Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 20 May 2008 – Afternoon

Time: 2 hours

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 23 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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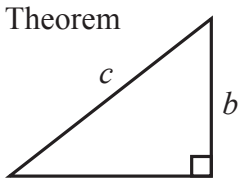
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

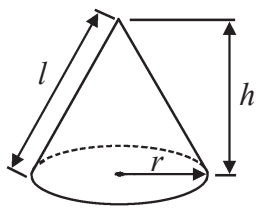
Pythagoras' Theorem



$a^2 + b^2 = c^2$

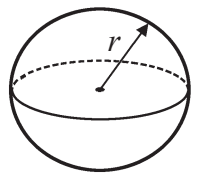
Volume of cone = $\frac{1}{3}\pi r^2 h$

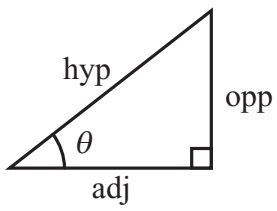
Curved surface area of cone = $\pi r l$



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

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





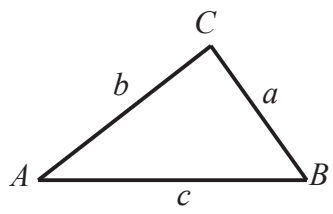
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

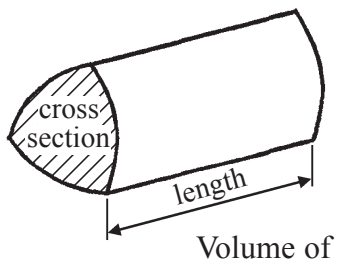
In any triangle ABC



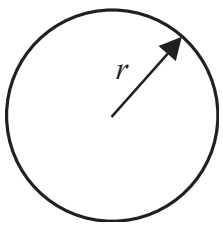
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



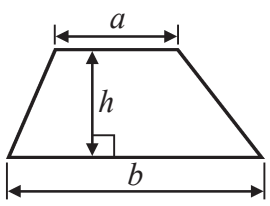
Volume of prism = area of cross section × length

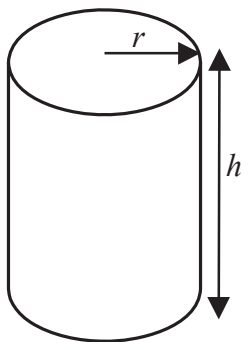


Circumference of circle = $2\pi r$

Area of circle = πr^2

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





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

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

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

Leave blank

Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

Without sufficient working, correct answers may be awarded no marks.

1. Solve

(a) $6x + 13 = 2x + 7$

$x =$ .....

(3)

(b) $\frac{y}{5} - 2 = 4$

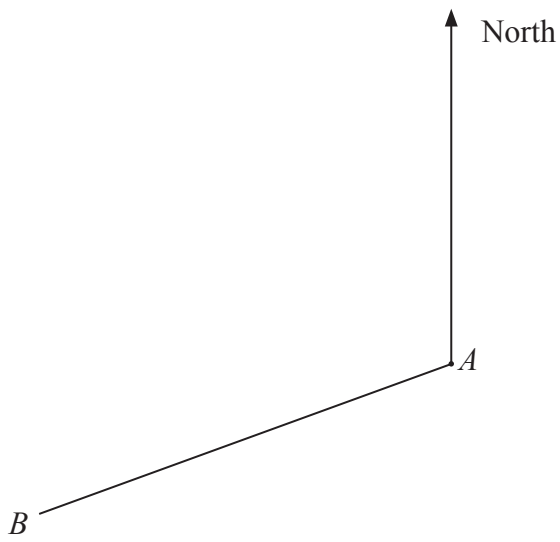
$y =$ .....

(2) **Q1**

(Total 5 marks)

Leave blank

2. The diagram shows two towns, *A* and *B*, on a map.



(a) Measure the bearing of *B* from *A*.

..... °

(2)

(b) *C* is another town.
The bearing of *C* from *A* is 125°.
Find the bearing of *A* from *C*.

..... °

(2)

Q2

(Total 4 marks)

Leave blank

3. The table shows information about the shoe sizes of 20 people.

Shoe size	Number of people
5	3
6	8
7	5
8	2
9	2

(a) Find the median shoe size.

.....

(2)

(b) Exactly 1 of these 20 people has a collar size of 15.

Jean says "If you choose one of these 20 people at random, the probability that this person will have **either** a shoe size of 8 **or** a collar size of 15 is

$$\frac{2}{20}+\frac{1}{20}=\frac{3}{20}$$

Is Jean correct?

.....

Explain your answer.

.....

.....

(2)

(Total 4 marks)

Q3

Leave blank

4. (a) Find the value of $3 - 5x$ when $x = -2$

.....

(2)

(b) Multiply out $5(y - 2)$

.....

(1)

(c) Factorise $w^2 + 5w$

.....

(2) **Q4**

(Total 5 marks)

Leave blank

5. The table shows information about the number of letters delivered to Manjit's house each day.

Number of letters delivered	Probability
0	0.2
1 to 5	0.5
6 to 10	0.2
More than 10	0.1

(a) There are 30 days in June.
Calculate an estimate of the number of days in June on which the number of letters delivered is 0

.....

(2)

(b) Find the probability that on a particular day the number of letters delivered is 6 or more.

.....

(2)

Q5

(Total 4 marks)

Leave blank

6. Show that

$$\frac{2}{3}+\frac{1}{4}=\frac{11}{12}$$

Q6

(Total 2 marks)

7. (a) Write $3^8 \times 3^6$ as a power of 3

.....

(1)

(b) Write $\frac{7^5}{7^2}$ as a power of 7

.....

(1)

(c) $\frac{5^n \times 5^3}{5^7} = 5^2$

Find the value of n.

$n =$ .....

(2)

(d) $A = 2^3 \times 3^4 \times 5^{16}$
$B = 2^5 \times 3 \times 7^{12}$

Find the Highest Common Factor of A and B.

.....

(2)

Q7

(Total 6 marks)

Leave blank

8. The diagram shows a prism with length 15 cm.
The cross section of the prism is a right-angled triangle with sides 3 cm, 4 cm and 5 cm.

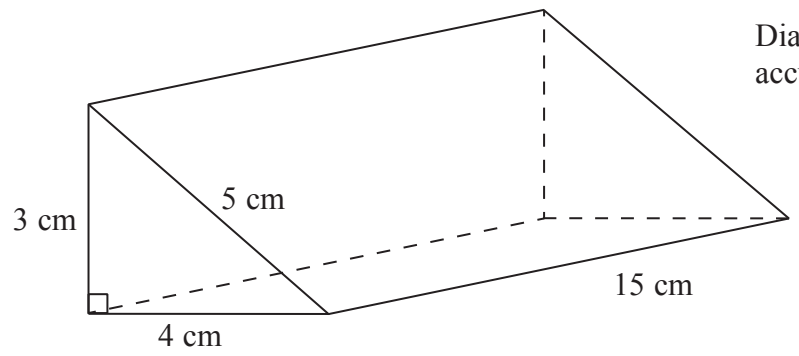


Diagram **NOT** accurately drawn

Calculate the total surface area of the prism.

..... cm^2

Q8

(Total 4 marks)

9. Solve the simultaneous equations

$$3x + y = 4$$
$$5x - y = 8$$

You must show sufficient working.

$x =$ .....

$y =$ .....

Q9

(Total 3 marks)

Turn over

Leave blank

10. The diagram shows a circle with centre O and radius 5 cm.

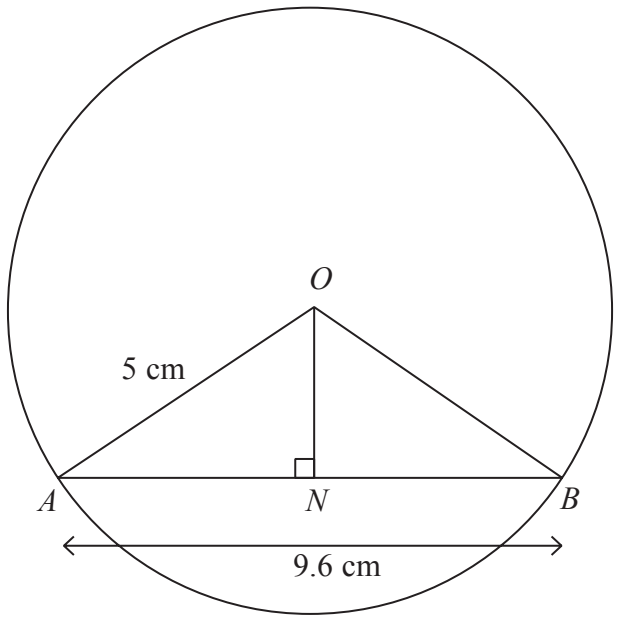


Diagram **NOT** accurately drawn

ANB is a chord of the circle.
$AB = 9.6$ cm.
Angle $ONA = 90°$.

(a) Write down the length of AN.

..... cm
(1)

(b) Calculate the length of ON.

..... cm
(3)

Q10

(Total 4 marks)

Leave blank

11. Joshi chooses two numbers from the box.

123.37
123.43
123.47
123.53
123.57
123.63
123.67

Marie says

"When you round Joshi's two numbers to 1 decimal place, they are equal."

Mikos says

"When you round Joshi's two numbers to 3 significant figures, they are **NOT** equal."

Both statements are correct.

Write down Joshi's two numbers.

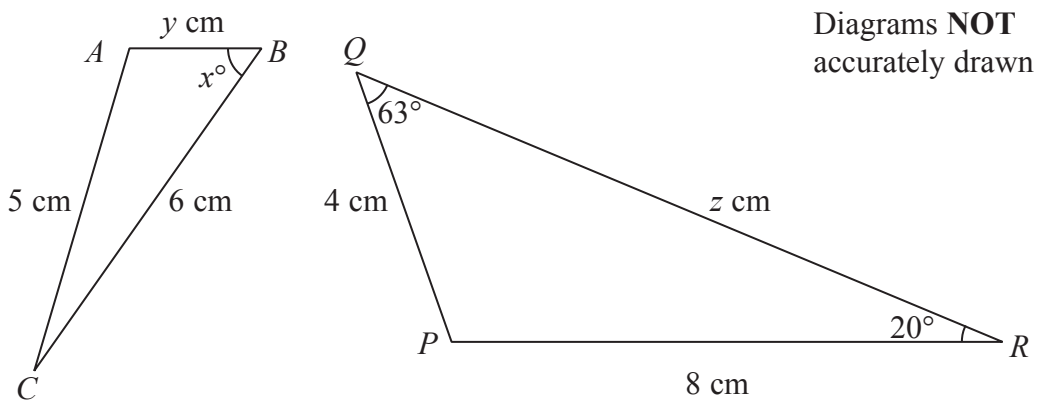
..... , ...

(Total 2 marks)

Q11

Leave blank

12. Here are two similar triangles.
AB corresponds to *PQ*.
BC corresponds to *QR*.



Diagrams **NOT** accurately drawn

Find the value of

(a) *x*

x = ...
(1)

(b) *y*

y = ...
(2)

(c) *z*

z = ...
(2)

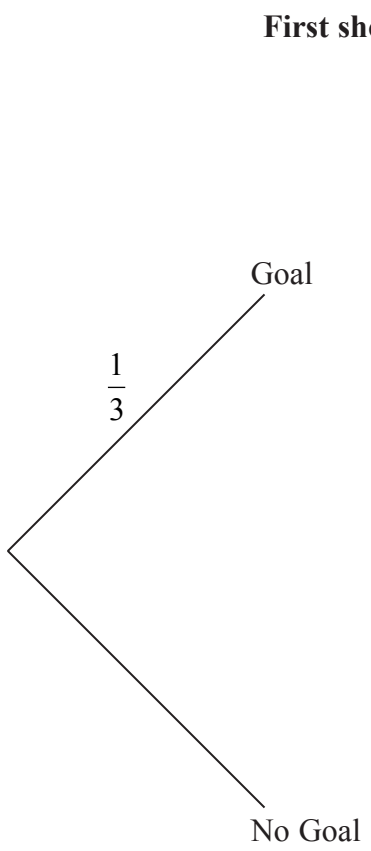
Q12

(Total 5 marks)

Leave blank

13. Each time Astrid takes a shot at goal, the probability that she will score is $\frac{1}{3}$
Astrid takes two shots.

(a) Complete the probability tree diagram.



(3)

(b) Calculate the probability that Astrid scores at least 1 goal.

.....

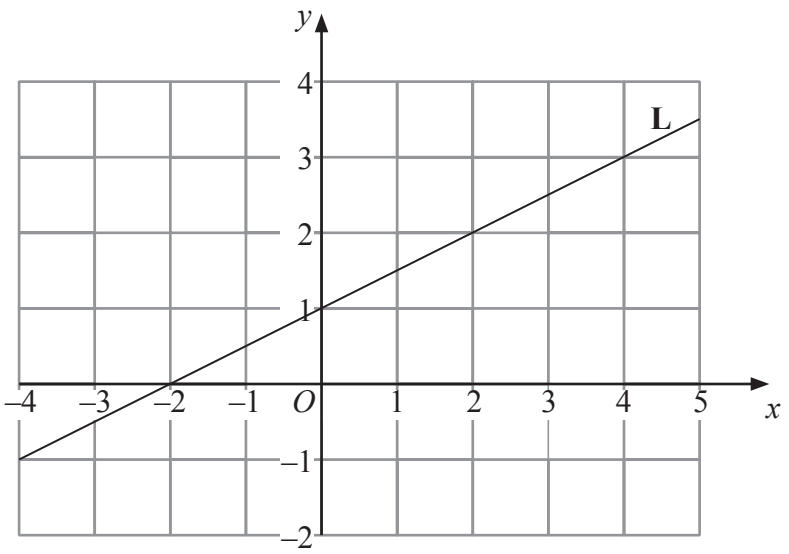
(3) **Q13**

(Total 6 marks)

Turn over

Leave blank

14. A line **L** passes through the points (0, 1) and (4, 3).



(a) (i) Find the gradient of the line **L**.

.....

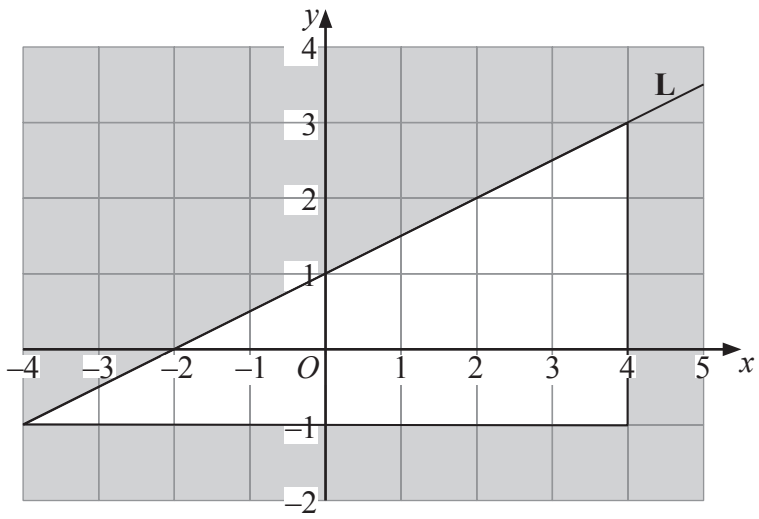
(ii) Find the equation of the line **L**.

.....

(4)

Leave blank

(b)



Write down the three inequalities that define the **unshaded** region.

.....

.....

.....

(3) **Q14**

(Total 7 marks)

Turn over

Leave blank

15.

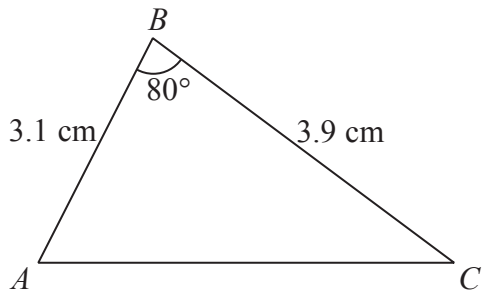


Diagram **NOT** accurately drawn

Calculate the length of AC.
Give your answer correct to 3 significant figures.

.....

(Total 3 marks)

Q15

Leave blank

16. (a) Solve $x^2 - 5x + 3 = 0$
Give your solutions correct to 3 significant figures.
You must show all your working.

.....

(3)

(b) Solve the inequality $y^2 < 9$

.....

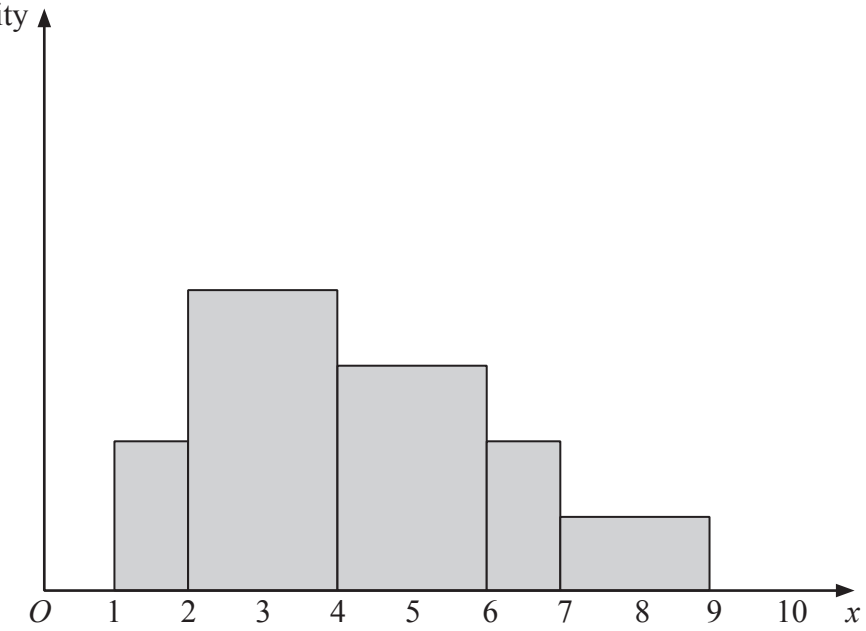
(2)

Q16

(Total 5 marks)

Leave blank

17. The histogram shows information about the heights, x cm, of some plants.
The histogram is drawn accurately.



(a) Calculate the percentage of values of x that lie between 2 and 4.

..... %
(3)

(b) Find the median of x.

.....
(2)

Q17

(Total 5 marks)

Leave blank

18. *APC* and *BPD* are chords of a circle.

AP = 4 cm.
BP = 3 cm.
PD = 14 cm.
PC = *x* cm.

Calculate the value of *x*.

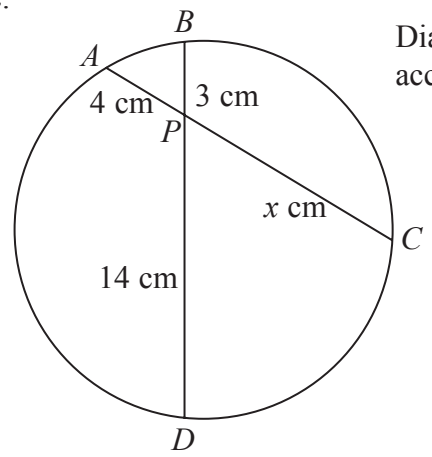


Diagram **NOT** accurately drawn

x = ...

(Total 2 marks)

Q18

19. A particle moves in a straight line through a fixed point *O*.
The displacement of the particle from *O* at time *t* seconds is *s* metres, where

$$s = t^2 - 6t + 10$$

(a) Find $\frac{ds}{dt}$

.....
(2)

(b) Find the velocity of the particle when $t = 5$

..... m/s
(2)

(c) Find the acceleration of the particle.

..... m/s^2
(2)

Q19

(Total 6 marks)

Turn over

Leave blank

20. (a) Evaluate $5 \times 10^{12} + 9 \times 10^{12}$
Give your answer in standard form.

.....

(2)

(b) Each of the numbers p, q and r is greater than 1 and less than 10

$p \times 10^{15} + q \times 10^{15} = r \times 10^{n}$
$p + q > 10$

(i) Find the value of n.

$n =$ .....

(ii) Find an expression for r in terms of p and q.

$r =$ .....

(3)

(Total 5 marks)

Q20

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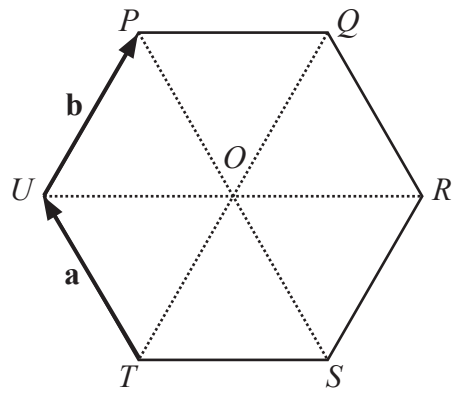
21. *PQRSTU* is a regular hexagon, centre *O*.
The hexagon is made from six equilateral triangles of side 2.5 cm.



$\overrightarrow{TU} = \mathbf{a}$. $\overrightarrow{UP} = \mathbf{b}$.

(a) Find, in terms of **a** and/or **b**, the vectors

(i) $\overrightarrow{TP}$

.....
(1)

(ii) $\overrightarrow{PO}$

.....
(1)

(iii) $\overrightarrow{UO}$

.....
(1)

(b) Find the modulus (magnitude) of $\overrightarrow{UR}$.

..... cm
(1)

Q21

(Total 4 marks)

Turn over

Leave blank

22.

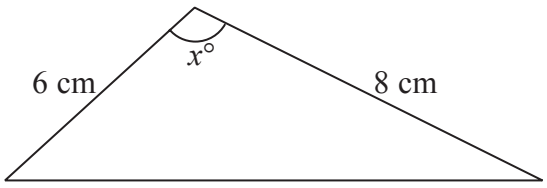


Diagram **NOT** accurately drawn

The area of the triangle is 12 cm^2.
The angle $x°$ is obtuse.
Calculate the value of x.

x = ...

Q22

(Total 4 marks)

Leave blank

23. (a) Simplify $\dfrac{x^2-9}{x^2+3x}$

.....

(3)

$f(x) = \dfrac{x^2-9}{x^2+3x}$ $\quad$ $g(x) = \dfrac{1}{x^2}$

(b) Use your answer to part (a) to find and simplify $fg(x)$.

$fg(x)$ = ...

(2) **Q23**

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

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