



Rewarding Learning

General Certificate of Secondary Education
2012

Centre Number

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Candidate Number

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Mathematics

Unit T4

(With calculator)



Higher Tier



[GMT41]

GMT41

WEDNESDAY 6 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.

Write your answers in the spaces provided in this question paper.

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

Answer **all fourteen** 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 1 and 7**.

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

The Formula Sheet is overleaf.

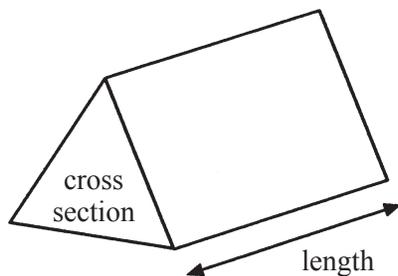
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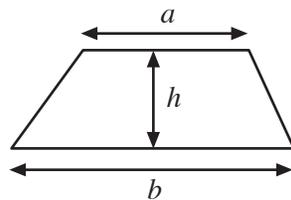
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Formula Sheet

Volume of prism = area of cross section \times length

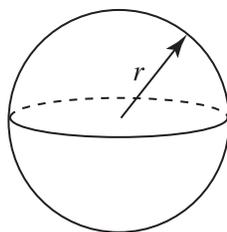


Area of trapezium = $\frac{1}{2}(a + b)h$



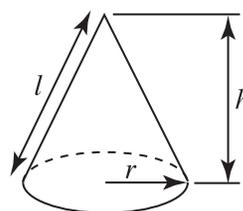
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

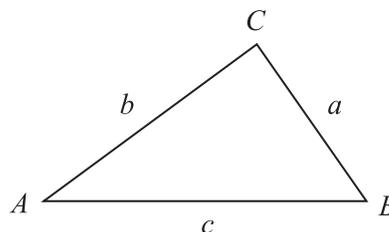


Quadratic Equation

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

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

In any triangle ABC



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 = $\frac{1}{2} ab \sin C$



Quality of written communication will be assessed in this question.

Examiner Only

Marks Remark

Show your working.

- 1 (a) In a housing estate $\frac{5}{6}$ of the houses have a garage.

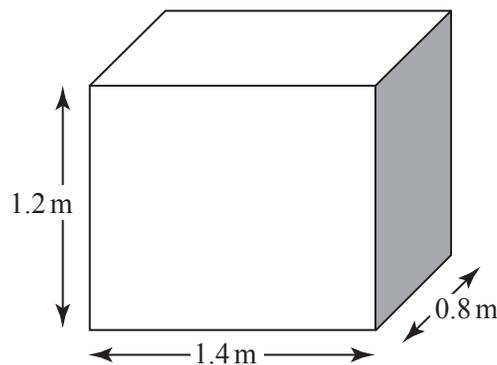
In three out of every four garages there is a car parked.

There are 15 cars in total parked in a garage. Find the number of houses that have no garage.

Answer _____ [3]

- (b) An empty tank is in the shape of a cuboid as shown with measurements 1.4 m, 1.2 m and 0.8 m all to the nearest 10 cm.

What is the smallest possible volume of the tank?



Answer _____ m³ [3]

Total Question 1

[Turn over



- 2 120 employees in a warehouse were asked how far they travelled to work each day. The table shows their responses.

Distance (km)	Frequency (number of people)	Distance (\leq)	Cumulative frequency
$0 < d \leq 5$	5	5	5
$5 < d \leq 10$	12	10	17
$10 < d \leq 15$	16		
$15 < d \leq 20$	21		
$20 < d \leq 25$	27		
$25 < d \leq 30$	14		
$30 < d \leq 35$	12		
$35 < d \leq 40$	8		
$40 < d \leq 45$	5		

(a) Complete the cumulative frequency table above. [1]

(b) Draw the cumulative frequency graph on the grid opposite. [3]

(c) Use your graph to find

(i) the median,

Answer _____ km [1]

(ii) the percentage of employees who travel more than 18 km to work each day.

Answer _____ % [2]

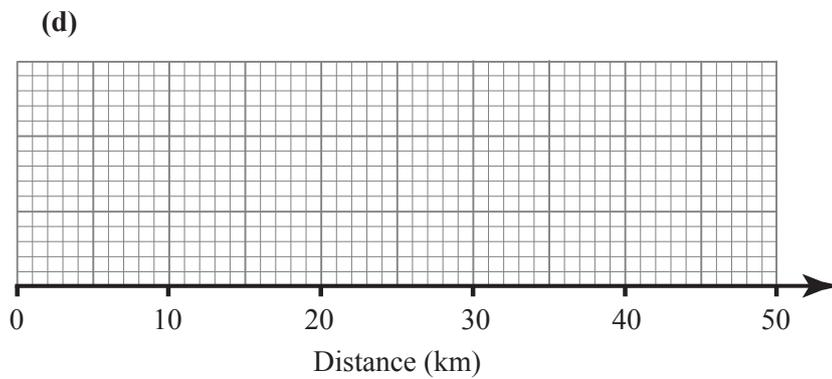
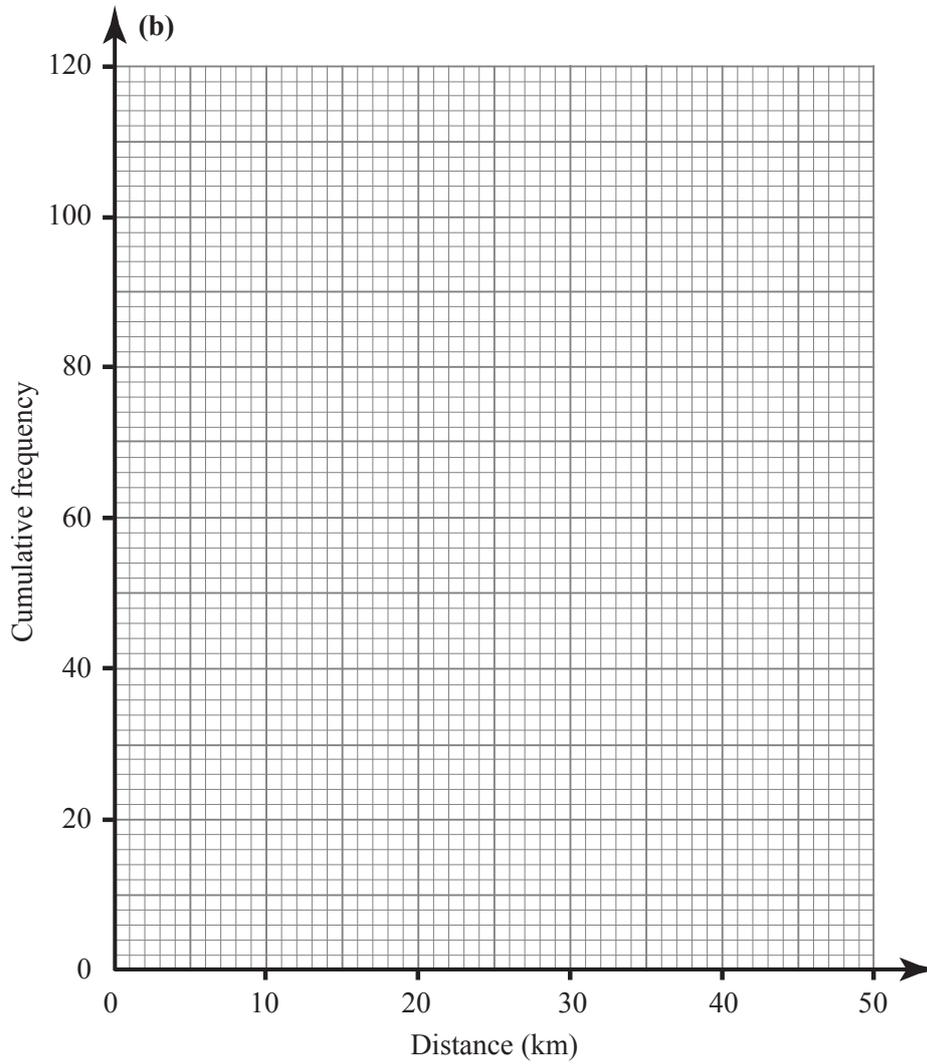
Examiner Only

Marks Remark



(d) The minimum distance travelled by any employee was 2 km and the maximum distance travelled was 44 km.

Draw a box plot below to illustrate the data for all 120 employees. [3]



Examiner Only	
Marks	Remark
Total Question 2	

[Turn over



3 (a) Find the least common multiple (LCM) of 60 and 132.

Answer _____ [2]

(b) M is the point $(-1, 4)$. N is the point $(5, 8)$.

Find the length of MN, correct to 2 decimal places.

Answer _____ [3]

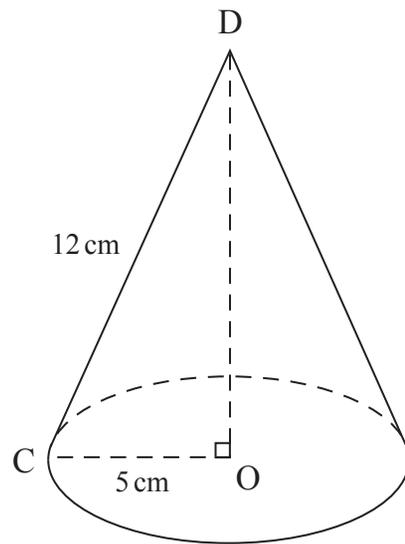
Examiner Only

Marks

Remark



(c)



OC is the radius of the base of the cone. OD is the height of the cone.
 $OC = 5 \text{ cm}$. $DC = 12 \text{ cm}$.

Calculate the angle DCO.

Answer _____ ° [3]

Examiner Only	
Marks	Remark
Total Question 3	

[Turn over



4 (a) Solve the simultaneous equations

$$5x + 2y = 13$$

$$2x - 3y = 9$$

A solution by trial and improvement will not be accepted.

Answer $x =$ _____

$y =$ _____ [4]

(b) Factorise fully

(i) $9xy - 12y^2$

Answer _____ [2]

(ii) $g^2 - 9h^2$

Answer _____ [2]

Examiner Only

Marks Remark

Total Question 4



- 5 (a) P, Q, R and S are points on the circumference of a circle, centre O.
The angle PSR is 48°

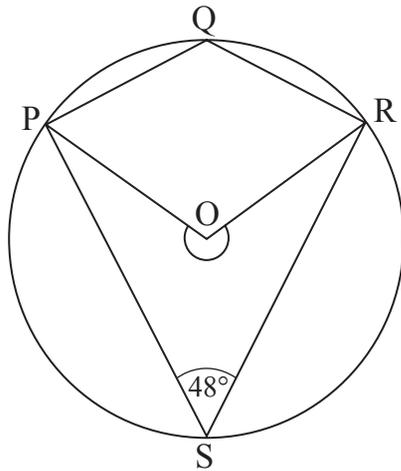


Diagram not
drawn accurately

Calculate

- (i) the angle PQR,

Answer _____ $^\circ$ [1]

- (ii) the reflex angle POR.

Answer _____ $^\circ$ [1]

Examiner Only	
Marks	Remark



(b) Solve the equation

$$\frac{3x-5}{2} - \frac{2x+7}{9} = \frac{11}{6}$$

A solution by trial and improvement will not be accepted.

Answer $x =$ _____ [4]

Examiner Only

Marks Remark

Total Question 6



Quality of written communication will be assessed in this question.

- 7 (a) In a forest, the warden wishes to estimate the number of rabbits. He catches and marks 140 rabbits and releases them again.

The next day he catches 80 rabbits and finds 23 of the marked ones among these.

Estimate the number of rabbits in the forest.

Show your work clearly.

Answer _____ [3]

- (b) "Lightup" claim that the lifetime of their light bulbs is over 1200 hours.

- (i) Explain why it is necessary to use sampling to find the lifetime of the light bulbs.

 _____ [1]

- (ii) Describe a suitable sampling method for testing the lifetime of the light bulbs.

 _____ [1]

Examiner Only	
Marks	Remark

[Turn over



- (c) In a hospital 840 patients were treated for tonsillitis during one year.

Some information on the gender and age groups of these patients is shown in the table below.

	Under 15	15–50	Over 50
Male	62	260	25
Female		413	

The hospital wishes to interview some of the patients.

They take a stratified sample of 80 patients.

- (i) How many patients in the sample should be males under 15?

Answer _____ [1]

- (ii) In the sample taken there were 5 females over 50. Estimate the number of females over 50 who were treated for tonsillitis in the hospital.

Answer _____ [1]

Examiner Only

Marks Remark

Total Question 7



8

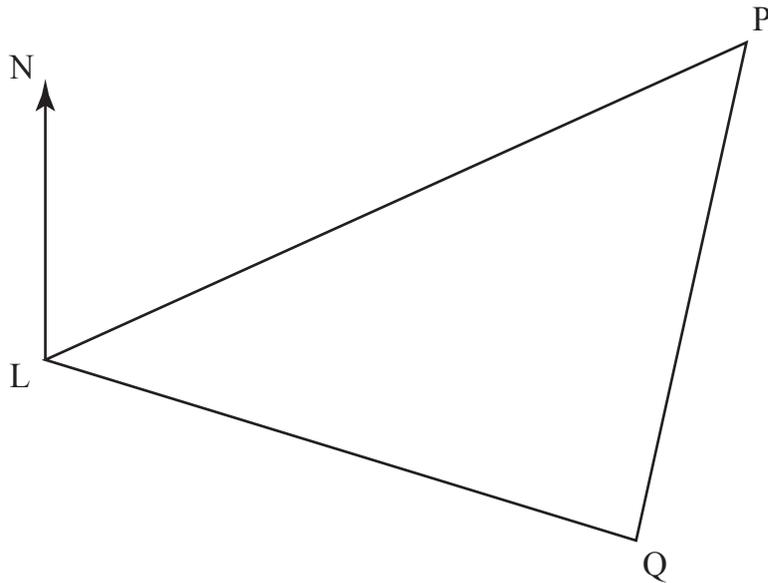


Diagram not
drawn accurately

Ship P is 62 km from a lighthouse L on a bearing of 072°

Ship Q is 45 km from L on a bearing of 124°

Calculate

(a) the distance between P and Q,

Answer _____ km [3]

(b) the area of triangle LPQ,

Answer _____ [3]

Examiner Only	
Marks	Remark

[Turn over

7415



24GMT4115

11 (a) Factorise $6a^2x - abx - 12b^2x$

Answer _____ [3]

(b) Solve $\frac{7}{3x-1} - \frac{5}{x+1} = 4$

A solution by trial and improvement will not be accepted.

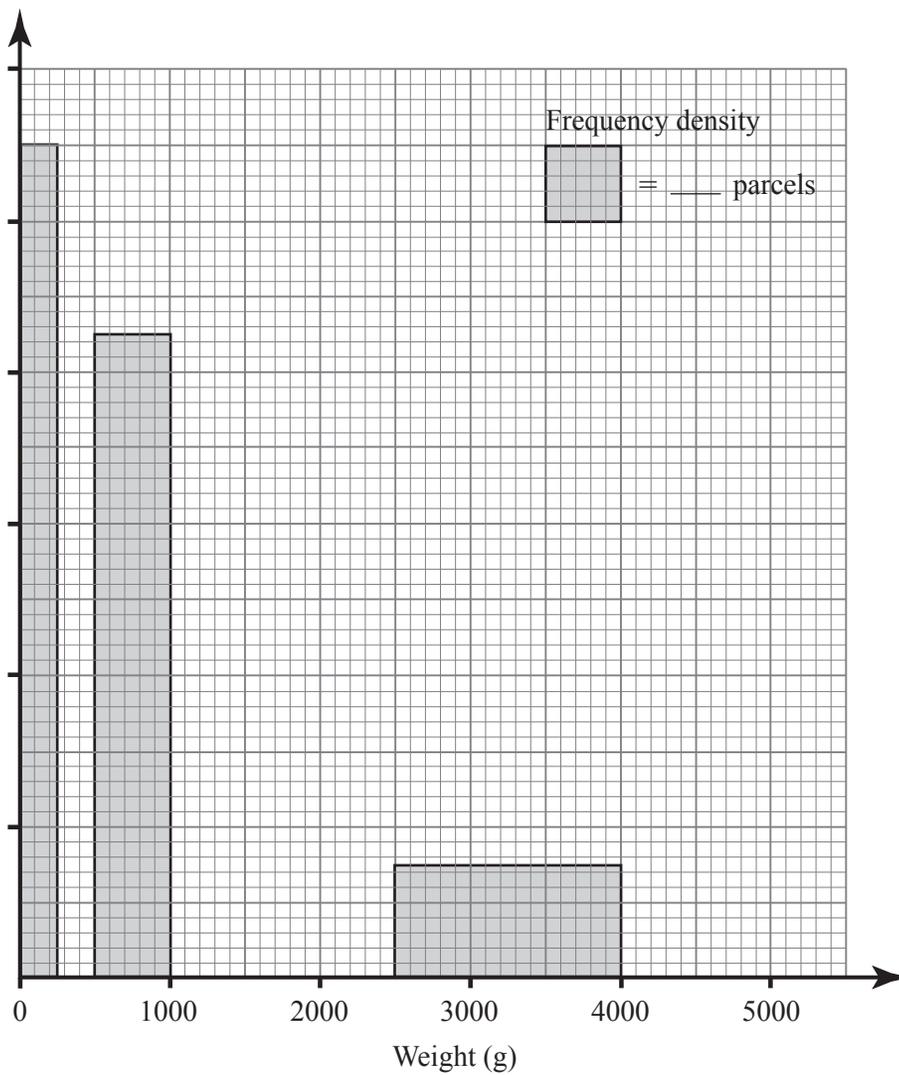
Answer _____ [7]

Examiner Only	
Marks	Remark
Total Question 11	

[Turn over



The histogram illustrates the weights of some of the parcels.



- (a) Complete the frequency density on the grid. [1]
- (b) Use the data in the table to complete the histogram. [2]
- (c) Use the data in the histogram to complete the table. [2]
- (d) Estimate the median weight of the 350 parcels.

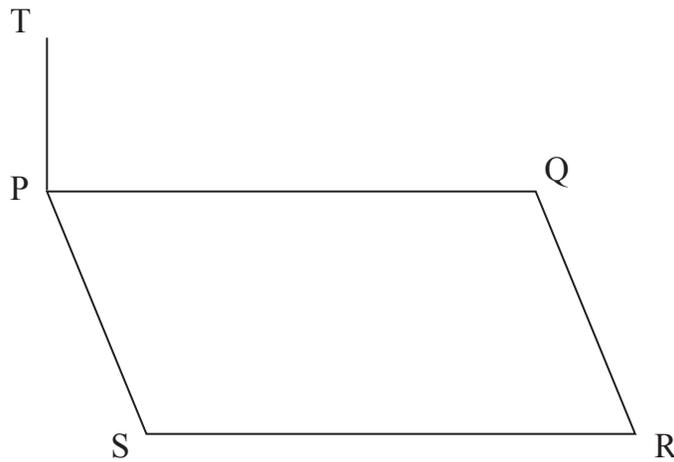
Answer _____ g [2]

Examiner Only	
Marks	Remark
Total Question 12	

[Turn over



13



A vertical telegraph pole TP stands at the corner P of a horizontal field PQRS.

PQRS is a rectangle of length 60 m and breadth 25 m.

The height of the pole is 10 m.

Calculate the angle of elevation of the top of the pole, T, from R.

Answer _____[°] [3]

Examiner Only

Marks	Remark

Total Question 13

7415



24GMT4122

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Question Number	Marks
1	
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QWC	

Total Marks	
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Examiner Number

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