

Name:

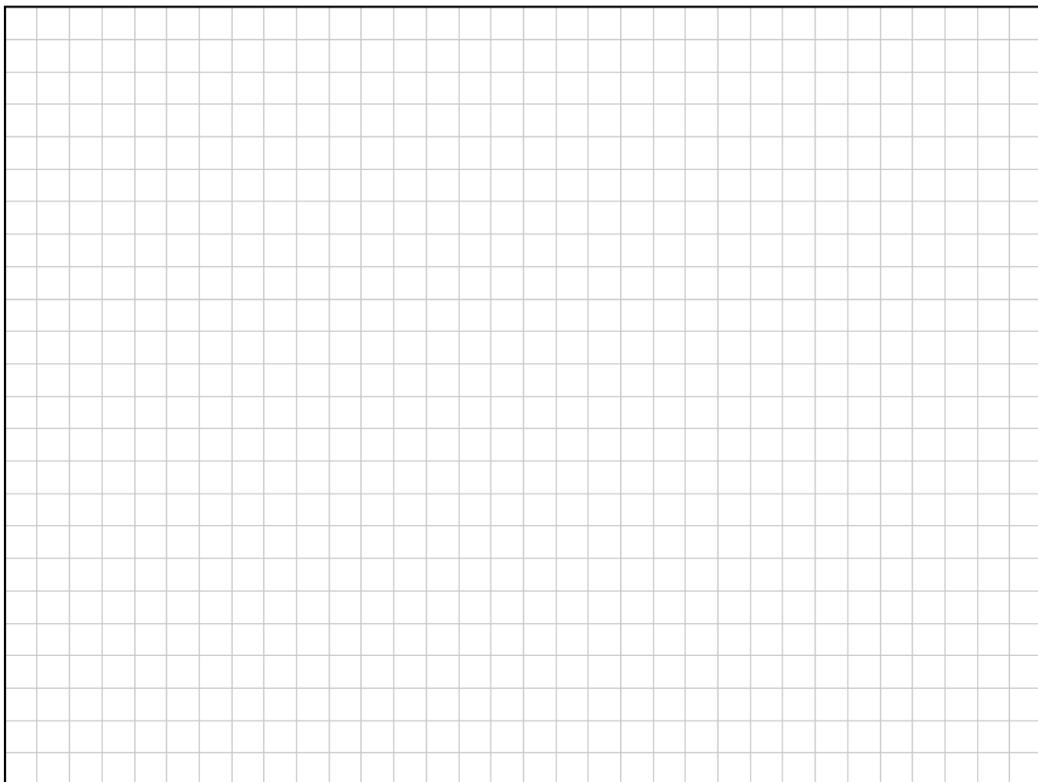
Question 1**Question 3****(30 marks)**

- (a) Show that $x = 4$ is a solution of the equation $x^2 - 2x - 8 = 0$.

- (b) The equation $x^2 + ax + b = 0$, where $a, b \in \mathbb{Z}$, has solutions $x = 5$ and $x = -2$.
Find the value of a and the value of b .

$a =$ $b =$

- (c) Find the solutions of the equation $5x^2 - 2x - 9 = 0$, where $x \in \mathbb{R}$.
Give each answer correct to 2 decimal places.

A large rectangular grid of graph paper, consisting of approximately 20 columns and 25 rows of small squares, intended for students to show their working for the problem.

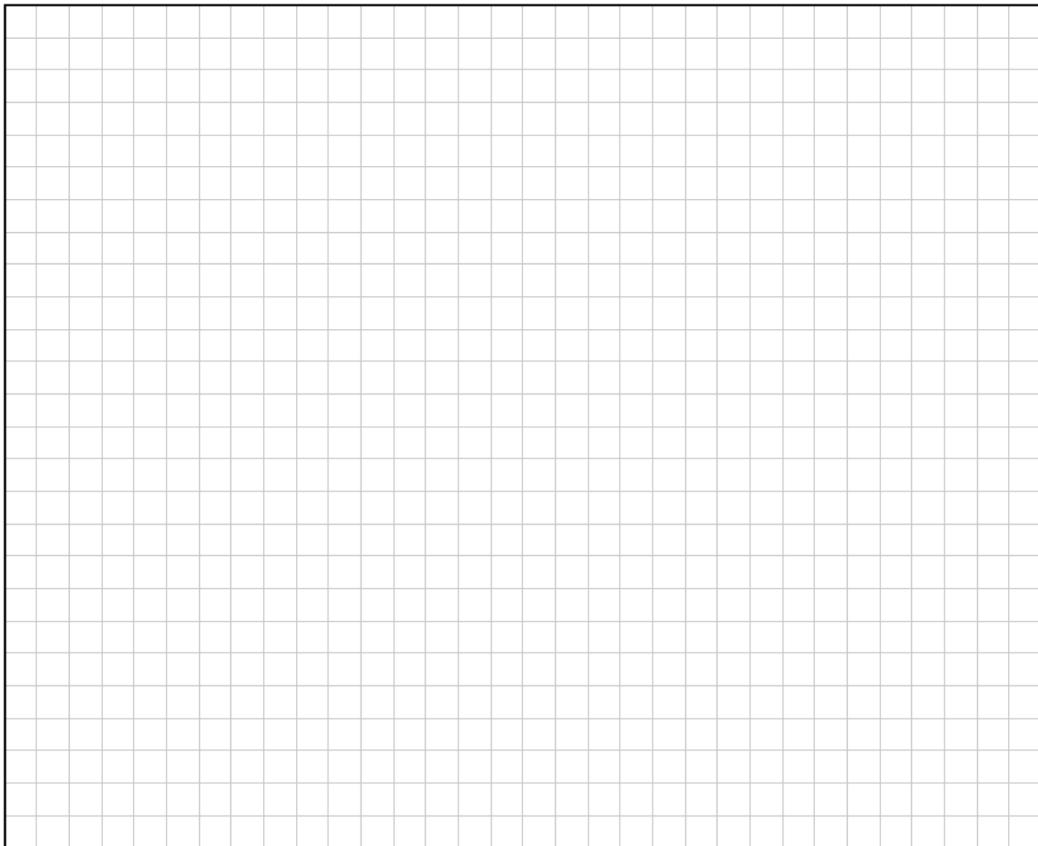
Question 2

Question 2

(25 marks)

- (a) Solve the equation:

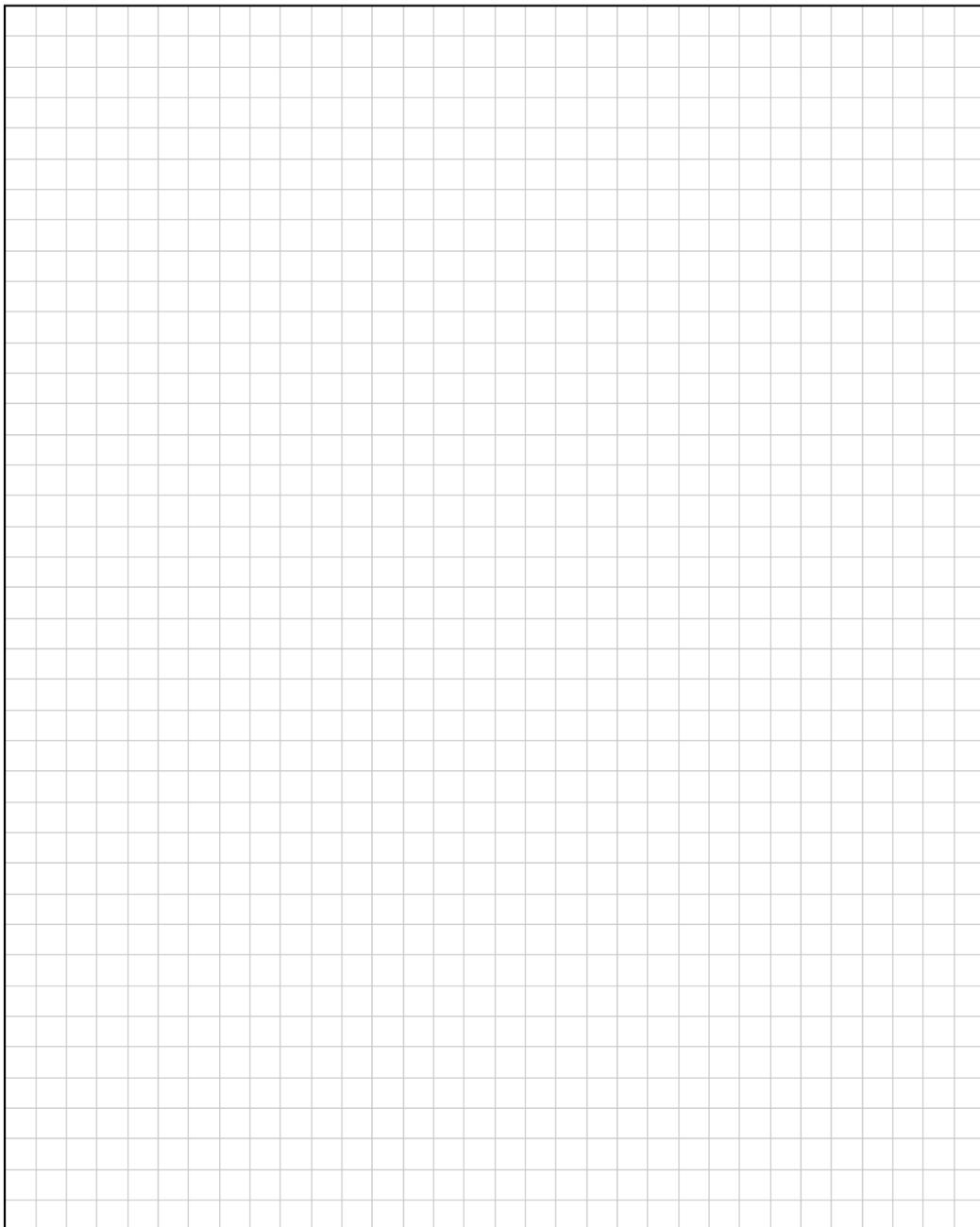
$$\frac{9x-6}{2} = \frac{3x-14}{3} + \frac{9x}{4}.$$

A large rectangular grid consisting of 20 columns and 25 rows of small squares, intended for students to show their working for the question.

(b) Solve the simultaneous equations:

$$3x - y = 4$$

$$4x^2 - 3xy = 4.$$

A large rectangular area filled with a grid of small squares, intended for students to show their working for solving the simultaneous equations provided in the question.

Question 3

Question 6

(25 marks)

- (a) Solve for x .

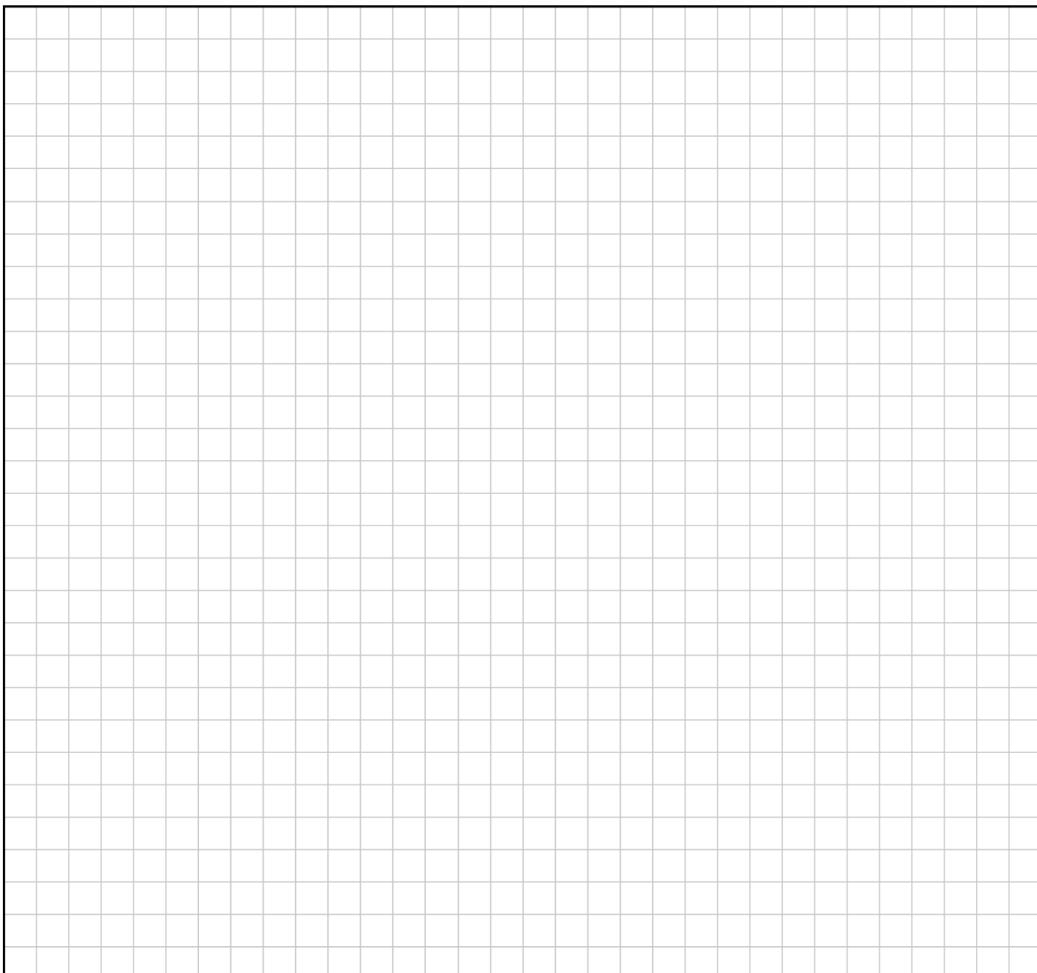
$$(x + 5)(3x - 4) - 3(x^2 + 2) + 4 = 0$$

- (b) Find the solutions of

$$\frac{5}{x+3} - \frac{1}{x} = \frac{1}{2} \text{ where } x \neq -3, 0, x \in \mathbb{R}.$$

Question 4

- (ii) Find the point of intersection of the lines $l: 3x - 4y = 5$ and $h: 2x - y = 10$.



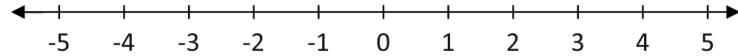
Question 5

Question 6

(25 marks)

- (a) Solve the following inequality for $x \in \mathbb{R}$ and show your solution on the numberline below:

$$2(3 - x) < 8.$$



- (b) Solve for x :

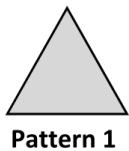
$$2^{2x-1} = 64.$$

Question 6

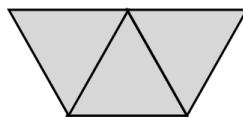
Question 9

(60 marks)

The following sequence of patterns is created using matchsticks to form equilateral triangles.



Pattern 1



Pattern 2



Pattern 3

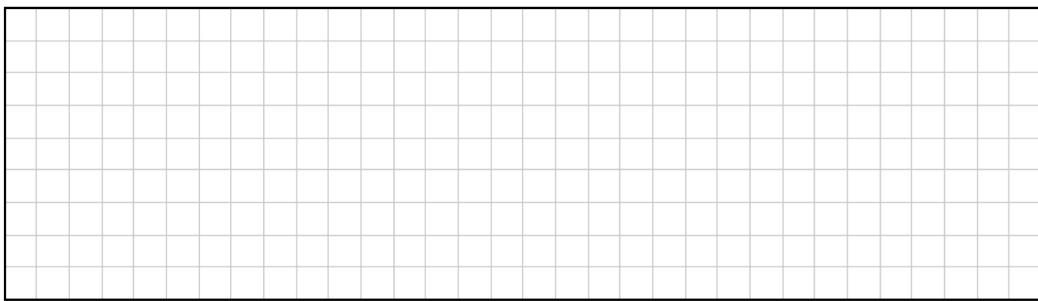
- (a) Complete the table below to show the number of matchsticks required to make each of the first six patterns of the above sequence.

Pattern Number	1	2	3	4	5	6
Number of Matchsticks	3	7				

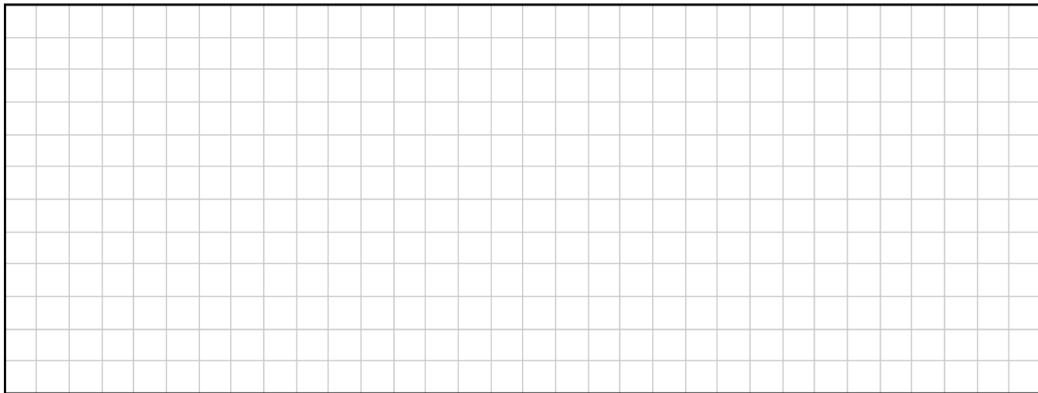
- (b) (i) How many matchsticks are required to make pattern 10 of the sequence?

- (ii) Find a formula for T_n , the number of matchsticks required to make pattern n of the sequence.

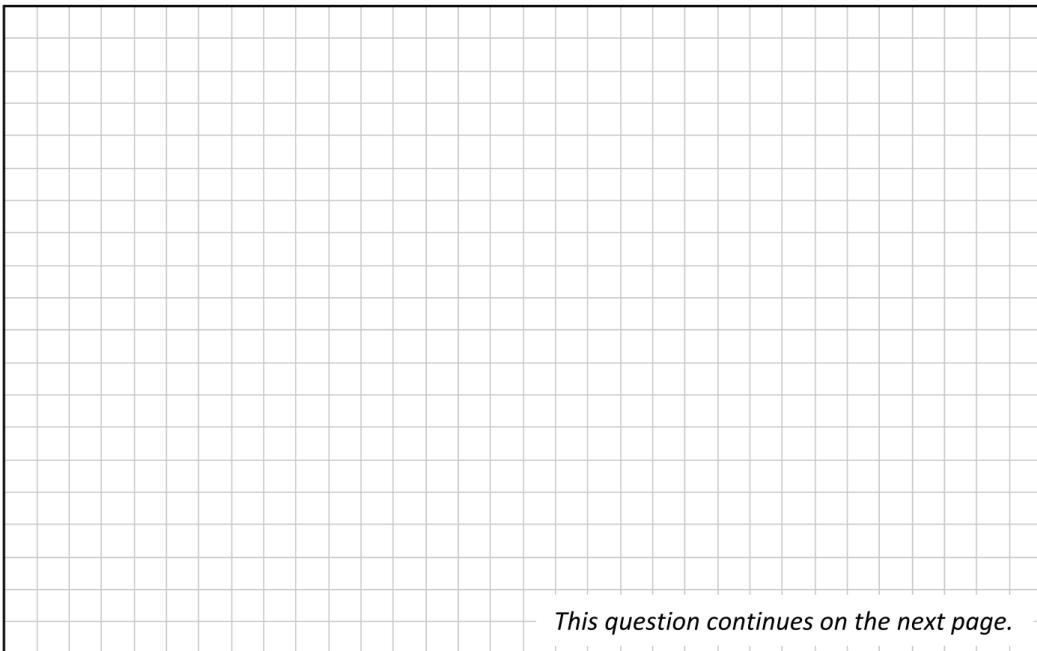
(iii) Pattern k has 147 matchsticks, where $k \in \mathbb{N}$. Find the value of k .



- (c) (i) Find a formula for S_n , the **total** number of matchsticks required to make the first n patterns.



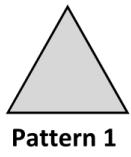
- (ii) Find the total number of complete patterns in the sequence that can be made using 820 matchsticks.



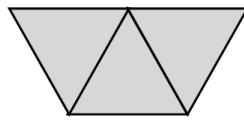
This question continues on the next page.

- (d) (i) The table below shows the number of triangles formed by each pattern for the first two patterns. Complete the table to show the number of triangles formed for patterns three to six.

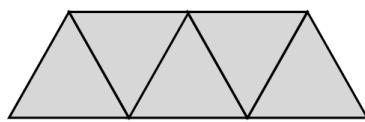
Pattern Number	1	2	3	4	5	6
Number of Triangles	1	3				



Pattern 1



Pattern 2



Pattern 3

- (ii) The area of each triangle is $4\sqrt{3}$ cm².

Find, correct to the nearest cm^2 , the **combined total area** covered by the first 15 patterns in the sequence.

Question 7

Question 5

(30 marks)

- (a) Find the value of the following expression when $x = 2$.

Give your answer in the form $\frac{a}{b}$ where $a, b \in \mathbb{N}$.

$$\frac{3x + 5}{10} - \frac{1}{x + 3}$$