

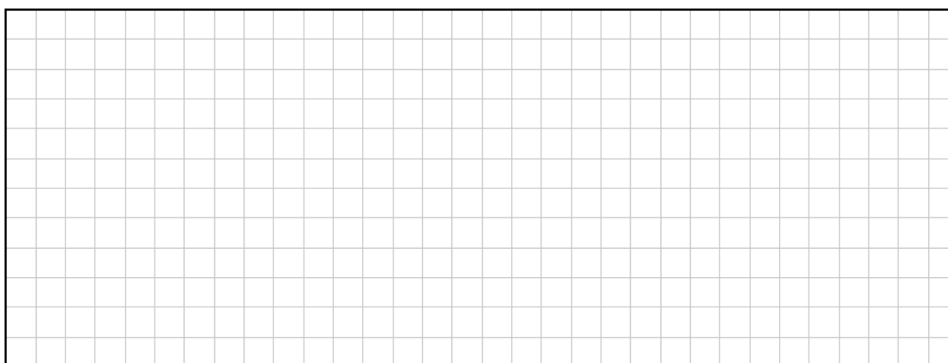
Name:

Question 1

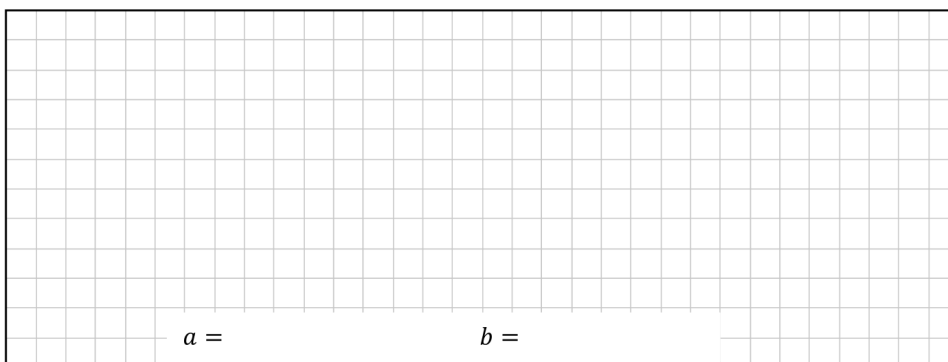
Question 3

(30 marks)

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

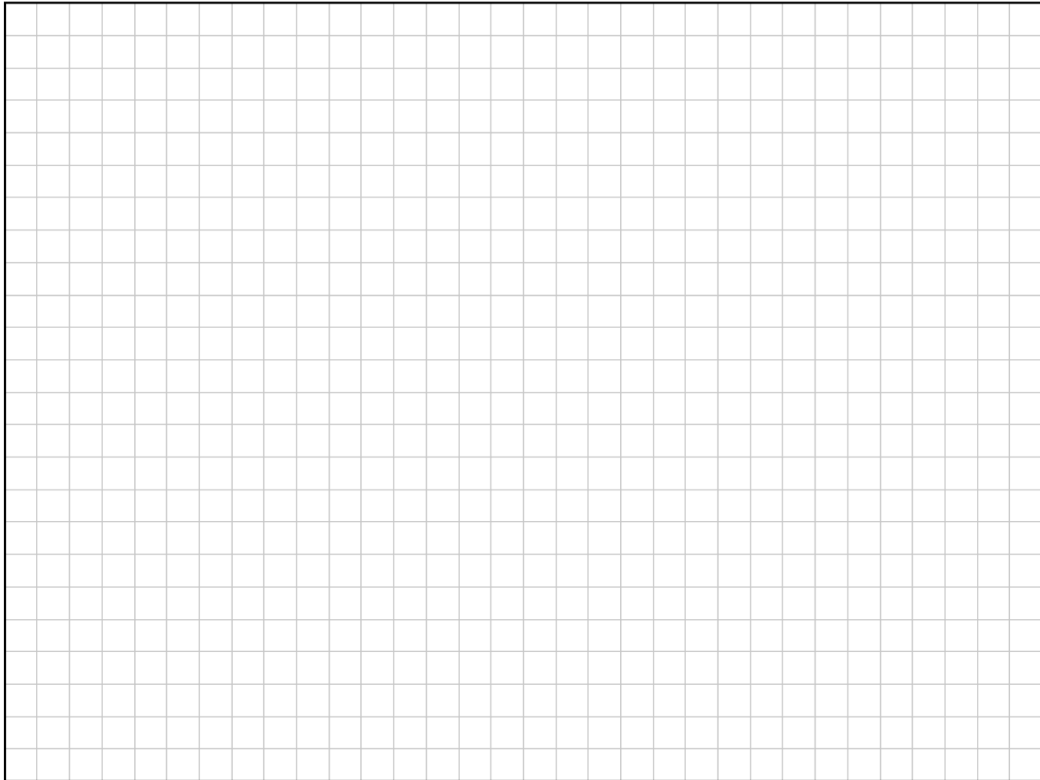


- (b) The equation $x^2 + ax + b = 0$, where $a, b \in \mathbb{Z}$, has solutions $x = 5$ and $x = -2$. Find the value of a and the value of b .



$a =$ $b =$

- (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.



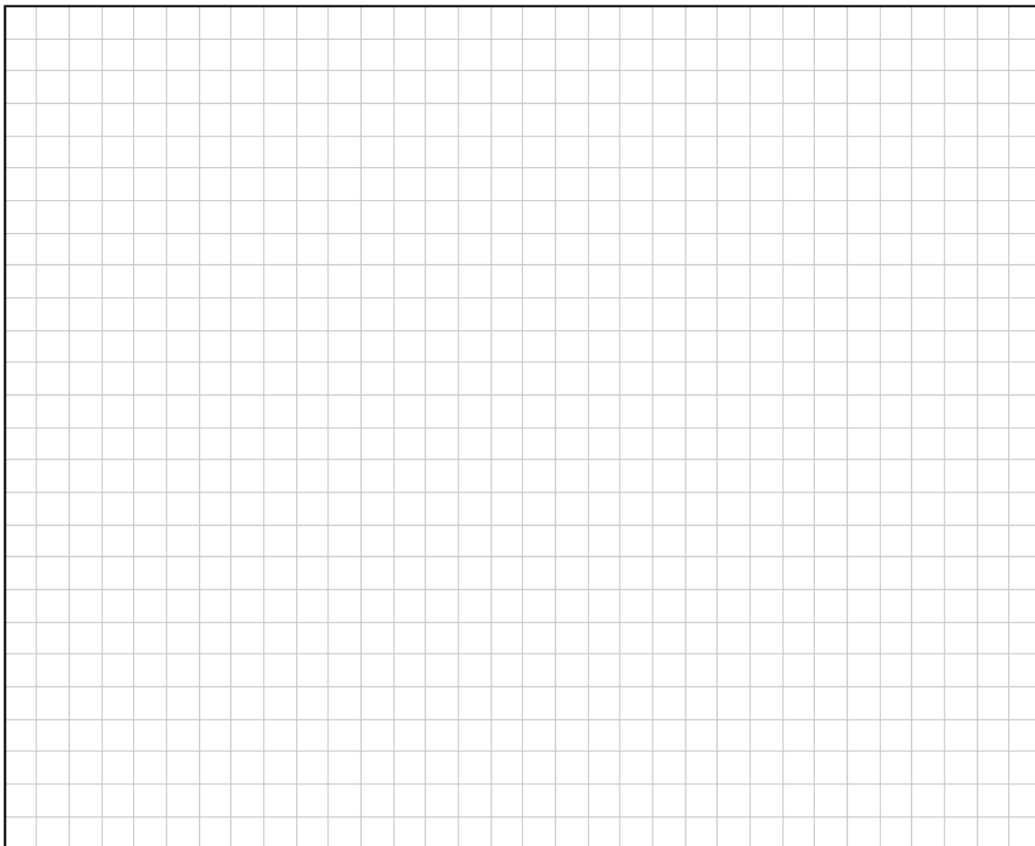
Question 2

Question 2

(25 marks)

(a) Solve the equation:

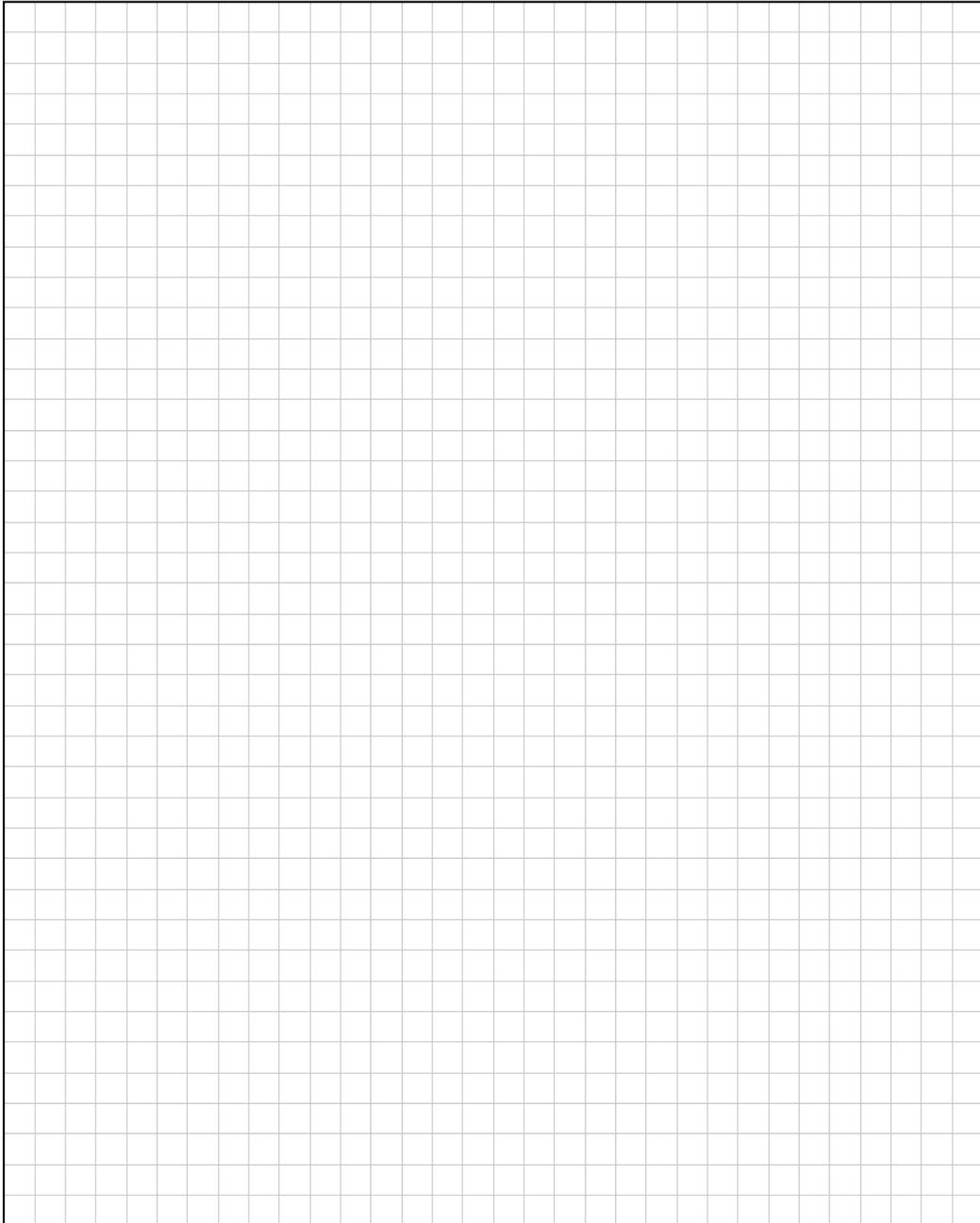
$$\frac{9x-6}{2} = \frac{3x-14}{3} + \frac{9x}{4}.$$



(b) Solve the simultaneous equations:

$$3x - y = 4$$

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



Question 3

Question 6

(25 marks)

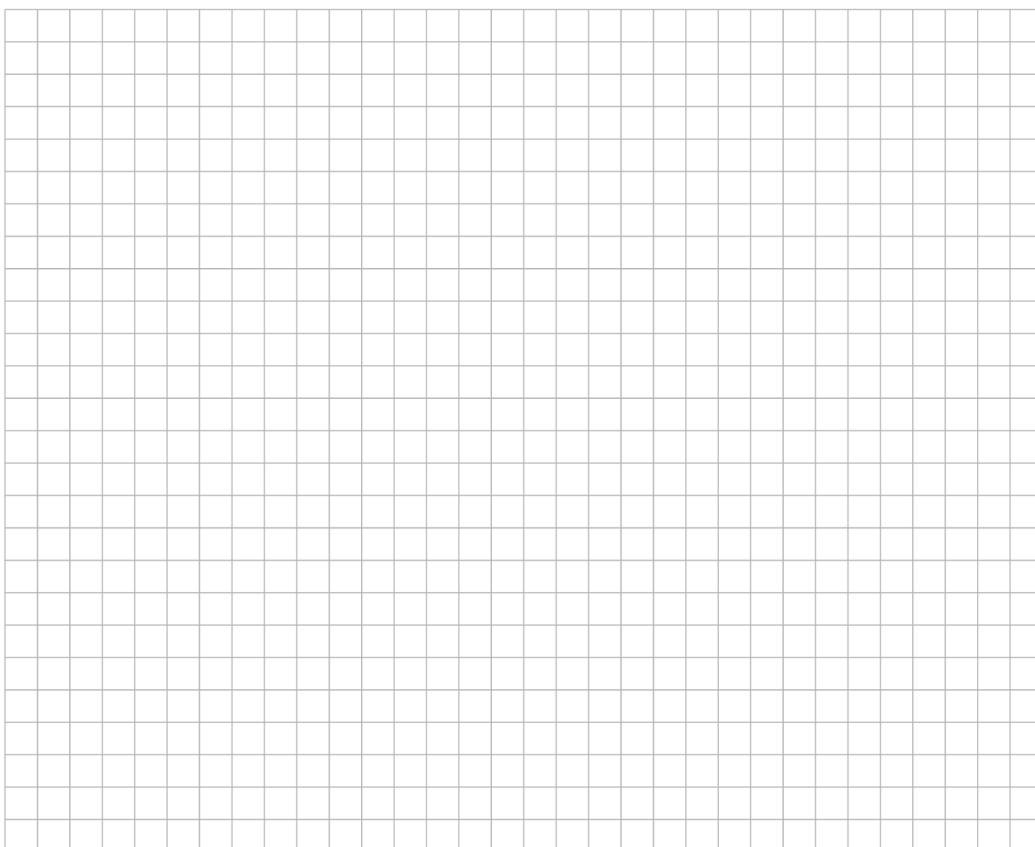
(a) Solve for x .

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



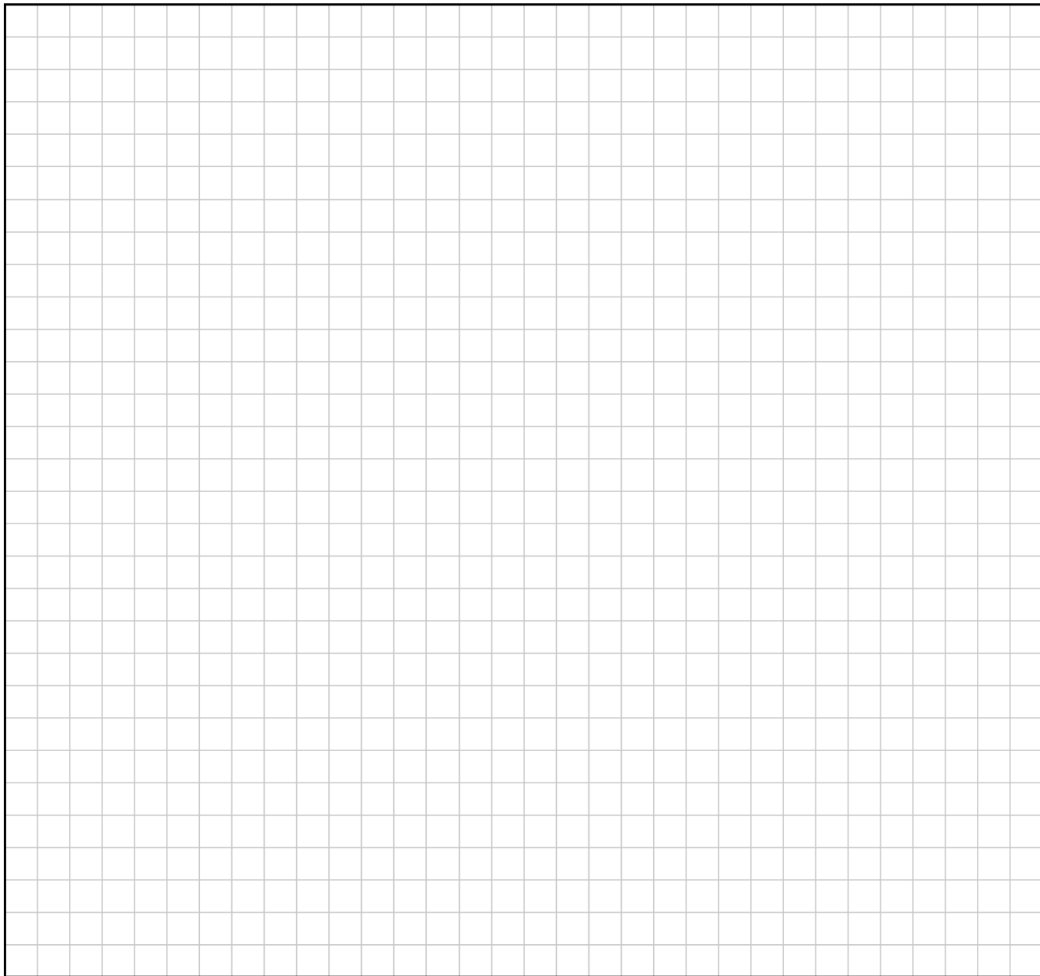
(b) Find the solutions of

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



Question 4

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



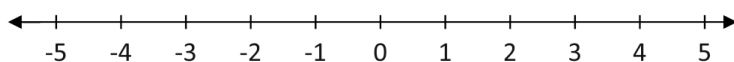
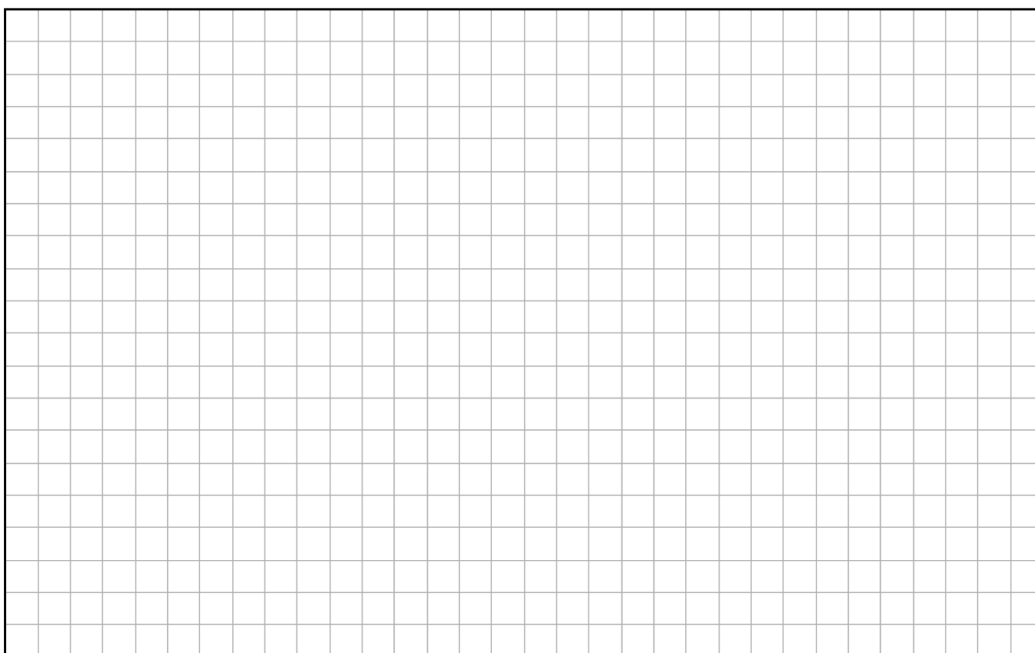
Question 5

Question 6

(25 marks)

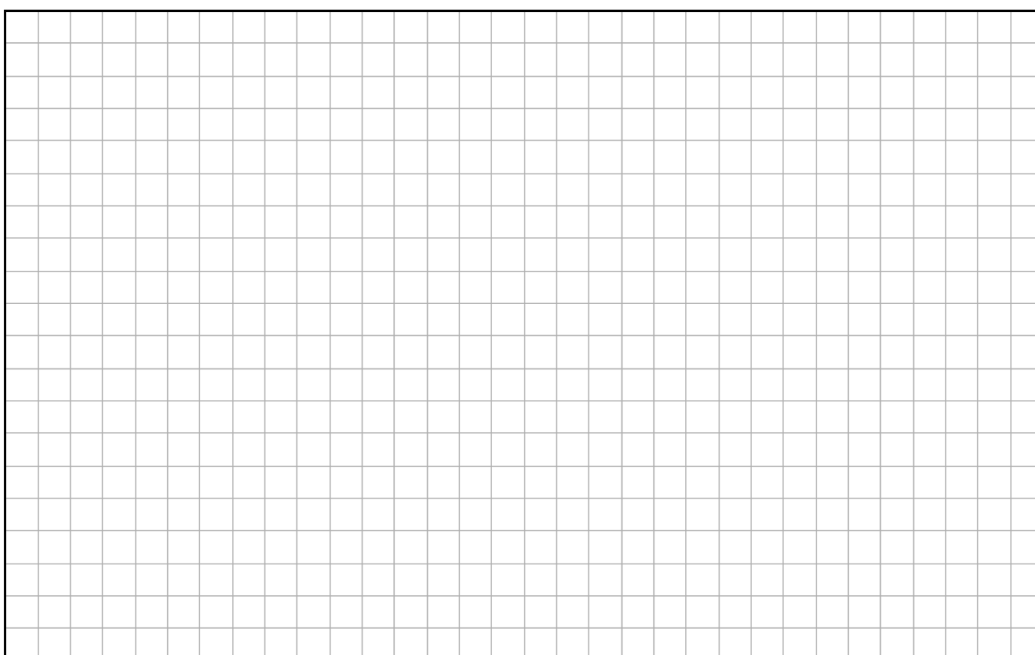
- (a) Solve the following inequality for $x \in \mathbb{R}$ **and** show your solution on the numberline below:

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



- (b) Solve for x :

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



Question 6

Question 9 (60 marks)

Question 9 (60 marks)

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



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				

[illegible]

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

[illegible]

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

[illegible]

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

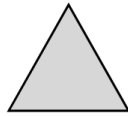
- (c) (i) Find a formula for S_n , the **total** number of matchsticks required to make the first n patterns.

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

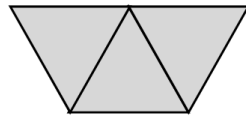
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- (d) (i)** The table below shows the number of triangles formed by each pattern for the first two patterns. Complete the table to show the number of triangles formed for patterns three to six.

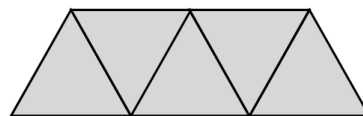
Pattern Number	1	2	3	4	5	6
Number of Triangles	1	3				



Pattern 1



Pattern 2



Pattern 3

[illegible]

- (ii) The area of each triangle is $4\sqrt{3} \text{ cm}^2$.
Find, correct to the nearest cm^2 , the **combined total area** covered by the first 15 patterns in the sequence.

[illegible]

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 $a, b \in \mathbb{N}$.

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

