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General Certificate of Secondary Education  
2013

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Candidate Number

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StudentBounty.com

## Mathematics

Unit T4

(With calculator)



Higher Tier



[GMT41]

\*GMT41\*

TUESDAY 11 JUNE, 9.15 am – 11.15 am

### TIME

2 hours.

### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided. Do not write outside the box, around each page, on blank pages or tracing paper.**

Complete in blue or black ink only. **Do not write with a gel pen.**

Answer **all twenty-two** questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You **may** use a calculator for this paper.

### INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Functional Elements will be assessed in this paper.

Quality of written communication will be assessed in **questions 11 and 15.**

You should have a calculator, ruler, compasses and a protractor.

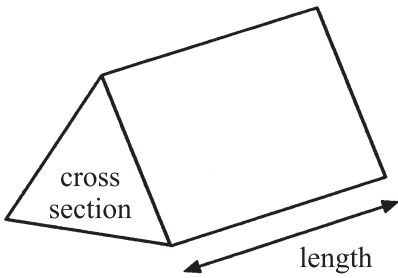
The Formula Sheet is on page 2.

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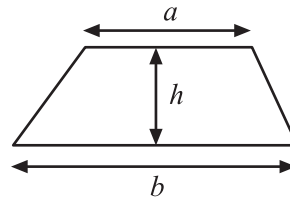


# Formula Sheet

**Volume of prism** = area of cross section  $\times$  length

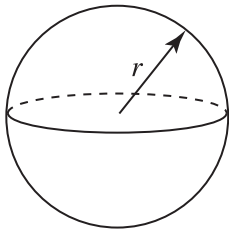


**Area of trapezium** =  $\frac{1}{2}(a + b)h$



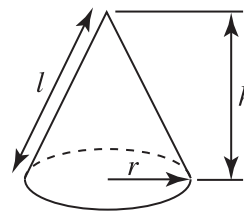
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

**Surface area of sphere** =  $4\pi r^2$

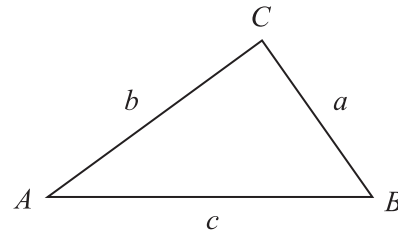


**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** =  $\pi r l$



**In any triangle ABC**



**Quadratic Equation**

The solutions of  $ax^2 + bx + c = 0$   
where  $a \neq 0$ , are given by

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

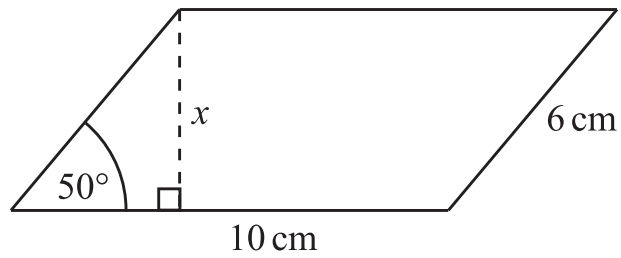
**Sine Rule:**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine Rule:**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2} ab \sin C$



1



A parallelogram has sides of 6 cm and 10 cm, with an angle of  $50^\circ$  between the sides.

Calculate the height  $x$  of the parallelogram.

Answer  $x =$  \_\_\_\_\_ cm [3]

Examiner Only

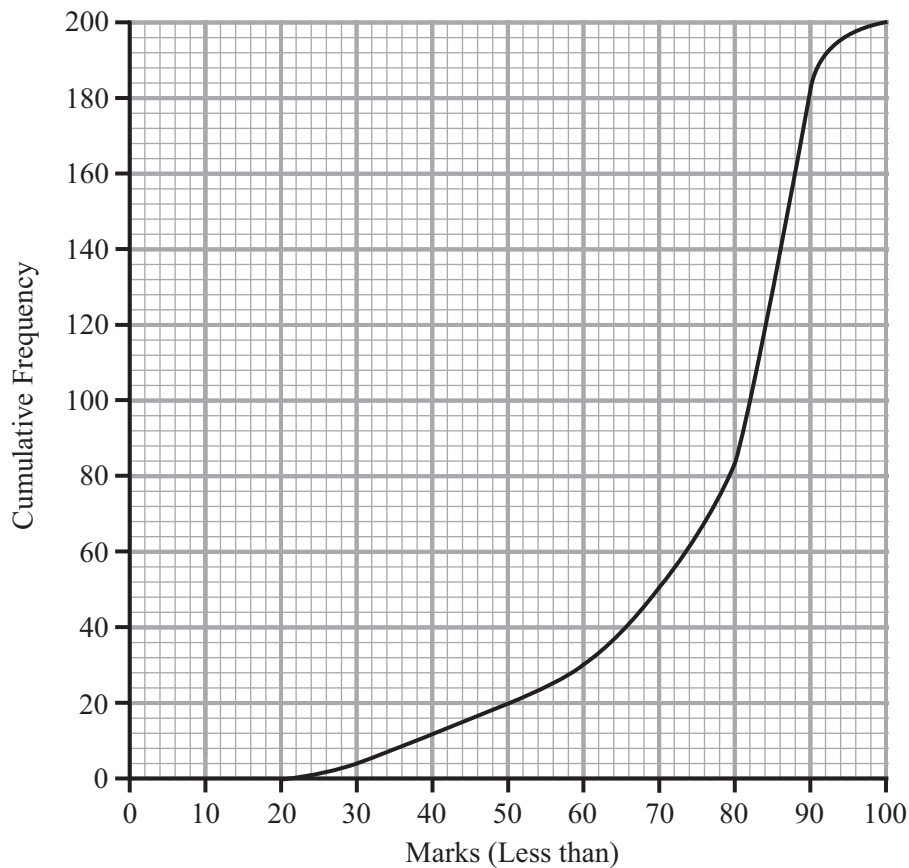
Marks Remark

Total Question 1

[Turn over]



- 2 The graph below shows the cumulative frequency of marks obtained in a spelling test.



- (a) Use the graph to estimate the inter-quartile range.

Answer \_\_\_\_\_ [2]

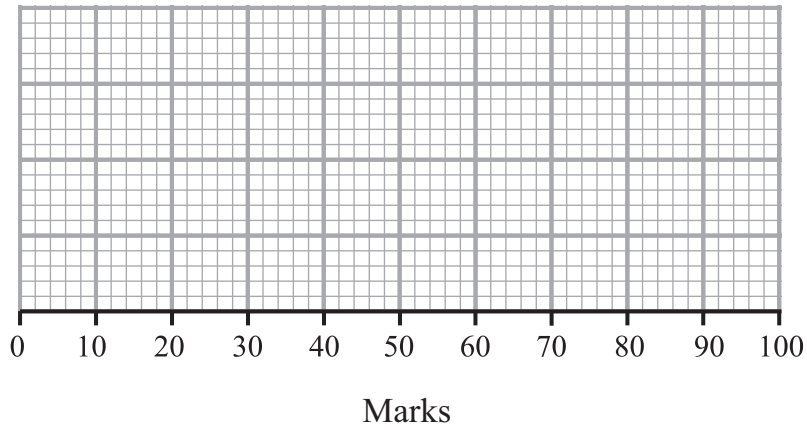
- (b) The pass mark is 75  
Estimate how many passed the spelling test.

Answer \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark



(c) From the graph opposite draw a box plot.



[3]

Examiner Only

Marks	Remark
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Total Question 2	

- 3 (a) Solve the simultaneous equations
- $$5x - y = 9$$
- $$-2x + y = 3$$
- Show your working clearly.

Answer  $x = \underline{\hspace{2cm}}$   $y = \underline{\hspace{2cm}}$  [2]

- (b) Solve  $\frac{2}{3}(1 - x) - \frac{1}{4}(3x - 1) = 8$

Answer  $x = \underline{\hspace{2cm}}$  [4]

Total Question 3	

[Turn over



4 (a) Factorise  $15xy - 5y^2$

Answer \_\_\_\_\_ [2]

(b) (i) Factorise  $x^2 - 9x - 36$

Answer \_\_\_\_\_ [2]

(ii) Hence solve  $x^2 - 9x - 36 = 0$

Answer \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark
Total Question 4	

5 What is the Highest Common Factor (HCF) of 210 and 252?

Answer \_\_\_\_\_ [2]

Total Question 5	

6 Tony opened a savings account with the Western Bank.  
After one year, the bank paid 6% per annum interest into his account.  
The total amount in his account was then £710.20  
Work out the amount of money with which Tony opened the account.

Answer £ \_\_\_\_\_ [3]

Total Question 6	



7 (a) Write  $7^{-2}$  as a fraction.

Answer \_\_\_\_\_ [1]

(b) Hence find the value of  $7^0 + 7^{-2}$

Answer \_\_\_\_\_ [1]

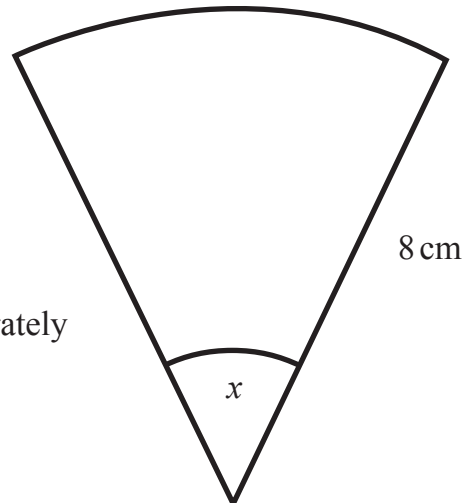
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Marks Remark

Total Question 7

8 The area of the sector is  $20.11 \text{ cm}^2$   
Calculate the angle  $x$ .

diagram not  
drawn accurately



Answer \_\_\_\_\_  $^\circ$  [4]

Total Question 8

[Turn over



9 Find the equation of the line which passes through the points

$(-2, 11)$  and  $(0, 5)$

Answer \_\_\_\_\_ [3]

Examiner Only

Marks Remark

Total Question 9

10 The load  $L$  which can be supported by a metal girder varies inversely as its length  $x$ .

A load of 10 tonnes can be supported by a girder 2 m long.

What length of girder will support a load of 12.5 tonnes?

Answer \_\_\_\_\_ m [3]

Total Question 10





Quality of written communication will be assessed in this question.

11 The table shows information about 500 pupils in a school.

Year	Number of Boys	Number of Girls
8	70	90
9	85	75
10	80	100

The headmaster wants to carry out a survey of the pupils' views on the new school library. He decides to choose a stratified sample of 60 pupils to take part in the survey.

(a) How many boys in Year 9 should be in the sample?

Answer \_\_\_\_\_ [2]

(b) For this data, why is it better to select a stratified sample than a random sample?

Answer \_\_\_\_\_  
\_\_\_\_\_ [2]

Examiner Only  
Marks Remark

Total Question 11

[Turn over



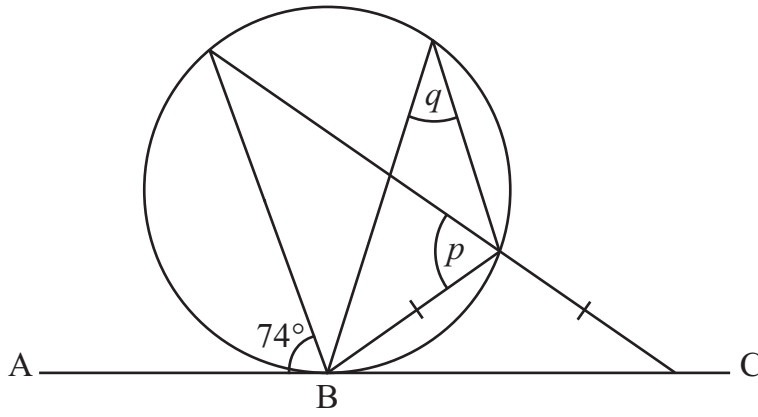


diagram  
not drawn  
accurately

Examiner Only	
Marks	Remark
Total Question 12	

- (a) AC is a tangent to the circle at B.  
Find the size of angle  $p$ , giving a reason.

Answer  $p = \text{_____}^\circ$ ;

because \_\_\_\_\_ [2]

- (b) Calculate the size of angle  $q$ .

Answer  $q = \text{_____}^\circ$  [2]



13

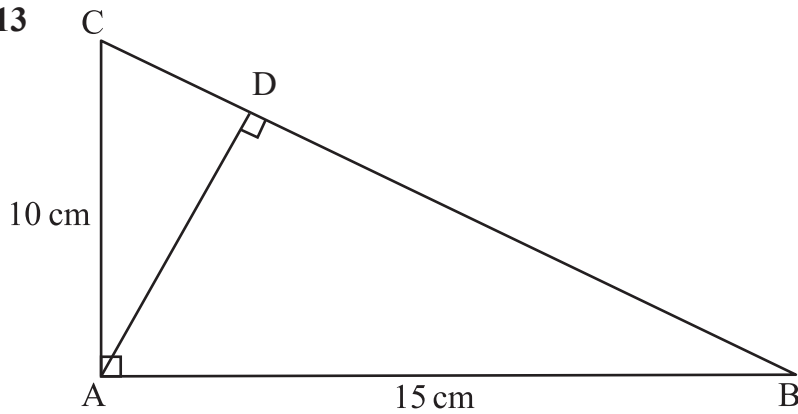


diagram  
not drawn  
accurately

Calculate the length AD.

Answer \_\_\_\_\_ cm [5]

Examiner Only	
Marks	Remark
Total Question 13	
Total Question 14	

- 14 The median of ten numbers is 40  
The mean of the numbers is 55  
20 is subtracted from the smallest number.  
Calculate the median and mean of the ten numbers now.

Answer median = \_\_\_\_\_, mean = \_\_\_\_\_ [4]

[Turn over

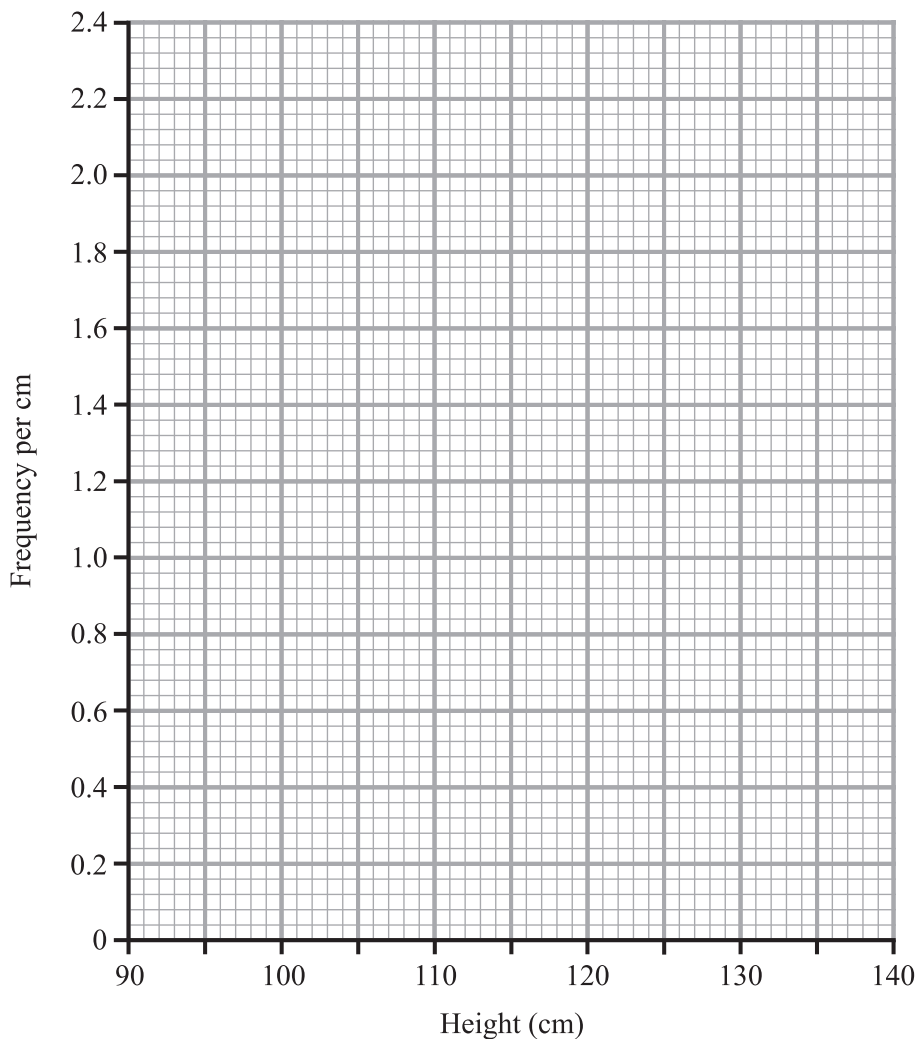


Quality of written communication will be assessed in this question.

15 The table gives information about heights of 60 swimmers.

Height, $h$ cm	Number of swimmers
$90 \leq h < 95$	11
$95 \leq h < 105$	16
$105 \leq h < 120$	18
$120 \leq h < 130$	8
$130 \leq h < 140$	7

(a) Illustrate the data by drawing a histogram on the graph paper below.



Histogram A

[3]

Examiner Only	
Marks	Remark



(b) The histogram drawn below illustrates the heights of a different group of 60 swimmers.  
 Compare this histogram with the one you have drawn.  
 Give two comparisons.

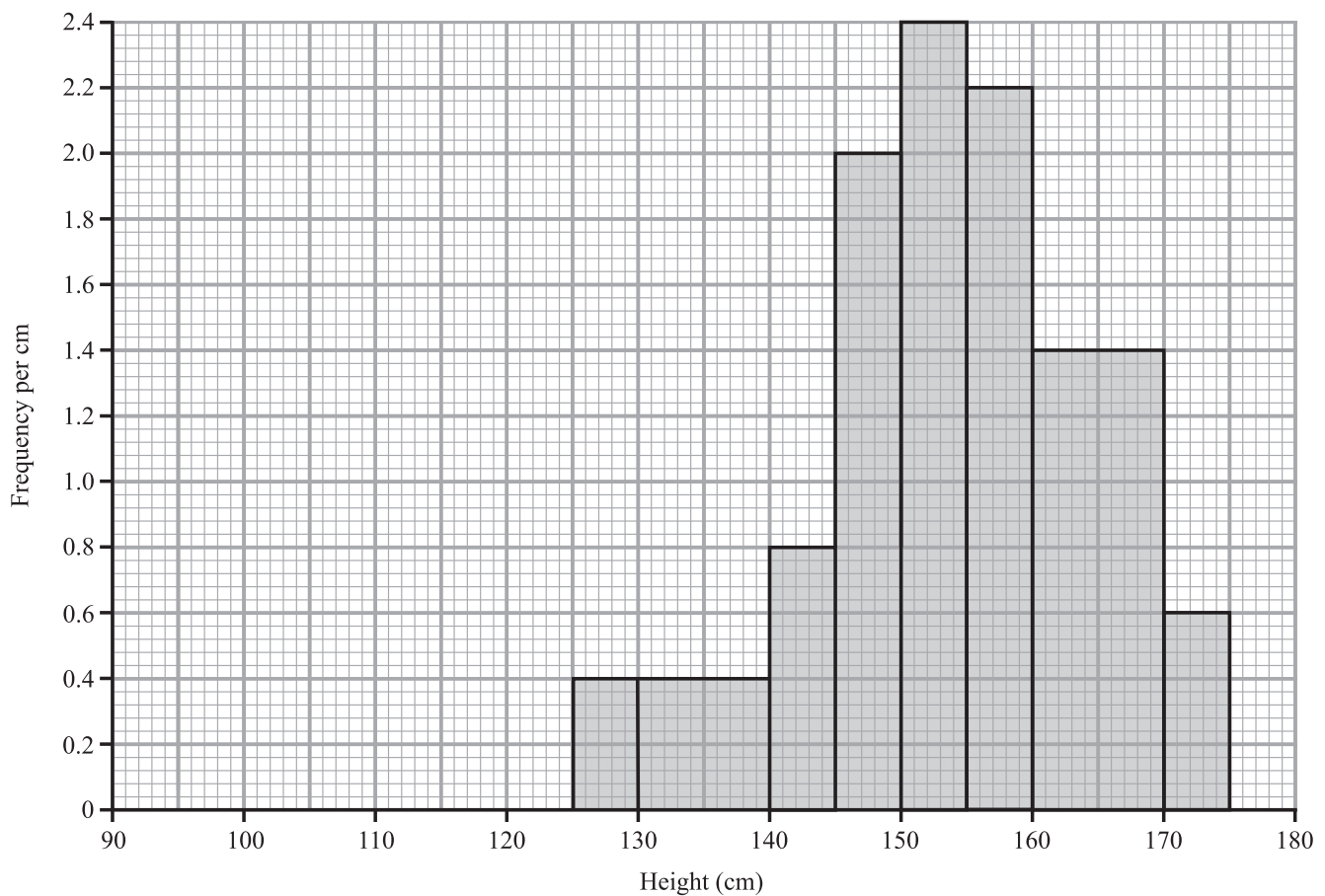
1. \_\_\_\_\_  
 \_\_\_\_\_ [1]

2. \_\_\_\_\_  
 \_\_\_\_\_ [1]

(c) Suggest a reason for the difference in the two histograms.

Answer \_\_\_\_\_  
 \_\_\_\_\_ [1]

Examiner Only	
Marks	Remark
Total Question 15	

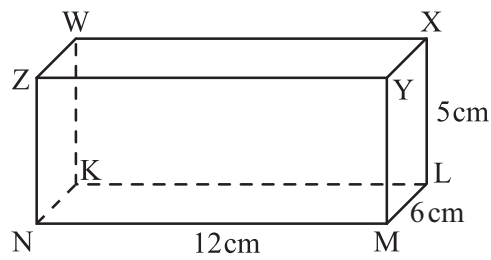


Histogram B

[Turn over



16 A cuboid is shown.



(a) Calculate the length of the space diagonal NX.

Answer \_\_\_\_\_ cm [2]

(b) Calculate the angle between NX and the base of the cuboid.

Answer \_\_\_\_\_ ° [3]

Examiner Only	
Marks	Remark
Total Question 16	
Total Question 17	

17 (a) Expand and simplify  $(3x - y)(x + 2y)$

Answer \_\_\_\_\_ [3]

(b) Factorise  $4x^2 - 4xy - 3y^2$

Answer \_\_\_\_\_ [2]



18 (a) What is the meaning of

(i)  $15^{\frac{1}{2}}$

Answer \_\_\_\_\_ [1]

(ii)  $16^{\frac{2}{3}}$

Answer \_\_\_\_\_ [2]

(b) Explain why  $2^{-1} \times \left(\frac{1}{16}\right)^{\frac{1}{2}}$  is equal to  $\frac{1}{8}$

[1]

(c) Show how to evaluate  $32^{-\frac{4}{5}}$  **without using a calculator.**

You must show clearly **each** stage of your method and write your final answer as simply as possible.

Answer \_\_\_\_\_ [4]

Examiner Only

Marks Remark

Total Question 18

[Turn over







20 A field ABCD is shown.

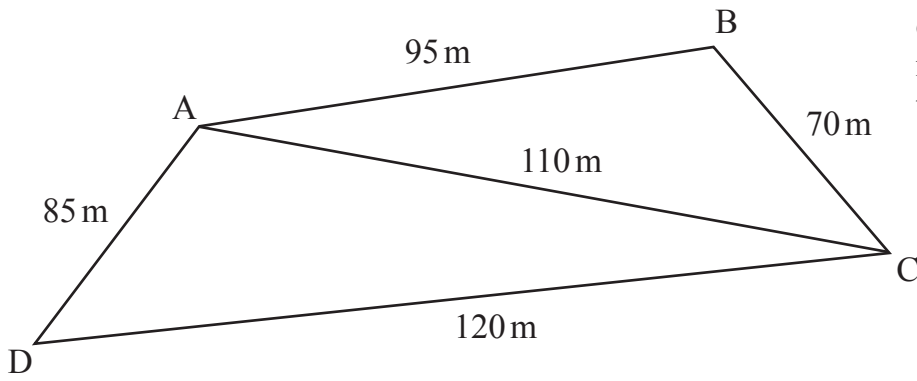


diagram  
not drawn  
to scale

A track AC runs diagonally from A to C. Angle  $CAB = 39.1^\circ$   
Calculate the shortest distance from B to D.

Answer \_\_\_\_\_ m [4]

Examiner Only

Marks	Remark
Total Question 20	

Total Question 20

[Turn over



21 Simplify  $\frac{2x^2 - 8}{x^2 - 14x + 24}$

Answer \_\_\_\_\_ [4]

Examiner Only	
Marks	Remark
Total Question 21	

22 Solve  $\frac{x+1}{x-2} + \frac{x-2}{x+1} = \frac{5}{2}$

Answer \_\_\_\_\_ [7]

Total Question 22	





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**THIS IS THE END OF THE QUESTION PAPER**

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use only**

<b>Question Number</b>	<b>Marks</b>
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<b>Total Marks</b>	
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Examiner Number

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