TEACHERS WITHOUT BORDERS PROGRAMME

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In Bill Gates words, at the Mandela Day 'Living Together' address: "Maintaining the quality of this country's higher education system while expanding access to more students will not be easy. But it's critical to South Africa's future" – working together, we can help achieve this."

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Clifton School	Milnerton High	Rustenburg Girls' High	St Peter's
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Herzlia High	Rondebosch Boys'	St Mary's DSG Kloof	Wynberg Secondary

November Examination

Grade 10
Mathematics Paper 2

Time: 2,5 hours

Total: 100

Session: 1

Date: 16 November 2013

	Section A				Section B				
Question	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
COG Level	1, 2	1, 2	1, 2	1, 2	3, 4	3, 4	3, 4	3, 4	
Score									
Max Mark	**8**	**8**	**20**	**15**	**7**	**7**	**22**	**13**	**100**
Marker Signature									

Instructions:

1. This paper consists of 8 questions and 19 pages including a formula sheet. Please check that your script is complete.
2. Complete all questions neatly and thoroughly.
3. Show all calculations in order to earn marks for method.
4. A calculator may be used unless otherwise stated. Round off your answers to 2 decimal places.

Section A

Question 1

1.1 The table below reflects the size of each of the nine provinces in South Africa, as provided on the site http://www.southafrica.info/about/facts.htm#provinces.

Province	Area (km^2)
Eastern Cape	169 580
Free State	129 480
Gauteng	x
KwaZulu-Natal	92 100
Limpopo	123 910
Mpumalanga	79 490
Northern Cape	361 830
North West	116 320
Western Cape	129 370
TOTAL AREA	1 219 090

1.1.1 Calculate the value of x (2)

1.1.2 What is the median province in South Africa? (1)

1.1.3 Determine the mean province size. (2)

1.2 Complete the table, indicating how to calculate the angle size of the sector representing each eye colour in a pie chart. (Do not draw the pie chart.) (3)

EYE COLOUR	FREQUENCY	ANGLE
Blue	12	
Brown	9	
Dark Brown	4	
Green	5	
TOTAL	**30**	

Question 2

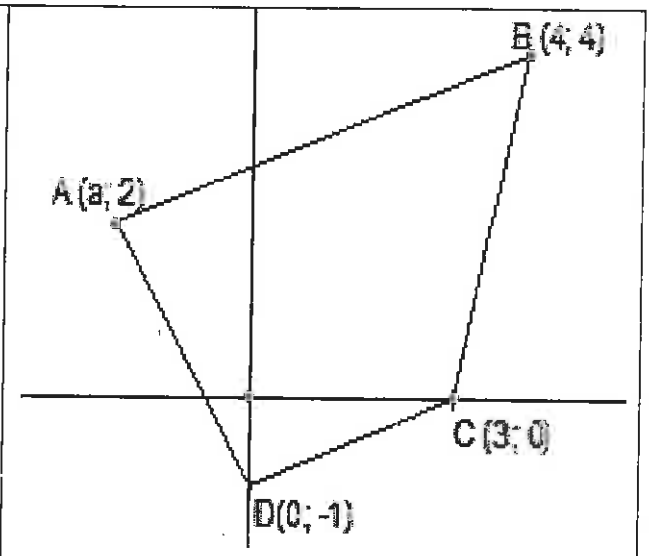
ALL the answers in this question have to be determined by analytical methods.

2.1.1 Determine midpoint K of the line segment DF, given point D(7; 5) and F(1; 2). (2)

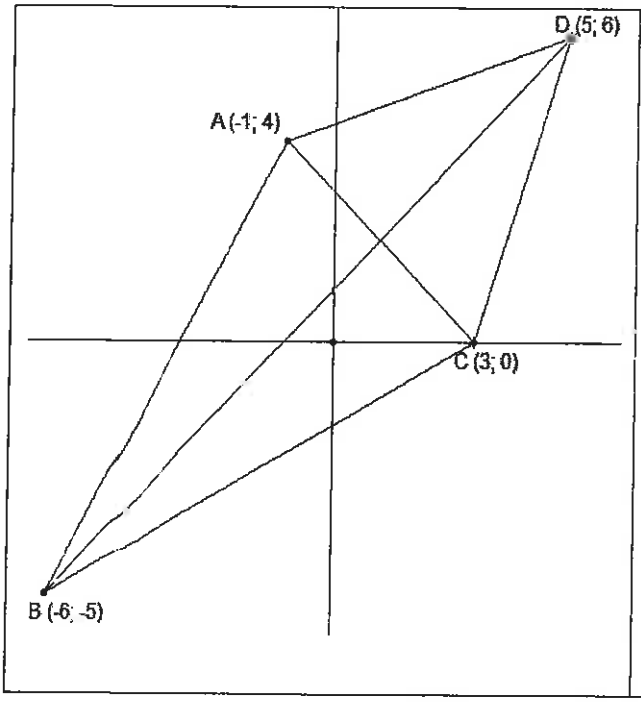
2.1.2 What is the gradient of the line $x = 2$? (1)

2.2.1 (3)

The figure ABCD is a trapezium. Determine the value of a.



2.2.2 (2)



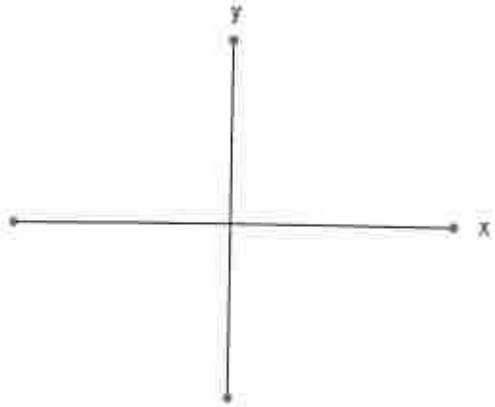
Calculate the length of the diagonal BD of the kite, given points B (-6; -5) and D (5; 6). Leave answer in surd form.

Question 3

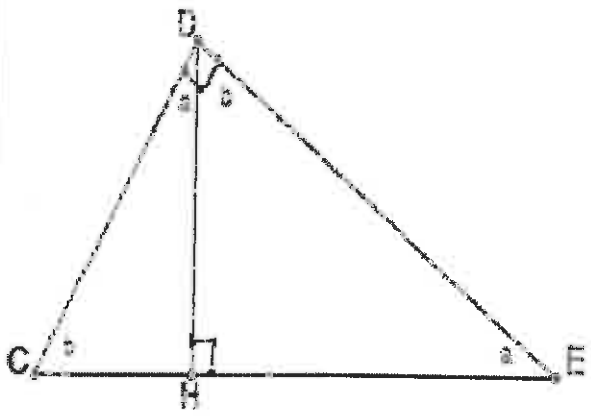
3.1.1a) In which quadrant does the terminal arm of an angle of 182° lie? (1)

3.1.1b) (1)

Roughly illustrate an angle of 45° on the Cartesian grid alongside.

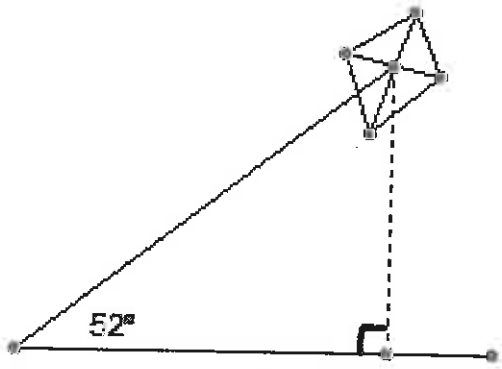


3.1.1c) (2)

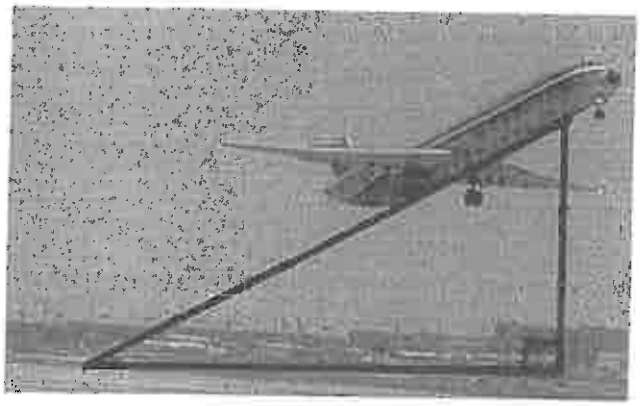


Give 3 answers for the ratio tan a in the figure on the left.

3.1.2 (2)

What is the height of your kite if it is flown at an angle of 52° on a $15m$ long string?	

3.1.3 (2)

	Calculate the angle of elevation θ of the plane if it is at a height of 600 m when it is a horizontal distance of 800 m from the point of take-off.

3.2 If $\tan\theta = \frac{8}{15}$ and $\theta \in [0°; 90°]$, determine the value of $3\sin\theta + \cos\theta$ **without the use of a calculator**. (4)

3.3 Calculate the value of:

a) $\frac{2\tan x + 4\cos y}{7}$ given: $x = 104{,}2°$ and $y = 241{,}7°$. (2)

b) A given: $\tan A = 2\sin 35°$ and $A \in [180°; 360°]$ (3)

c) $\cos A + 2\tan(\frac{A}{2})$ given: $A = 229{,}8°$ (3)

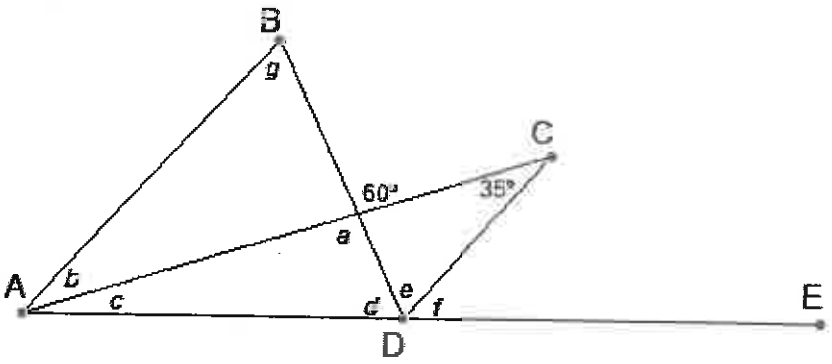
Question 4

4.1 (7)

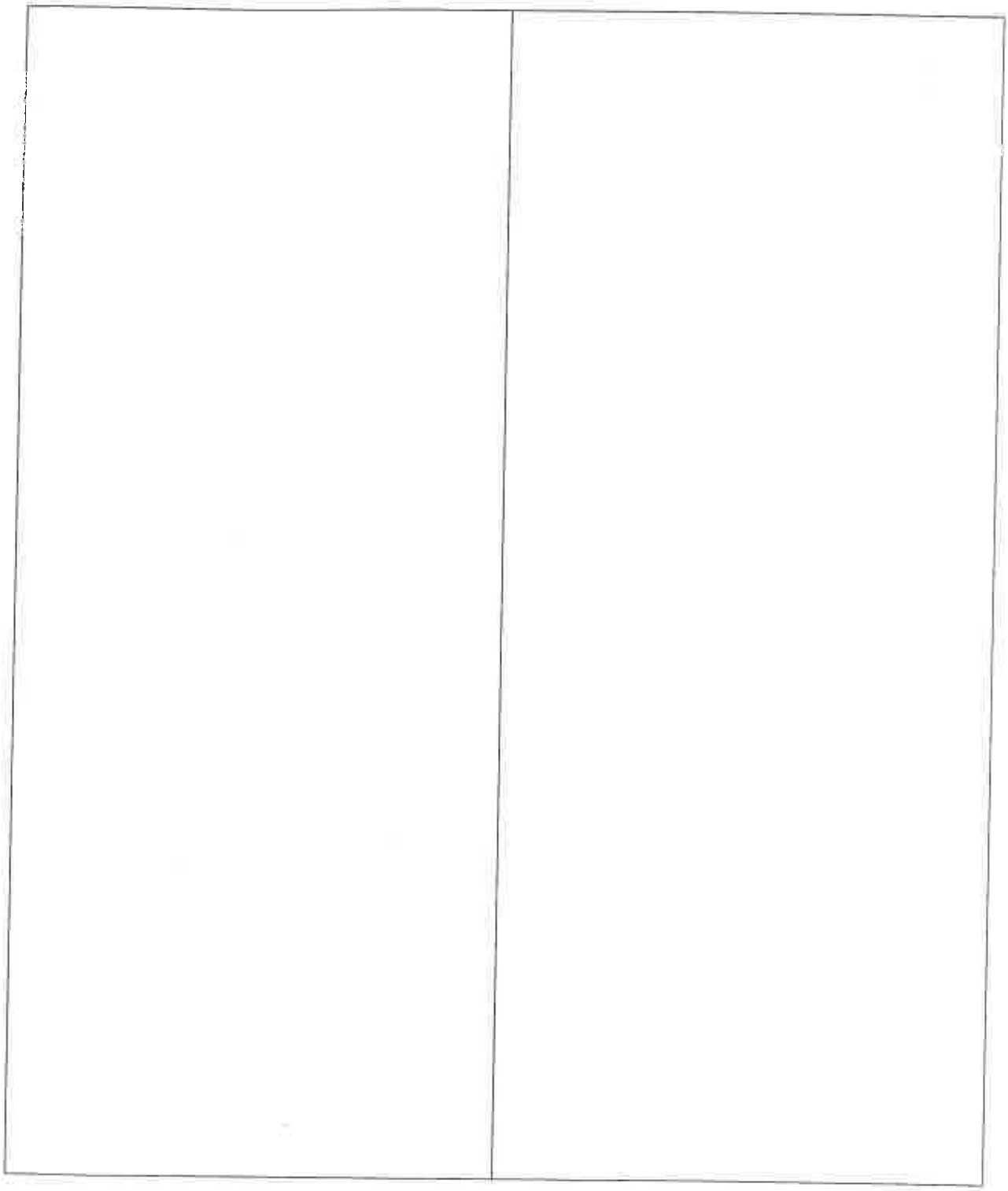
Find the size of the angles a to g (in that order), giving reasons.

Lines *AB* and *CD* are parallel.

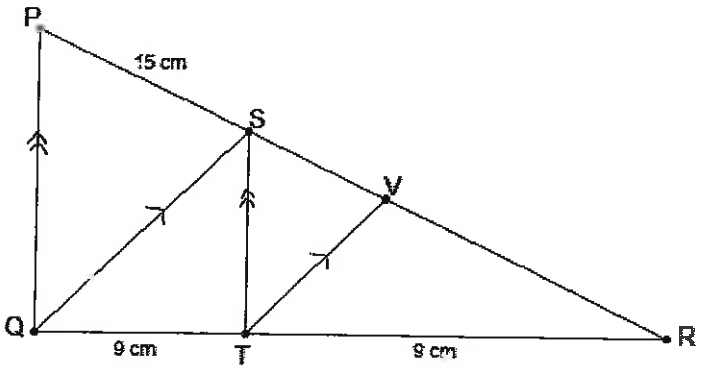
Lines *AD* and *DC* are equal in length.



Statement	Reason



4.2 In the diagram below $QS \| TV; PQ \| ST; QT = TR = 9\ cm$ and $PS = 15\ cm$.



4.2.1 Prove $VR = 7\frac{1}{2}\ cm$. (4)

4.2.2 a) Calculate PQ if $PQ = \frac{16}{5}VR$ (2)

b) Hence prove that $angle\ PQR = 90°$ (2)

Section B

Question 5

5.1 The following figures show the daily income (in rand) for a small business in Sunninghill over a 30 day period.

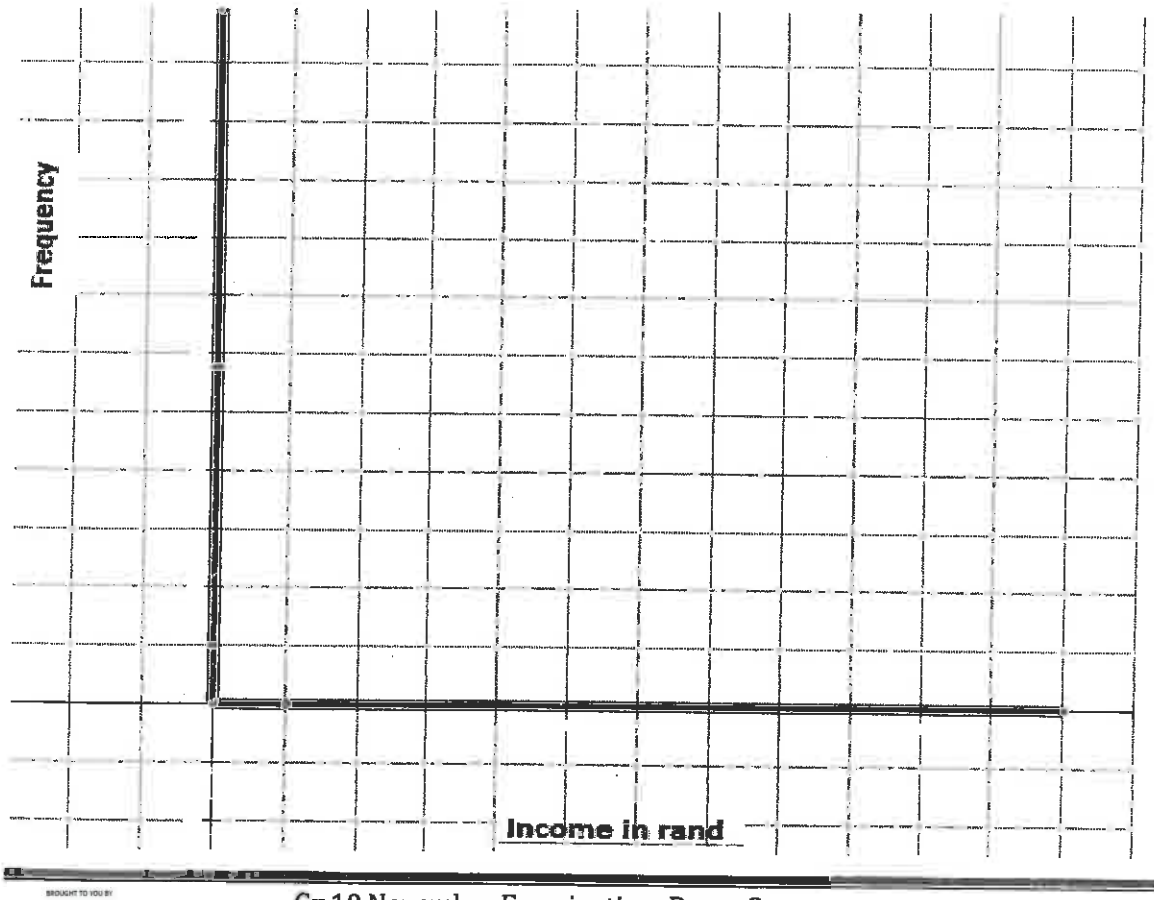
436	520	980	684	798	842	346	472	591	257
745	763	892	385	427	445	676	848	907	605
412	306	584	527	634	701	549	1 002	812	596

5.1.1 Group the data into the 5 equal intervals, and complete the frequency table. (3)

Income (rand)	Frequency
$100 \leq x < 300$	
$300 \leq x < 500$	
$500 \leq x < 700$	
$700 \leq x < 900$	
$900 \leq x < 1100$	

5.1.2 The owner decides that if he is to keep his business, he has to earn a daily income of R600 or more for at least 60% of the time. By suitable calculation, determine what income the owner is in fact earning 60% of the time. (2)

5.1.3 Plot a histogram from the information in the table in 5.1.1. (2)

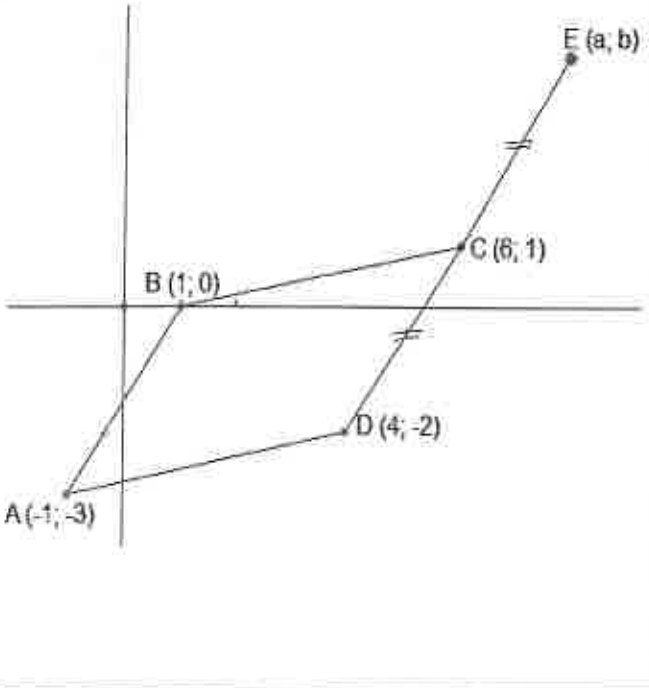


Question 6

ALL the answers in this question have to be determined by analytical methods.

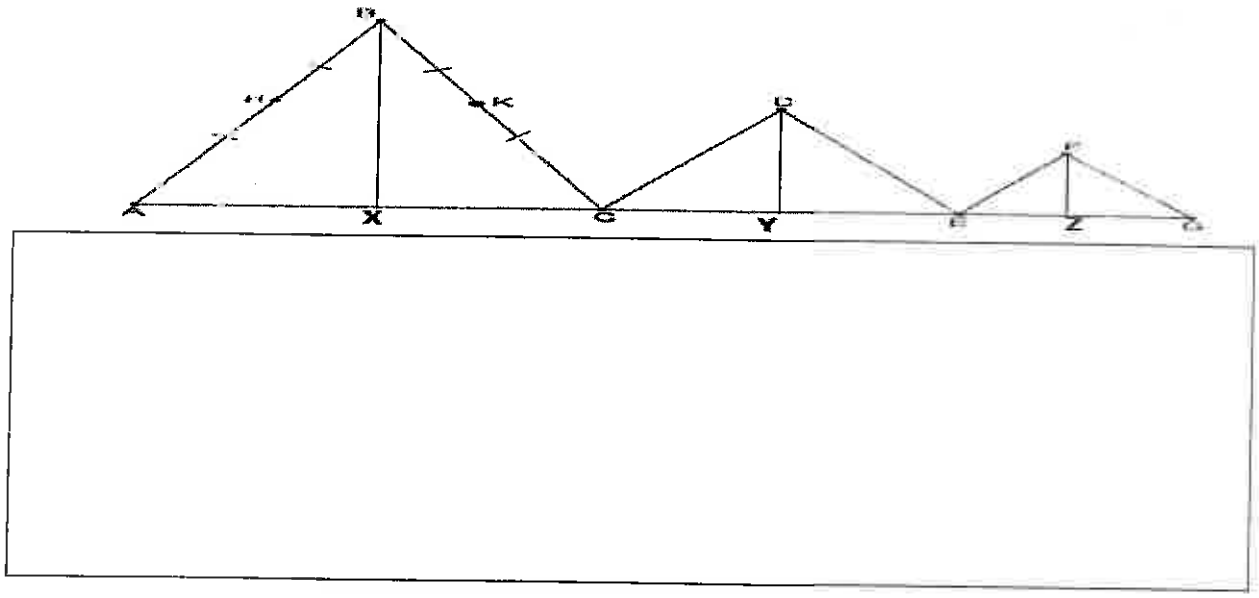
6.1 Prove that the points K(2; 3), L(2+4t; 3-5t) and M(2+4u; 3-5u) are collinear for all real values of t and u. (3)

6.2 (2)



If DC is extended to E such that DC = CE, find the values of a and b.

6.3 Each successive triangle is half the height of the previous one. Find the perpendicular height DY of ΔDCE, given $AB = BC = 10\ m$ and $AC = 6\ m$. (2)

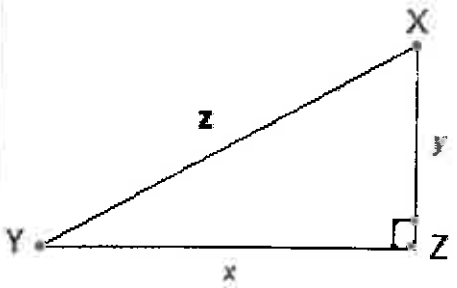


Question 7

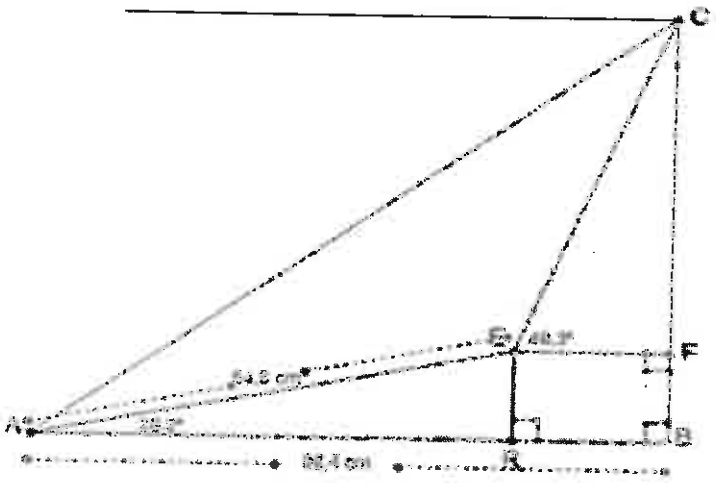
7.1 If A and B are complementary angles, and $\sin A = \frac{5}{13}$, make use of an appropriate diagram and determine, **without the use of a calculator**, the value of $3 \sin A + 5 \cos B$. (6)

7.2 (5)

Use the accompanying sketch and **PROVE** the trigonometric identity $\sin^2X + \cos^2X = 1$



7.3



In the figure:

$angle\ EAR = 28{,}2°$

$angle\ CEF = 48{,}3°$

$AE = 64{,}8cm$

$AB = 98{,}4cm$

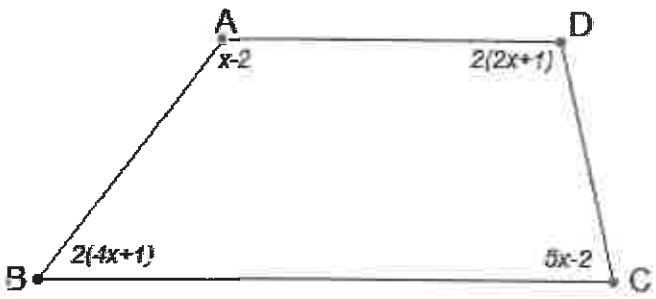
Calculate **to one decimal place**:

7.3.1 RB (3)

7.3.2 BC (4)

7.3.3 the angle of depression of A from C. (4)

Question 8

8.1 (9)

The angles of quadrilateral ABCD are $x-2;\ 2(4x+1);\ 5x-2$ and $2(2x+1)$ respectively. Show that the quadrilateral is a trapezium.