

2<sup>nd</sup> Yr Maths.

Revision for HL  
Summer exam

2015

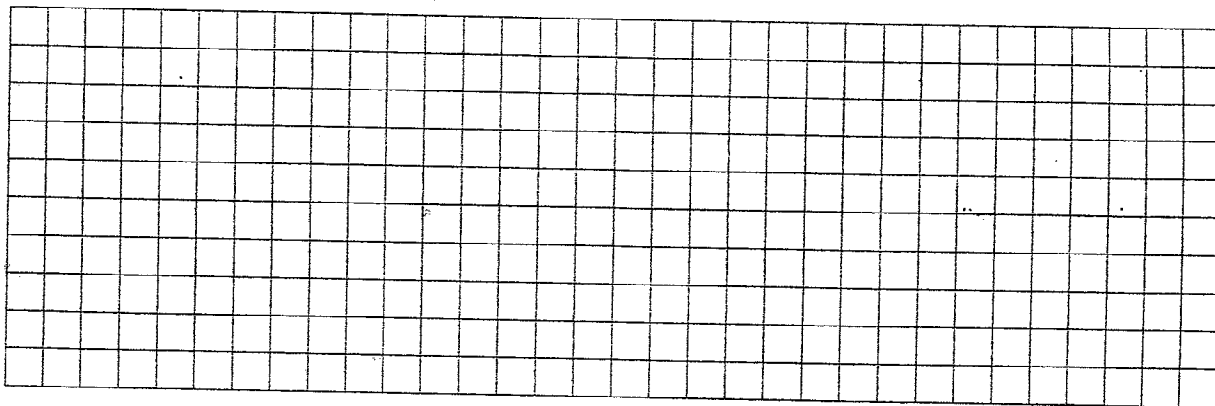
s)

✓ Question 1

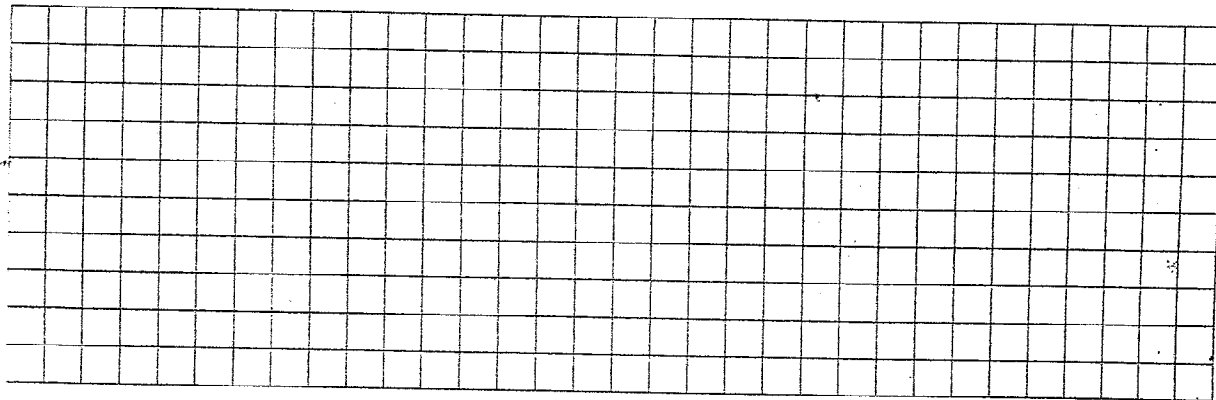
(Suggested maximum time: 10 minutes)

Factorise fully each of the following expressions:

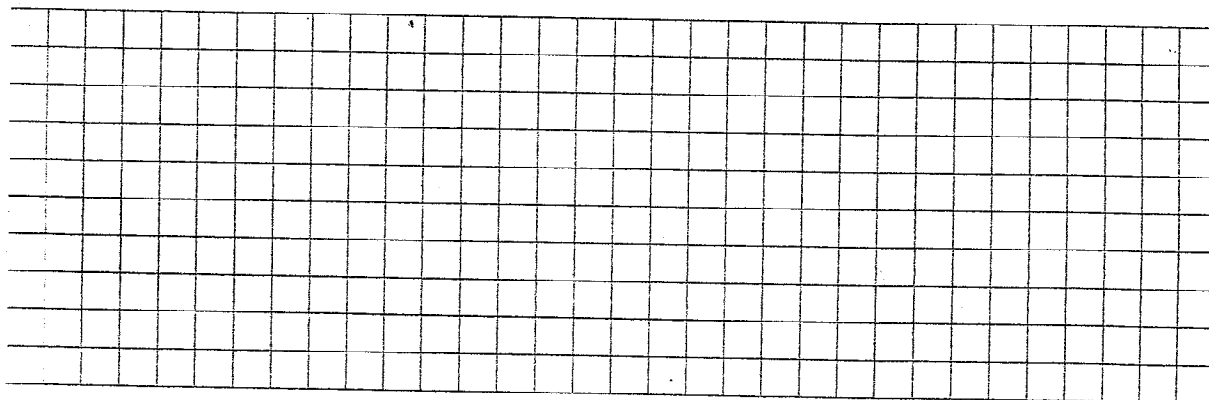
(a)  $x^2 - 10x - 24$



(b)  $bx + 2y - by - 2ax$



(c)  $x^4 - 16$





utes)

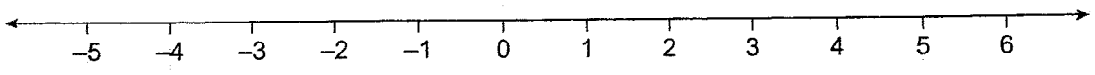
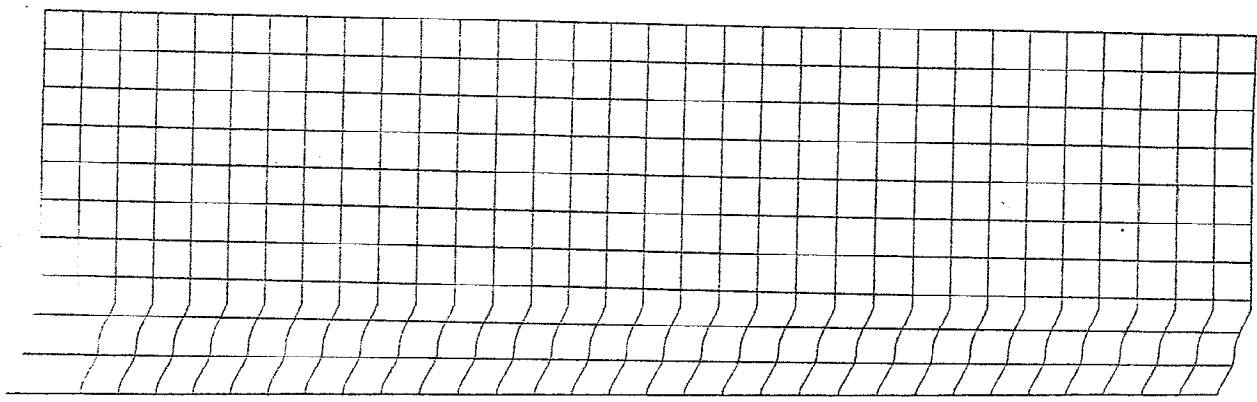
Question 3

(Suggested maximum time: 10 minutes)

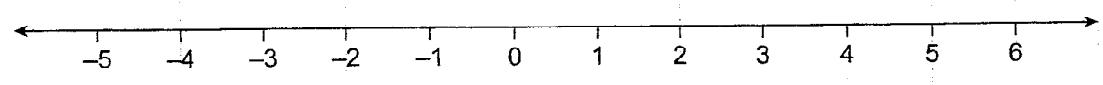
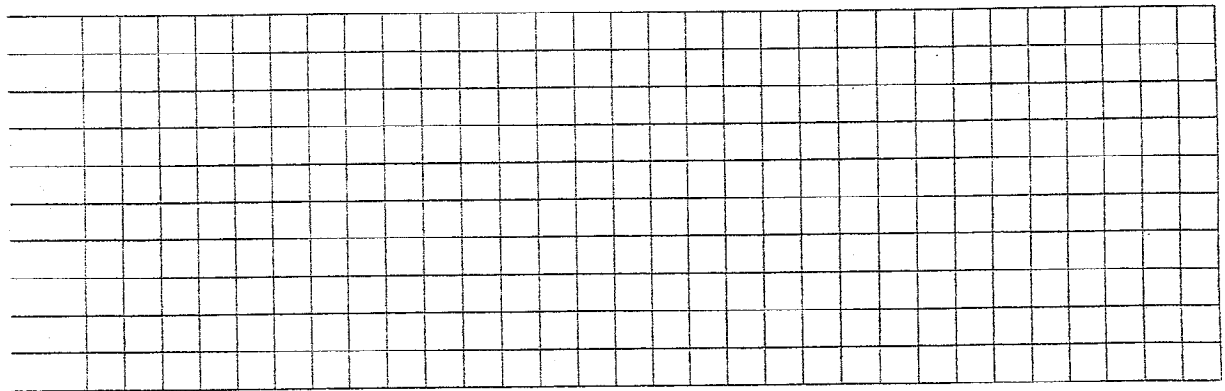
On the number lines provided, graph the solutions to the following inequalities:

he

(a)  $5 \geq 3 - x \geq -2$ , where  $x \in \mathbb{Z}$



$-3 \leq 3 + 2x < 9$ , where  $x \in \mathbb{R}$



Question 4

(Suggested maximum time: 10 minutes)

- (a) Express  $\frac{x-2}{x+1} - \frac{5}{x-1}$  as a single fraction.

- (b) Solve the equation  $\frac{x-2}{x+1} - \frac{5}{x-1} = \frac{1}{3}$ .

Write your answer in the form  $p \pm q\sqrt{r}$ , where  $p$ ,  $q$  and  $r \in N$ .

Question 5

(Suggested maximum time: 20 minutes)

- (a) Express in its simplest form:  $\frac{5-x}{5} + \frac{x-4}{4}$ .

- (b) Solve for  $x$ :  $3x^2 + 11x = 4$ .

- (c) Divide  $2x^3 + x^2 - 13x + 6$  by  $x + 3$ .

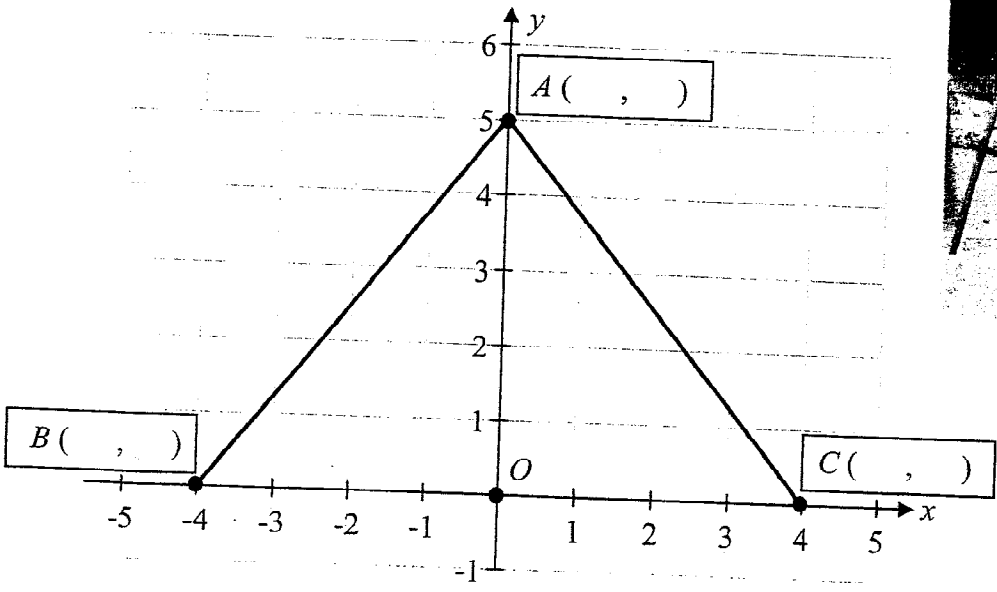


Question 7

(Suggested maximum time: 20 minutes)

The diagram below shows part of the frame of a swing on a co-ordinate grid. Each unit on the grid represents one metre.

The line segments  $[AB]$  and  $[AC]$  represent metal bars.



- (i) Write the co-ordinates of the points  $A$ ,  $B$ , and  $C$  in the spaces provided in the diagram.
- (ii) Find the total length of metal bar needed to make this part of the swing. Give your answer in metres, correct to one decimal place.

(iii) Find the slope of  $AB$  and the slope of  $AC$ .

$AB$ :

$AC$ :

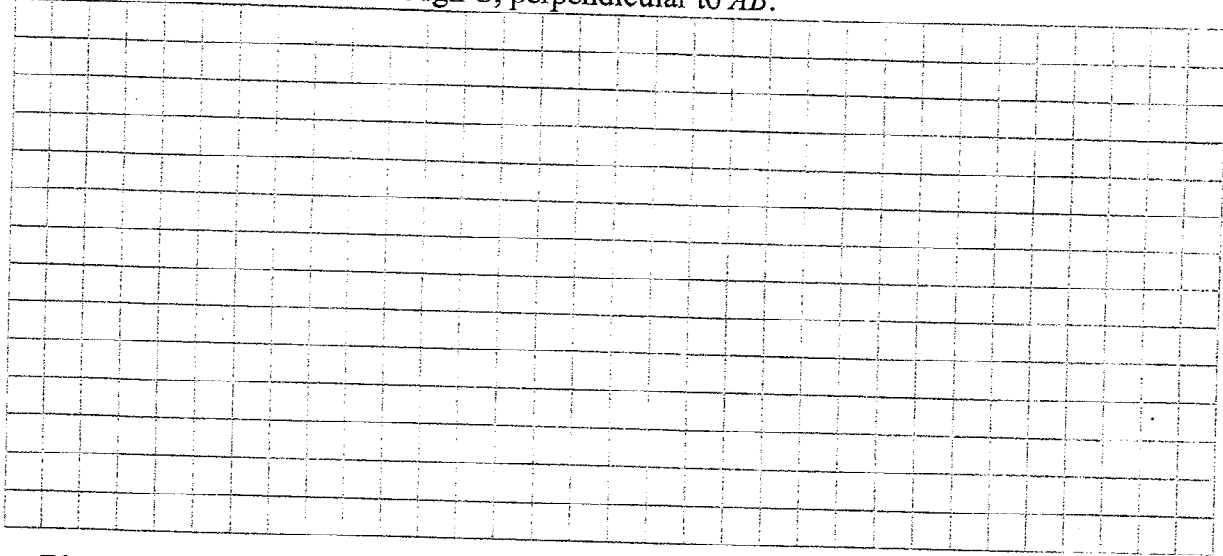
(iv) Is  $AB$  perpendicular to  $AC$ ? Give a reason for your answer.

Answer:

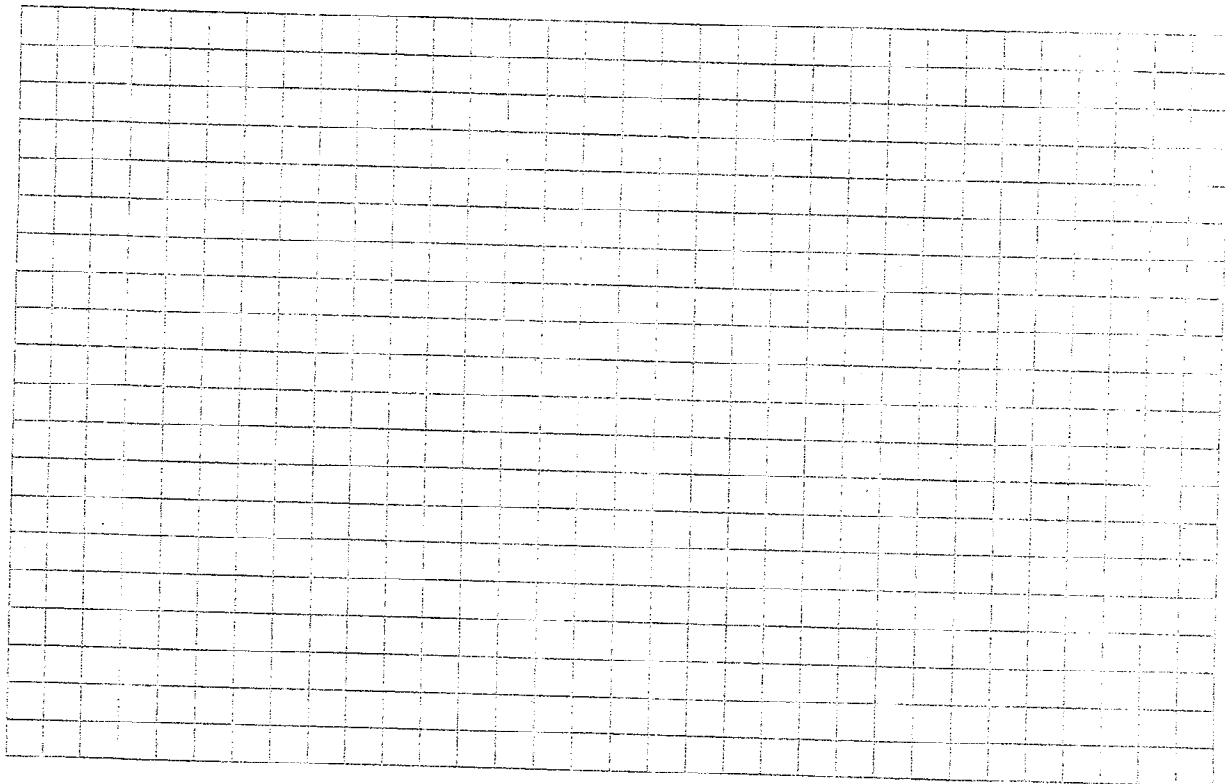
Reason:



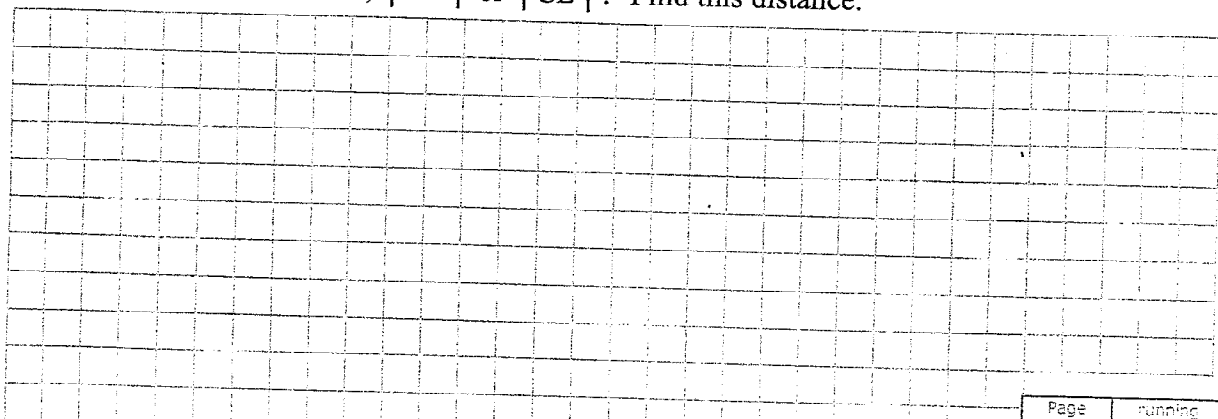
(d) Find the equation of the line through  $C$ , perpendicular to  $AB$ .



(e) Let  $E$  be the point where this perpendicular line through  $C$  intersects  $AB$ . Calculate the coordinates of the point  $E$ .



(f) Which is the shorter distance,  $|CD|$  or  $|CE|$ ? Find this distance.



2013  
SEC P2







Question 12

(Suggested maximum time: 20 minutes)

The salaries, in €, of the different employees working in a call centre are listed below.

22 000	16 500	38 000	26 500	15 000	21 000	15 500	46 000
42 000	9 500	32 000	27 000	33 000	36 000	24 000	37 000
65 000	37 000	24 500	23 500	28 000	52 000	33 000	25 000
23 000	16 500	35 000	25 000	33 000	20 000	19 500	16 000

(a) Use this data to complete the grouped frequency table below.

Salary (€1000)	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
No. of Employees							

[Note: 10 – 20 means €10 000 or more but less than €20 000, etc.]

(b) Using mid-interval values find the mean salary of the employees.

Handwritten area for working out the mean salary using mid-interval values.

(c) (i) Outline another method which could have been used to calculate the mean salary.

Handwritten area for outlining another method to calculate the mean salary.

(ii) Which method is more accurate? Explain your answer.

Handwritten area for answering which method is more accurate and explaining the answer.

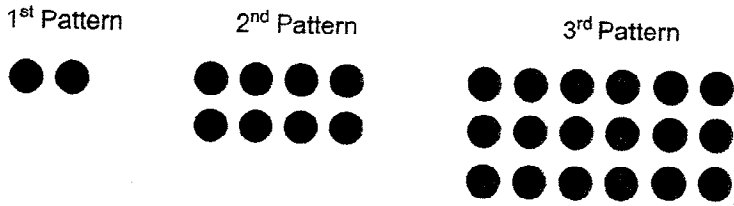
Answer

Reason

Question 13

(Suggested maximum time: 15 minutes)

The disks in the diagram below are arranged in rows and columns to form a sequence of patterns.

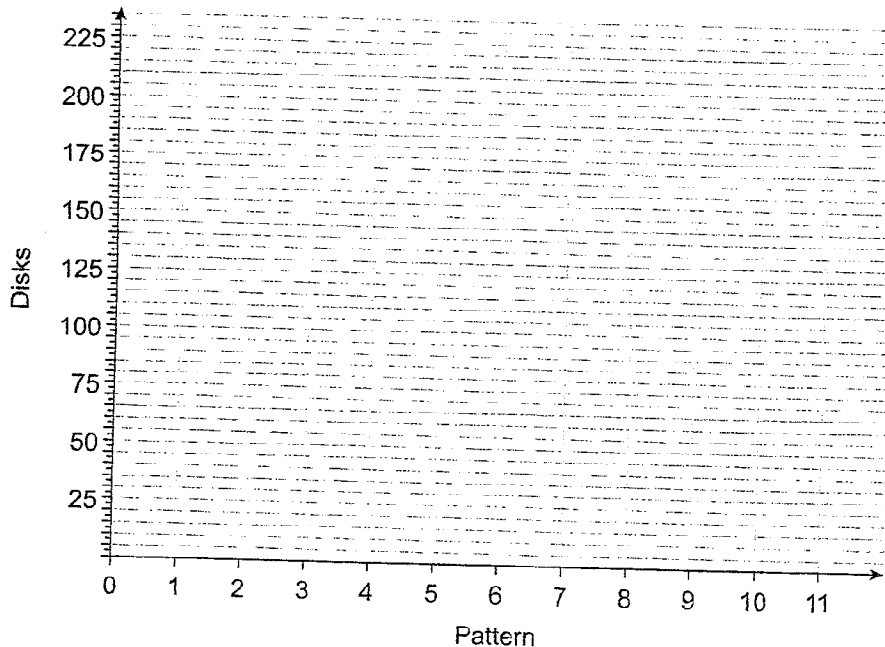


(a) Fill in the table below to show the number of disks in the sequence of patterns.

Pattern	Rows of disks	Columns of disks	Number of disks
1 <sup>st</sup>	1	2	2
2 <sup>nd</sup>	2	4	8
3 <sup>rd</sup>			
4 <sup>th</sup>			
5 <sup>th</sup>			
.			
.			
.			
$n^{\text{th}}$			

Note: For the  $n^{\text{th}}$  pattern, write the number of disks in terms of  $n$ .

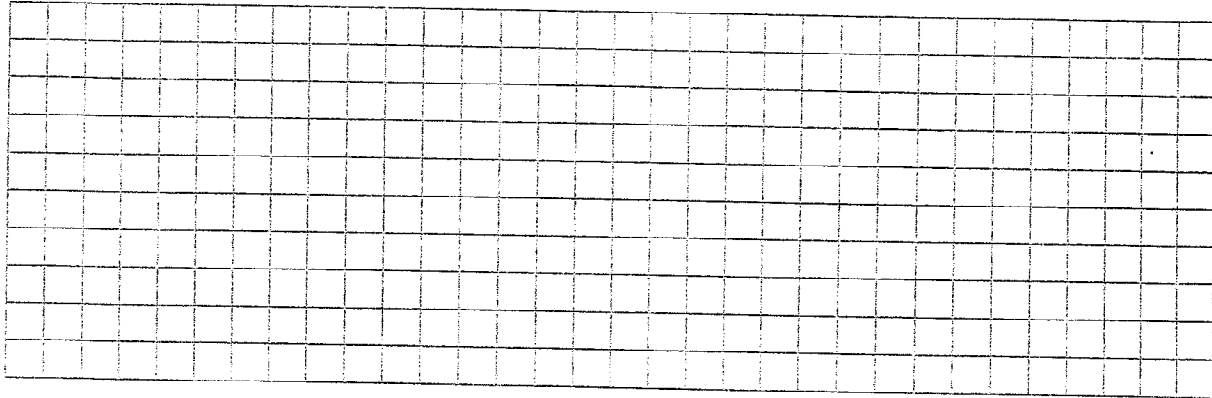
(b) Use the completed table to draw a graph showing the relationship between the pattern number and the number of disks in that pattern.



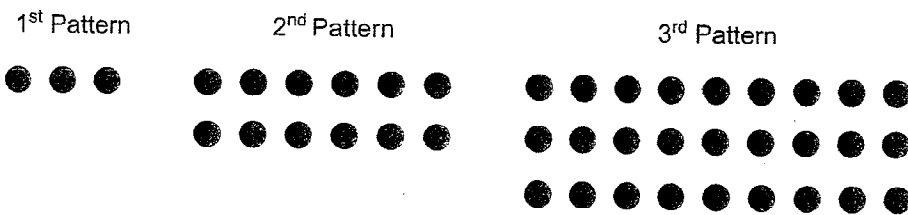
Sample 5  
Educate.ie P1

- (c) Use the graph to find:
- (i) the number of disks required for the 8<sup>th</sup> pattern      Answer: \_\_\_\_\_
  - (ii) the pattern that will have 200 disks      Answer: \_\_\_\_\_

(d) Use the expression for the  $n^{\text{th}}$  pattern to verify your answers in (c) (ii) above.



(e) Disks are arranged in rows and columns to form a different sequence of patterns, as shown below.



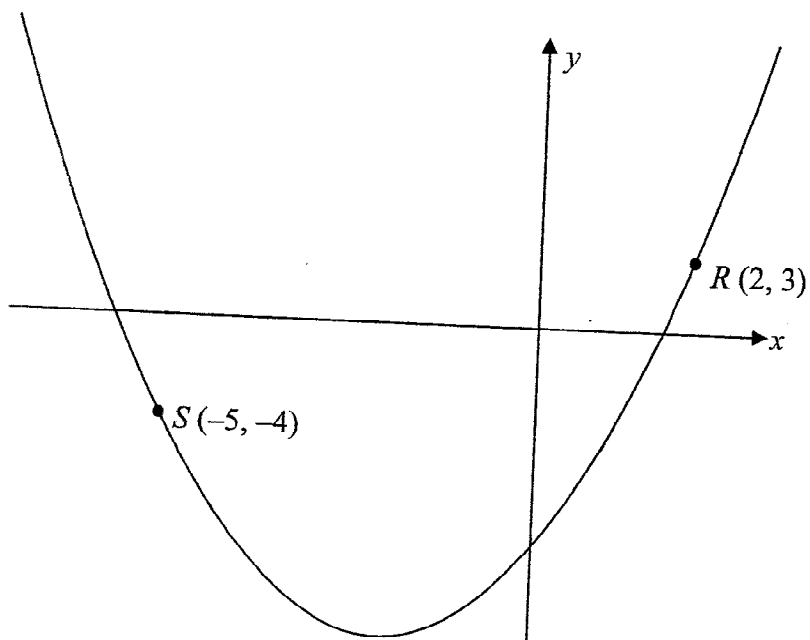
Write an expression, in terms of  $n$ , for the number of disks in the  $n^{\text{th}}$  pattern.



Question : 14

(Suggested maximum time: 20 minutes)

Part of the graph of the function  $y = x^2 + ax + b$ , where  $a, b \in \mathbb{Z}$ , is shown below.



The points  $R(2, 3)$  and  $S(-5, -4)$  are on the curve.

(a) Use the given points to form two equations in  $a$  and  $b$ .

Handwritten area with horizontal lines for working out the solution to part (a).

b) Solve your equations to find the value of  $a$  and the value of  $b$ .

Handwritten area for question b, consisting of approximately 15 horizontal lines.

c) Write down the co-ordinates of the point where the curve crosses the  $y$ -axis.

Handwritten area for question c, consisting of approximately 8 horizontal lines.

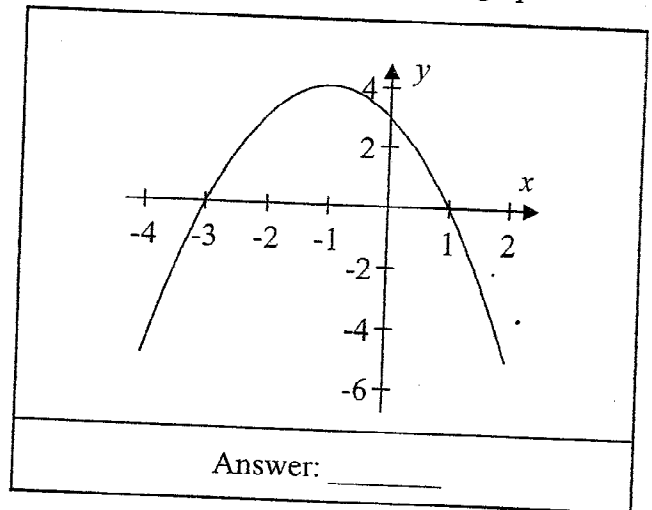
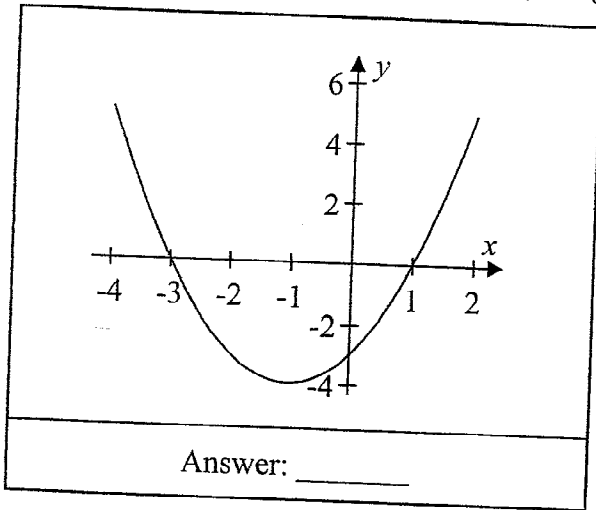
d) By solving an equation, find the points where the curve crosses the  $x$ -axis.  
Give each answer correct to one decimal place.

Handwritten area for question d, consisting of approximately 25 horizontal lines.

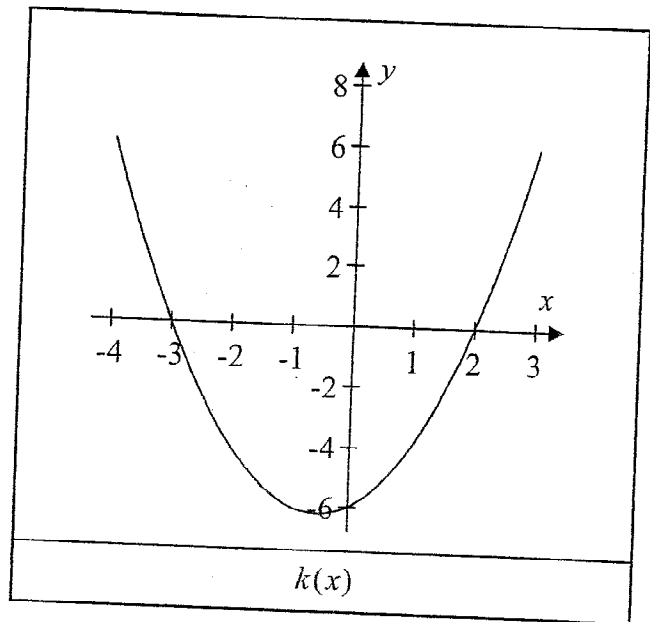
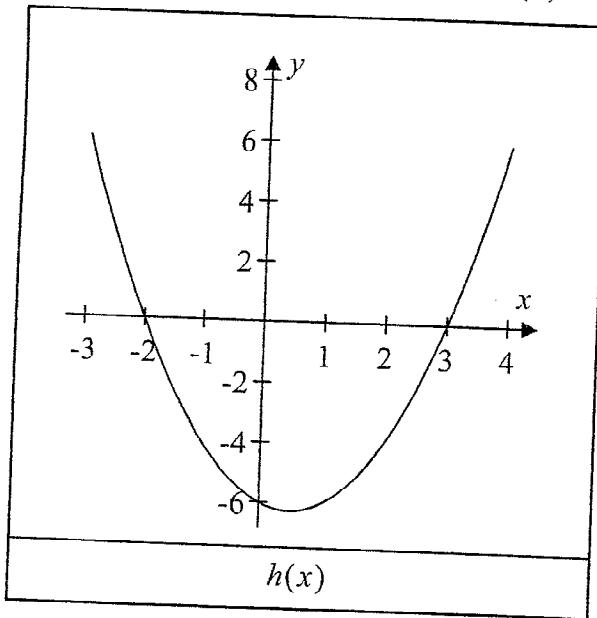
Question 15

(Suggested maximum time: 10 minutes)

- (a) The graphs of the functions  $f(x) = x^2 + 2x - 3$  and  $g(x) = -x^2 - 2x + 3$  are shown below. Identify each graph by writing  $f(x)$  or  $g(x)$  in the space provided below the graph.



- (b) The graphs of the functions  $y = h(x)$  and  $y = k(x)$  are shown below.



Write down the roots of each function.

Hence, or otherwise, write down an equation for each function.

Roots of  $h(x)$ :

Equation:  $h(x) =$

Roots of  $k(x)$ :

Equation:  $k(x) =$