

**Dr Oliver Mathematics**  
**GCSE Mathematics**  
**2013 November Paper 1H: Non-Calculator**  
**1 hour 45 minutes**

The total number of marks available is 100.

You must write down all the stages in your working.

1. This is a list of ingredients for making chicken soup for 4 people.

(3)

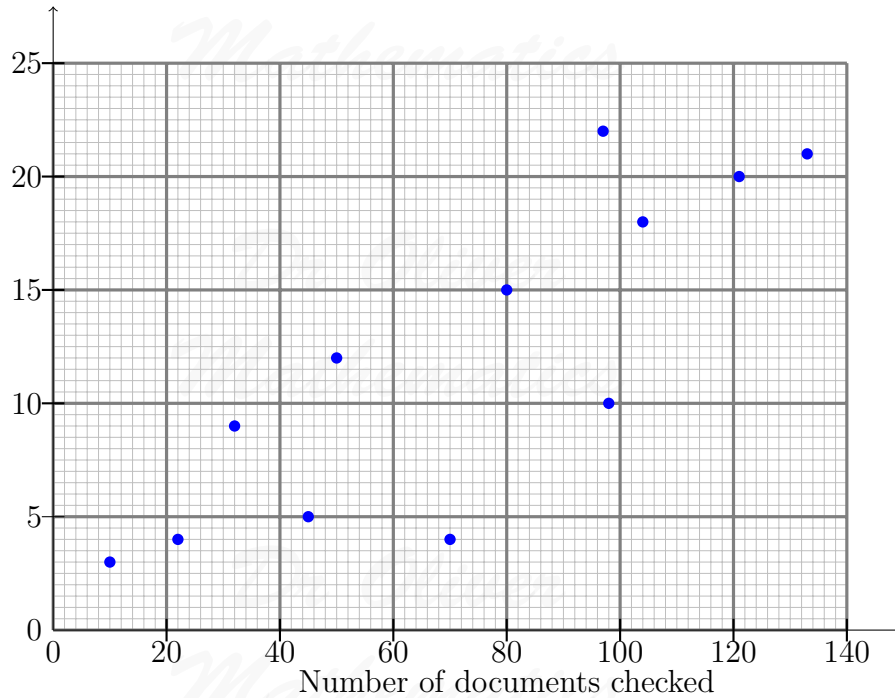
Ingredients for 4 people	
60 g	butter
300 g	chicken
150 ml	cream
1	onion
640 ml	chicken stock

Bill is going to make chicken soup for 6 people.

Work out the amount of each ingredient he needs.

2. A publisher checks documents for errors.  
He records the number of documents that are checked each day.  
He also records the total number of errors in the documents each day.  
The scatter graph shows this information.

Total number of errors



On another day 90 documents are checked.

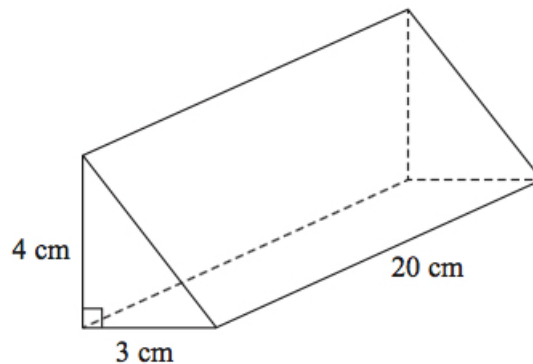
There is a total of 17 errors.

- (a) Show this information on the scatter graph. (1)
- (b) Describe the correlation between the number of documents checked and the total number of errors. (1)

One day 110 documents are checked.

- (c) Estimate the total number of errors in these documents. (2)

3. Here is a triangular prism. (4)



Work out the volume of this triangular prism.

4. (a) Simplify (2)

$$4y + 2x - 3 + 3x + 8.$$

- (b) Factorise fully (2)

$$9x^2 - 6xy.$$

- (c) Expand (1)

$$4(x + 2).$$

- (d) Expand and simplify (2)

$$(x - 5)(x + 3).$$

5. Jane has a packet of seeds.

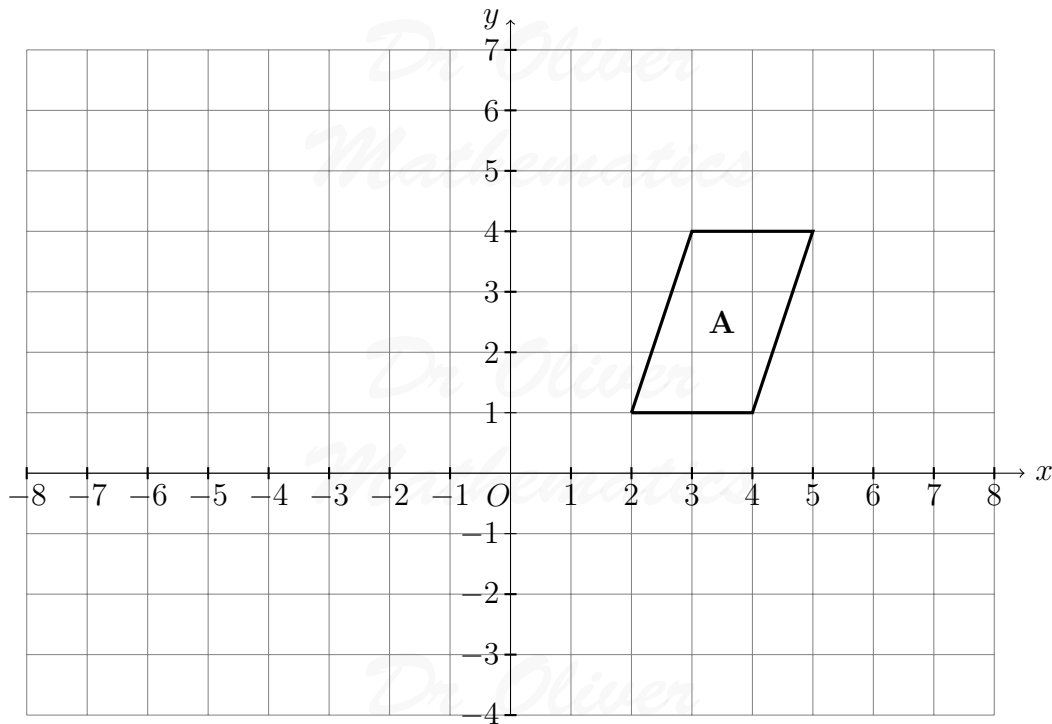
The probability that a seed will grow is 0.75.

- (a) What is the probability that a seed will **not** grow? (1)

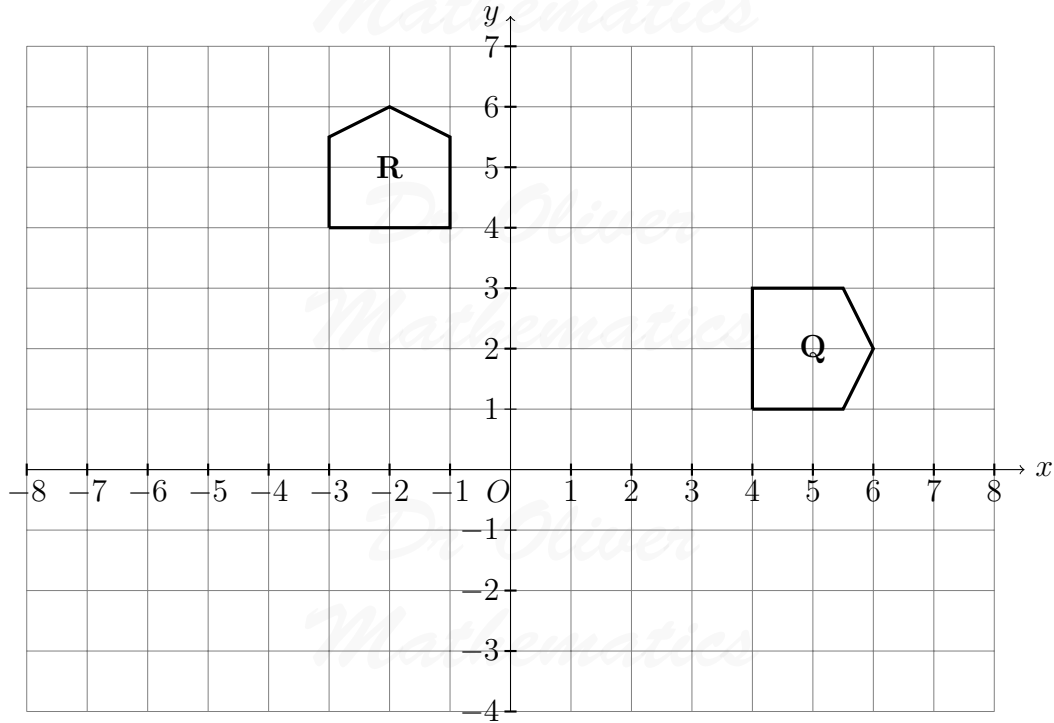
Jane plants 200 of these seeds.

- (b) Estimate the number of the seeds that will grow. (2)

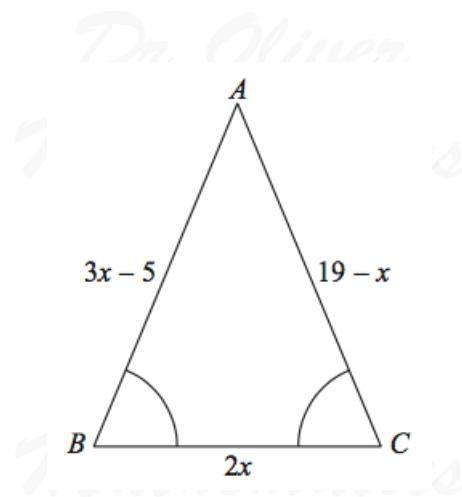
6. (a) Translate shape **A** by the vector  $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$ . (1)



- (b) Describe fully the single transformation that maps shape **Q** onto shape **R**. (3)



7. Rita is going to make some cheeseburgers for a party. (4)  
She buys some packets of cheese slices and some boxes of burgers.  
There are 20 cheese slices in each packet.  
There are 12 burgers in each box.  
Rita buys exactly the same number of cheese slices and burgers.  
(a) How many packets of cheese slices and how many boxes of burgers does she buy?  
Rita wants to put one cheese slice and one burger into each bread roll.  
She wants to use all the cheese slices and all the burgers.  
(b) How many bread rolls does Rita need?
8.  $ABC$  is a triangle. (5)



Angle  $ABC =$  angle  $BCA$ .

The length of side  $AB$  is  $(3x - 5)$  cm.

The length of side  $AC$  is  $(19 - x)$  cm.

The length of side  $BC$  is  $2x$  cm.

Work out the perimeter of the triangle.

Give your answer as a number of centimetres.

9. Julia is investigating how much exercise people do in a week. She uses these two questions in a questionnaire.

**Question 1**      **What is your age?**

Under 15

15 to 25

25 to 40

over 40

**Question 2**      **How much exercise do you do?**

A bit

Some

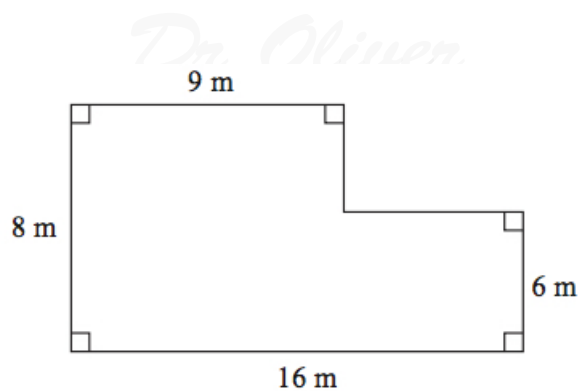
A lot

- (a) Write down **one** thing wrong with each of these questions. (2)

Julia wants to know how much time people spend exercising.

- (b) Design a question Julia could use in her questionnaire. (2)

10. The diagram shows the floor of a village hall. (5)



The caretaker needs to polish the floor.  
 One tin of polish normally costs £19.  
 One tin of polish covers  $12 \text{ m}^2$  of floor.  
 There is a discount of 30% off the cost of the polish.  
 The caretaker has £130.  
 Has the caretaker got enough money to buy the polish for the floor?  
 You must show all your working.

11. Each day a company posts some small letters and some large letters. (5)  
 The company posts all the letters by first class post.  
 The tables show information about the cost of sending a small letter by first class post and the cost of sending a large letter by first class post.

**Small Letter**

Weight	First Class Post
0–100 g	60p

**Large Letter**

Weight	First Class Post
0–100 g	£1.00
101–250 g	£1.50
251–500 g	£1.70
501–750 g	£2.50

One day the company wants to post 200 letters.  
 The ratio of the number of small letters to the number of large letters is 3 : 2.  
 70% of the large letters weigh 0-100 g.  
 The rest of the large letters weigh 101-250 g.  
 Work out the total cost of posting the 200 letters by first class post.

12. On the grid, draw the graph of  $y = 3x + 2$  for values of  $x$  from  $-2$  to  $2$ . (4)



13. Hertford Juniors is a basketball team. (3)  
At the end of 10 games, their mean score is 35 points per game.  
At the end of 11 games, their mean score has gone down to 33 points per game.  
How many points did the team score in the 11th game?

14. (a) Write down the reciprocal of 5. (1)

(b) Evaluate  $3^{-2}$ . (1)

(c) Calculate  $9 \times 10^4 \times 3 \times 10^3$ . (2)  
Give your answer in standard form.

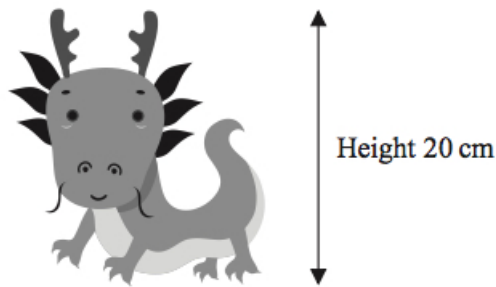
15. Solve the simultaneous equations (4)

$$3x + 4y = 5$$

$$2x - 3y = 9.$$

16. A company makes monsters. (3)

The company makes small monsters with a height of 20 cm.



A small monster has a surface area of  $300 \text{ cm}^2$ .

The company also makes large monsters with a height of 120 cm.

A small monster and a large monster are mathematically similar.

Work out the surface area of a large monster.

17.  $AB$  is a line segment. (2)

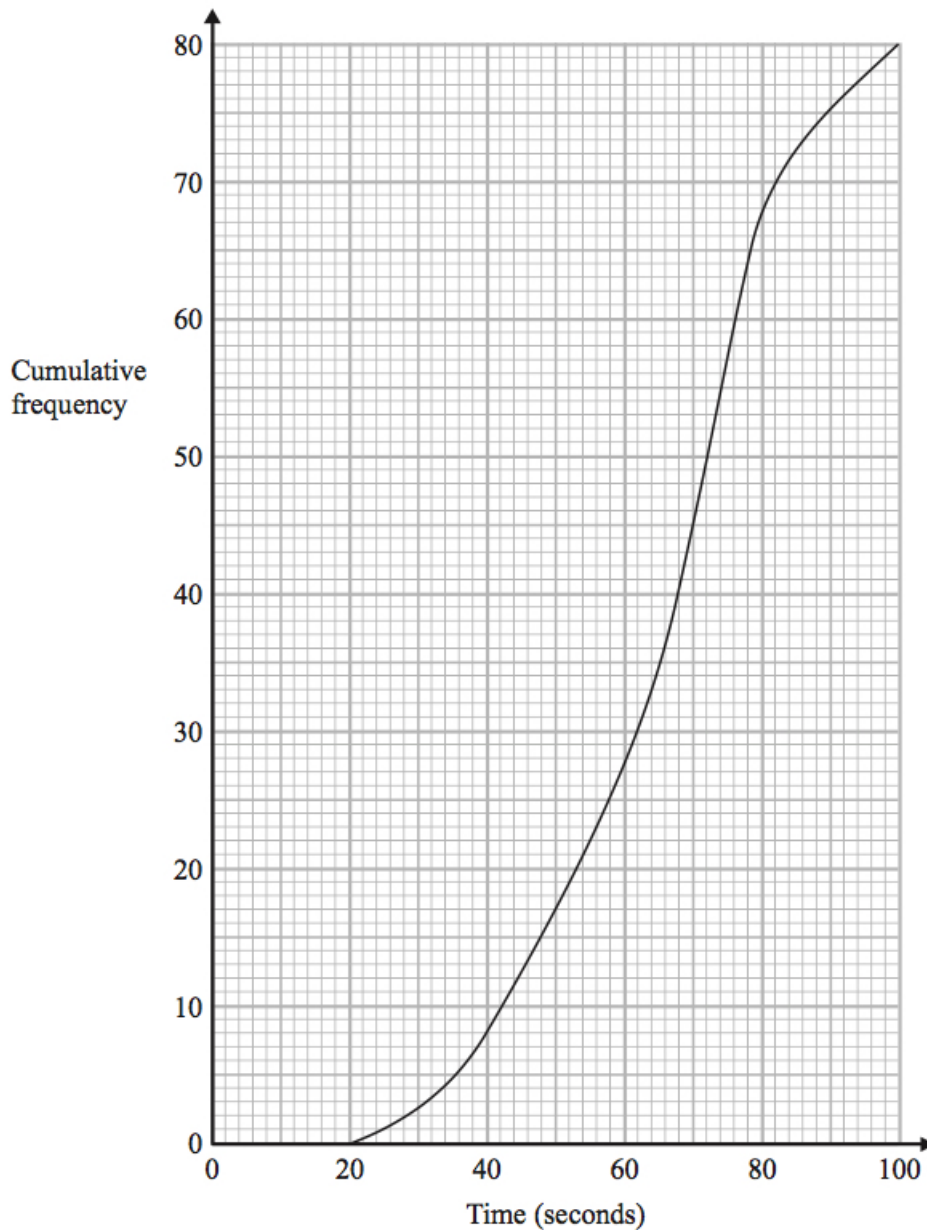
$A$  is the point with coordinates  $(3, 6, 7)$ .

The midpoint of  $AB$  has coordinates  $(-2, 2, 5)$ .

Find the coordinates of  $B$ .

18. The cumulative frequency graph shows information about the times 80 swimmers take to swim 50 metres.





- (a) Use the graph to find an estimate for the median time. (1)

A swimmer has to swim 50 metres in 60 seconds or less to qualify for the swimming team.

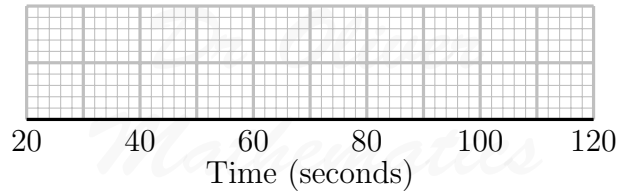
The team captain says, "More than 25% of swimmers have qualified for the swimming team."

- (b) Is the team captain right? (3)

You must show how you got your answer.

For these 80 swimmers, the least time taken was 28 seconds and the greatest time taken was 96 seconds.

- (c) Use the cumulative frequency graph and the information above to draw a box plot (3)  
for the times taken by the swimmers.



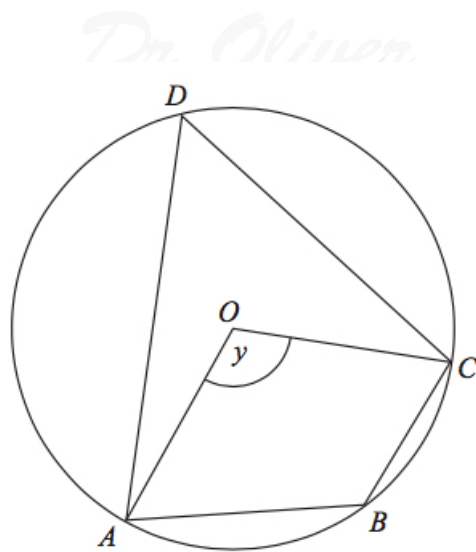
19. In a supermarket, the probability that John buys fruit is 0.7. (3)  
In the same supermarket, the probability that John independently buys vegetables is 0.4.  
Work out the probability that John buys fruit or buys vegetables or buys both.

20. (a) Solve (3)  
$$\frac{4(8x - 2)}{3x} = 10.$$

- (b) Write as a single fraction in its simplest form (3)  
$$\frac{2}{y + 3} - \frac{1}{y - 6}.$$

21.  $y$  is directly proportional to the square of  $x$ . (4)  
When  $x = 3$ ,  $y = 36$ .  
Find the value of  $y$  when  $x = 5$ .

22.  $A$ ,  $B$ ,  $C$ , and  $D$  are points on the circumference of a circle, centre  $O$ . (4)



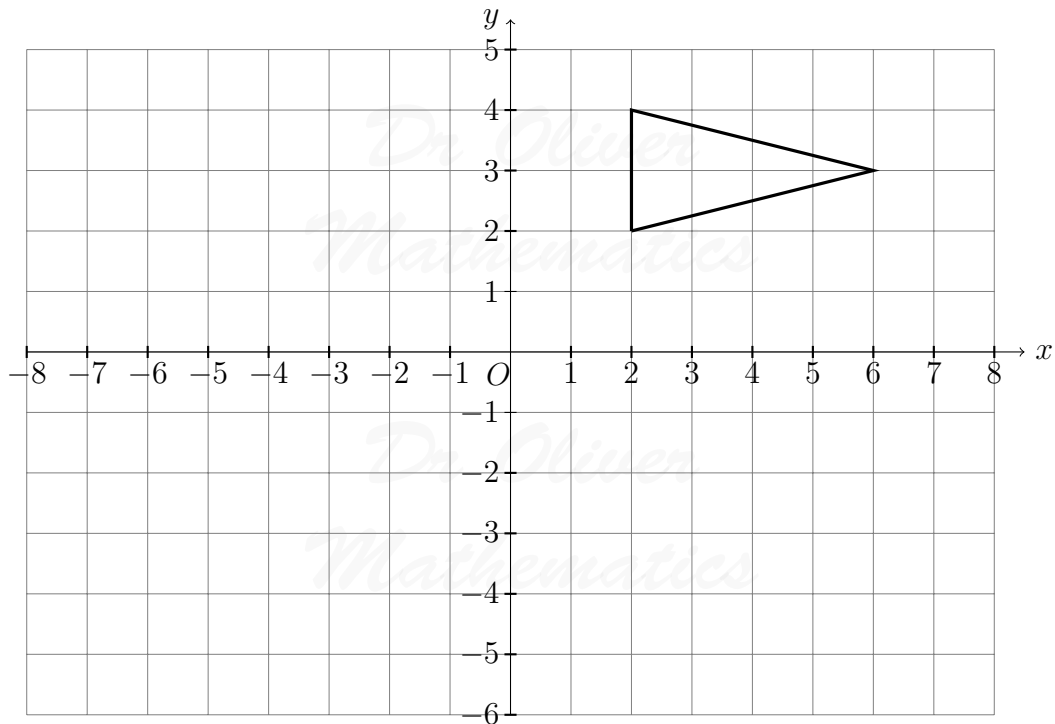
Angle  $AOC = y$ .

Find the size of angle  $ABC$  in terms of  $y$ .

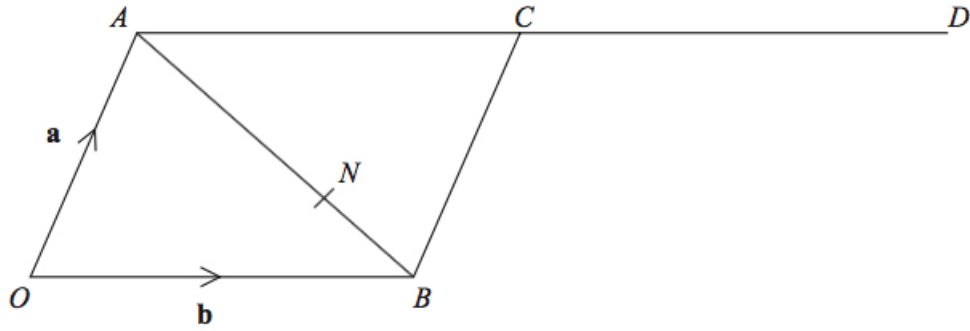
Give a reason for each stage of your working.

23. On the grid, enlarge the triangle by scale factor  $-\frac{1}{2}$ , centre  $(0, -2)$ .

(2)



24.  $OACB$  is a parallelogram.



$\vec{OA} = \mathbf{a}$  and  $\vec{OB} = \mathbf{b}$ .

$D$  is the point such that  $\vec{AC} = \vec{CD}$ .

The point  $N$  divides  $AB$  in the ratio  $2 : 1$ .

(a) Write an expression for  $\vec{ON}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ . (3)

(b) Prove that  $OND$  is a straight line. (3)