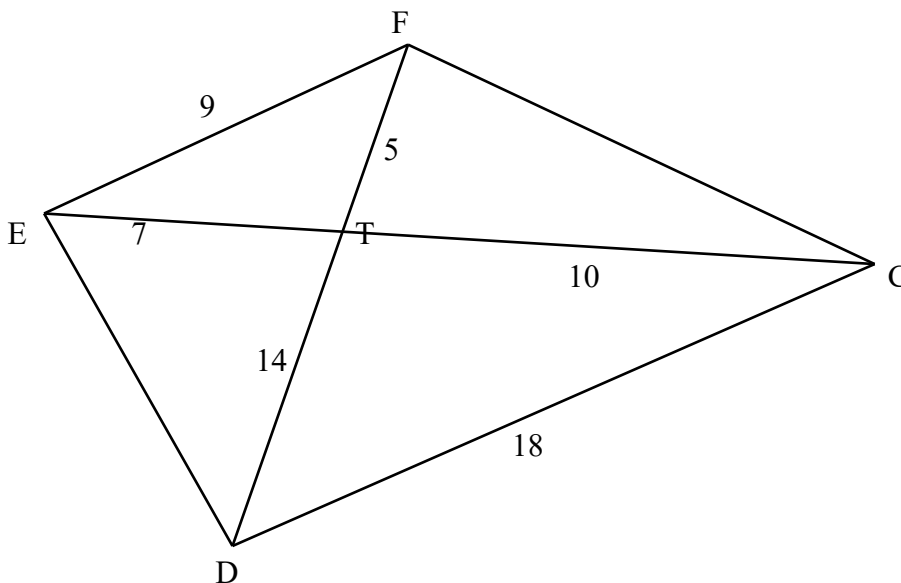
- 5.3 In the diagram below, ABCD is a parallelogram such that  $AD = BE$ ,  $\widehat{A} = 124^\circ$ , ED bisects  $\widehat{BEF}$  and BEFD is a quadrilateral.

Calculate, with reasons, the values of  $x$  and  $y$ .



(6)

- 5.4 In the diagram below,  $FT = 5$  cm,  $ET = 7$  cm,  $EF = 9$  cm,  $CT = 10$  cm,  $DT = 14$  cm and  $CD = 18$  cm.

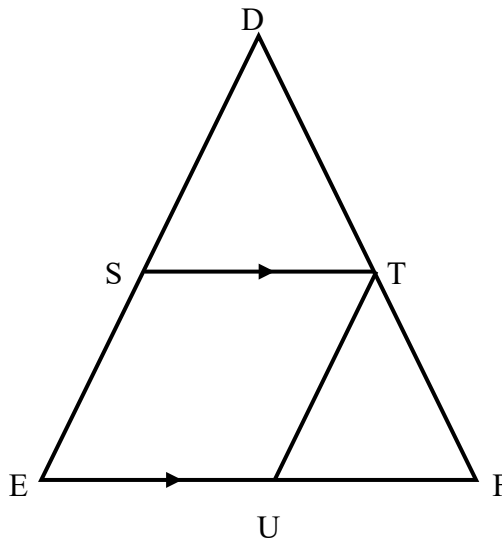


- 5.4.1 Prove that  $\triangle EFT \parallel \triangle DCT$ . (3)
- 5.4.2 If it is further given that  $\widehat{DFC} = \widehat{TDC}$ , prove that  $\widehat{FEC} = \widehat{TCF}$ . (3)

5.5 5.5.1 Complete the following statement for  $\Delta ABC$ :

If D is a point on AB and E is a point on AC such that  $AD = DB$  and  $DE \parallel BC$ , then ... (1)

5.5.2 In  $\Delta DEF$ ,  $DS = SE$ ,  $EU = UF$  and  $ST \parallel EF$ .

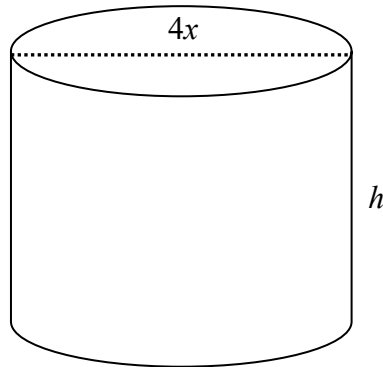


Prove that SEUT is a parallelogram. (4)  
[28]

**QUESTION 6**

The cylinder in the diagram below has a diameter of  $4x$  units and a height of  $h$  meters. The cylinder is open at the top and the total surface area of the cylinder =  $32\pi$  meters.

Calculate the height of the cylinder in terms of  $x$ .



(3)  
[3]

**TOTAL: 100**