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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/62**

Paper 6 Investigation and Modelling (Extended) **February/March 2026**

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly, including sketches, to gain full marks for correct methods.
- In this paper you will be awarded marks for providing full reasons, examples and steps in your working to communicate your mathematics clearly and precisely.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Any blank pages are indicated.

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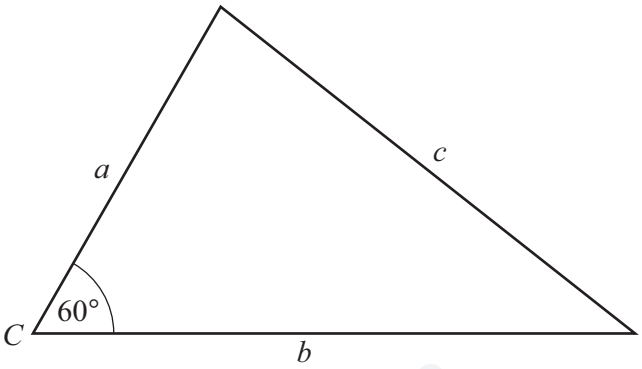
Section A

Investigation Eisenstein triples

You are advised to spend no more than 45 minutes on this section.

In this investigation you will look at the lengths of the sides of a triangle where one angle is 60°.



In the triangle:

- the length of the shortest side is a centimetres
- the length of the longest side is b centimetres
- the length of the side opposite the 60° angle is c centimetres.

When a, b and c are integers the sides of the triangle make an Eisenstein triple (a, b, c).

1 The cosine rule says that $c^2 = a^2 + b^2 - 2ab\cos C$.
For an Eisenstein triple angle $C = 60°$.

Give a reason why $c^2 = a^2 + b^2 - ab$ for an Eisenstein triple.

..... [1]

2 Use $c^2 = a^2 + b^2 - ab$ to complete the Eisenstein triple (9, 24, ...).

(9, 24, ...) [2]

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3 The diagrams show how you can use one Eisenstein triple to find another related Eisenstein triple.

The sides of triangle PQR make the Eisenstein triple (a, b, c).

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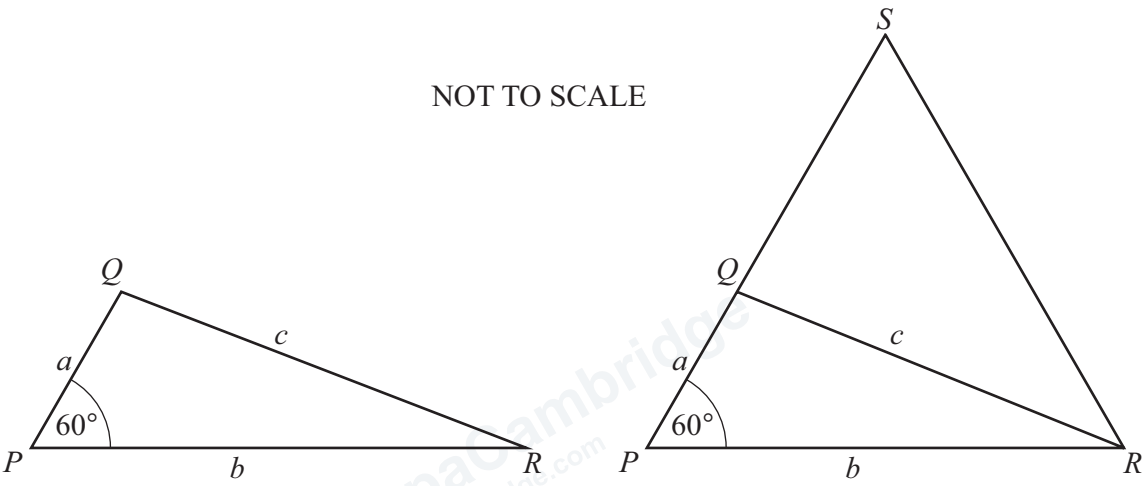

In the diagram on the right, PQ has been extended to S so that $PS = PR$.

(a) Give geometrical reasons why triangle QSR gives the Eisenstein triple $(b - a, \quad b, \quad c)$.

.....

.....

.....

..... [3]

(b) (9, 65, 61) is an Eisenstein triple.

Use the information in **3(a)** to write down the related Eisenstein triple.

(..... , ... , ...) [1]

(c) (32, ... , ...) and (45, ... , ...) are two Eisenstein triples that are related to each other.

Find the missing integers and complete the two Eisenstein triples.

(32, ... , ...) (45, ... , ...) [3]

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4 The table shows the first 7 terms of a sequence of Eisenstein triples (a, b, c).

(a) Complete the table.
n is the term number in the sequence.

n	a	b	c
1	3	3	3
2	5	8	7
3	7	15	
4	9	24	21
5	11	35	
6			43
7			

[5]

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(b) Use patterns in the table to find expressions for each of a, b and c in terms of n.

$a =$ .....

$b =$ .....

$c =$ .....

[5]

(c) Find two Eisenstein triples where the difference between b and c is 35.

(..... , ... , ...) and (..... , ... , ...) [5]

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Section B

Modelling Economic order quantity

You are advised to spend no more than 45 minutes on this section.

In this task you will find the minimum cost when ordering items and model the best quantity for an order.

5 A shop sells only one type of office chair.
The shop buys these chairs from a maker.
In one year the shop buys 600 of these chairs.

(a) Buying cost
It costs the shop $240 to buy one of these chairs from the maker.
This is the buying cost for one chair.

Find the total buying cost for the 600 chairs.

..... [2]

(b) Because of lack of space and money the shop cannot buy all the 600 chairs at once.
Instead, it buys x chairs at a time.
This is called an order for x chairs.

Write down an expression for the number of orders the shop makes in one year.

..... [1]

(c) Ordering cost
For each order there is a cost, called the ordering cost.
This is for filling in forms and checking the delivery.
The shop has an ordering cost of $32 for each order.

Use your answer to **5(b)** to find an expression for the total ordering cost in one year.
Write your answer as a single fraction.

..... [2]

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(d) The shop stores the chairs that it orders.

(i) Before the delivery of an order the shop has 0 chairs.
After the delivery of an order the shop has x chairs.

The shop estimates that the number of chairs that it stores at any time is the mean of 0 and x.

Write down an expression in terms of x for the mean of 0 and x.

..... [1]

(ii) **Storage cost**
It costs \$24 to store one chair for the whole year.
This is the storage cost for one chair.

Show that a model for the total cost in dollars, T, in one year for buying, ordering and storage is

$$T = 144\,000 + \frac{19\,200}{x} + 12x.$$

[2]

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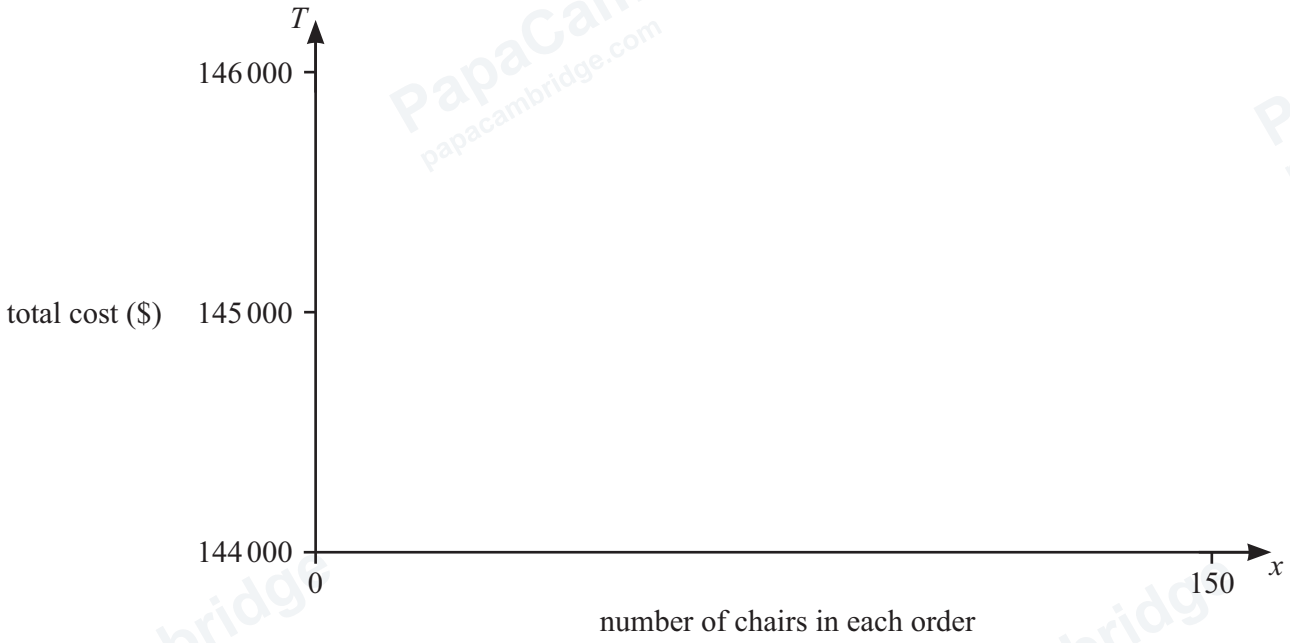
6 **(a)** Sketch the graph of $T = 144\,000 + \frac{19\,200}{x} + 12x$ for values of x between 0 and 150.



[2]

(b) The number of chairs in each order that gives the minimum total cost is called the economic order quantity.

(i) Find the economic order quantity.

..... [1]

(ii) The shop buys 600 chairs in one year.

Calculate the number of orders in a year that gives the minimum total cost.

..... [2]

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(c) To buy the 600 chairs the shop makes 50 orders.
This costs the shop more than the minimum total cost.

Calculate how much more it costs.

..... [4]

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7 For a quicker method to calculate the economic order quantity, x, the American engineer R H Wilson used this model.

$$x = \sqrt{\frac{kNC}{S}}$$

k is an integer.
N is the number of items (chairs) bought in a year.
C is the ordering cost in $ for each order.
S is the storage cost in $ for each item for one year.

(a) For the shop, $N = 600$, $C = 32$ and $S = 24$.

Use your answer to **6(b)(i)** to find the value of k.

..... [2]

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(b) The shop reduces the 600 chairs that it buys in one year by 10%.

Using Wilson's model, find the percentage change in the economic order quantity.

..... [6]

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