Maths Points

Junior and Leaving Cert

JCOL BASIC SKILLS

PACK 7

Junior Cert Ordinary level

JCOL Basic Skills: Pack 7 – Table of Contents

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Express b in terms of a and c when $a + 4b = 3c$.

$$a + 4b = 3c$$

$$4b = 3c - a$$

Subtract a from both sides.

$$b = \frac{3c - a}{4}$$

Divide both side by 4.

l is the line $x + y - 5 = 0$.

By letting $y = 0$, find the co-ordinates of the point where the line l meets the x-axis.

$x + y - 5 = 0$

A line crosses the x axis where $y = 0$.

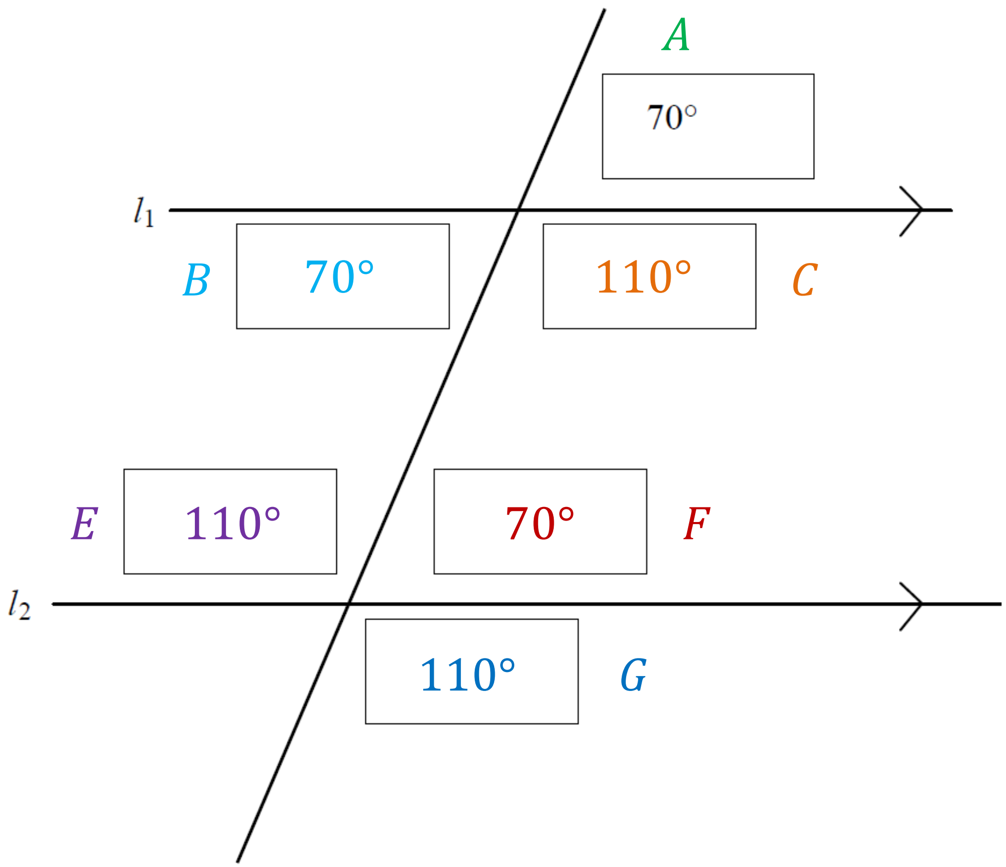
$$x + y - 5 = 0$$
$$x + 0 - 5 = 0 \quad \leftarrow \boxed{y = 0}$$
$$x = 5$$

$$(5, 0)$$

The line meets the x-axis at $(5, 0)$.

In the diagram below $l_1 \parallel l_2$. Write the measure of each angle shown by an empty box into the diagram, without using a protractor.

Label the Angles



Theorem 1
(Vertically-opposite Angles)

Vertically opposite angles are equal in measure.

$A = B = 70°$

Supplementary Angles

Two angles are supplementary when their sum is 180°.

$A + C = 180°$

$70 + C = 180$

$C = 180 - 70$

$C = 110°$

Theorem 3
(Alternate Angles)

If two lines are parallel, then any transversal will make equal alternate angles with them.

$B = F = 70°$

$C = E = 110°$

Theorem 5
(Corresponding Angles)

Two lines are parallel if and only if for any transversal, corresponding angles are equal.

$A = F = 70°$

$C = G = 110°$

Find the point of intersection of the following two lines.

$$y = 2x + 7$$
$$y = 5x - 11$$

To find the **point of intersection** we solve the **simultaneous equation.**

Write the equations in the form $ax + by = c$ and label them 1 and 2.

$$-2x + y = 7 \quad \rightarrow 1$$
$$-5x + y = -11 \quad \rightarrow 2$$

Multiply one or both lines so that we **eliminate** either the x or y when adding the lines.

1 $\quad -2x + \cancel{y} = 7$

2 $\times -1 \quad 5x - \cancel{y} = 11$

$$3x = 18$$
$$x = \frac{18}{3}$$
$$x = 6$$

Sub $x = 6$ back into either original equation to find y.

1 $\quad -5x + y = -11$

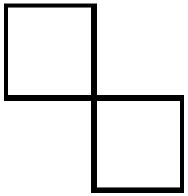
$$-5(6) + y = -11 \quad \leftarrow \boxed{x = 6}$$
$$-30 + y = -11$$
$$y = 30 - 11$$
$$y = 19$$

Point of Intersection of the lines :

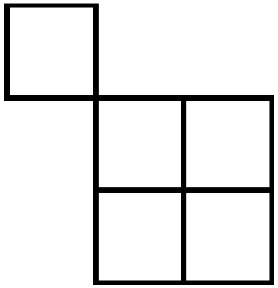
(6, 19)

The first three patterns in a sequence are shown.

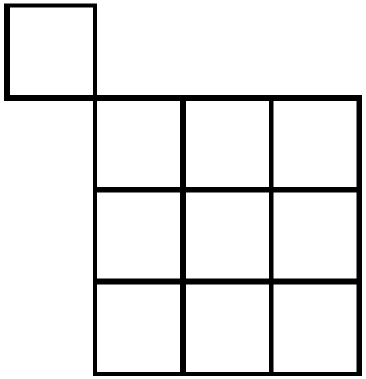
Draw Pattern 4 in the sequence.



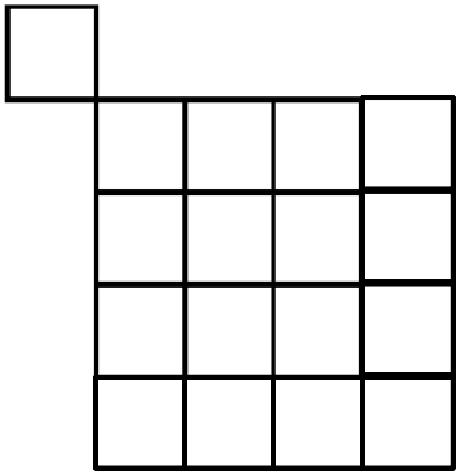
Pattern 1



Pattern 2



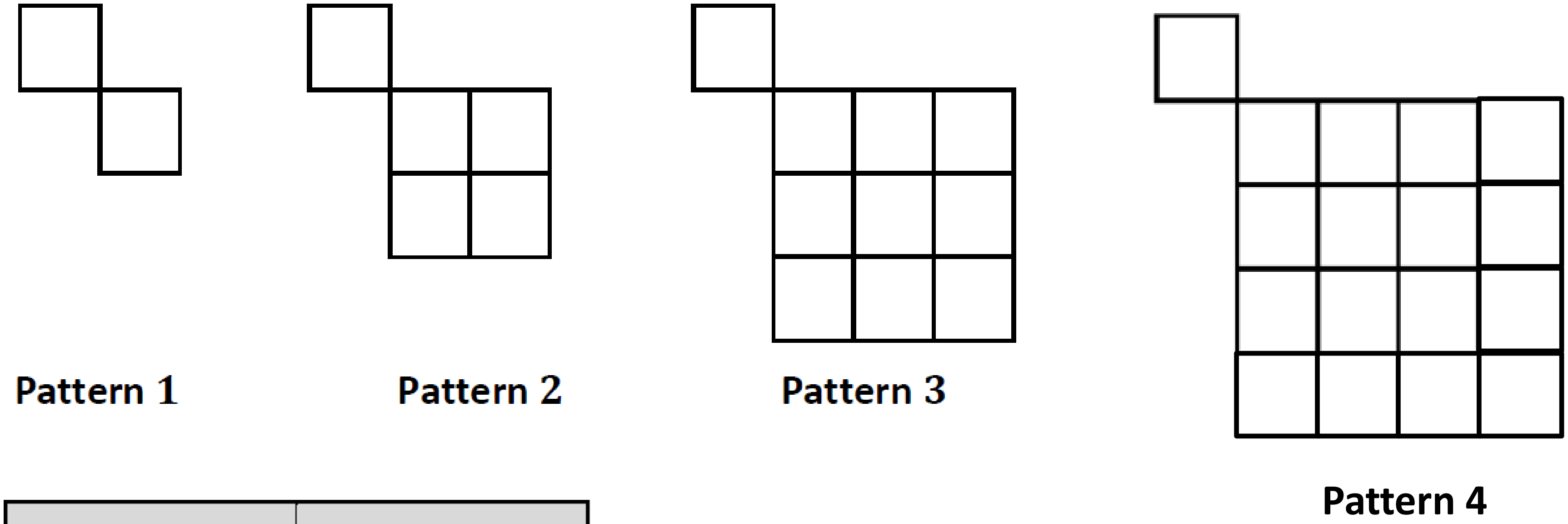
Pattern 3



Pattern 4

Continued

Fill in the table to show the number of small squares in each of the first four patterns.



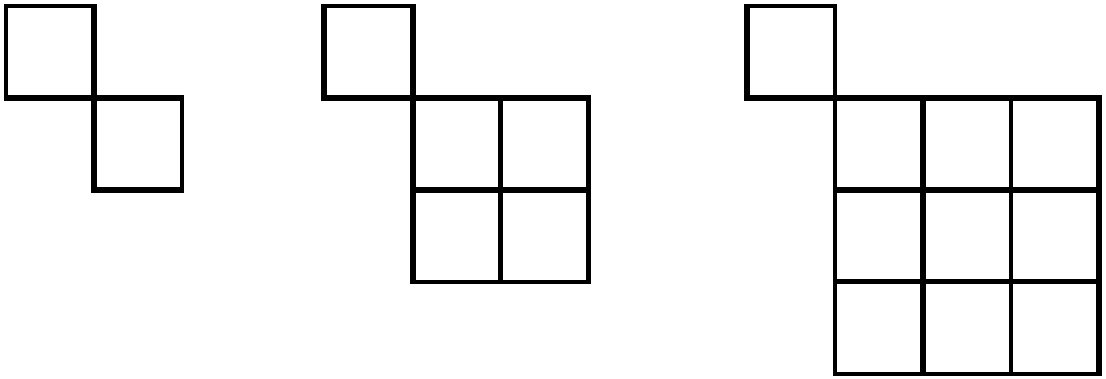
Pattern	Number of small squares
1	2
2	5
3	10
4	17

Continued

The number of small squares in Pattern n is:

$n^2 + 1$

Use this to work out the number of small squares in Pattern 20.



Pattern 1

Pattern 2

Pattern 3

To find the number of small squares in any pattern we square the pattern number and add one.

$T_n = n^2 + 1$

20$^{\text{th}}$ pattern:

$T_{20} = (20)^2 + 1$ ← $n = 20$

$T_{20} = 400 + 1$

$T_{20} = 401$

Continued

What kind of sequence is made by the number of small squares in each pattern?

Tick (✓) one box only. Give a reason for your answer.

linear	quadratic	exponential
☐	☑ ✓	☐

Pattern	Number of small squares
1	2
2	5
3	10
4	17

3

5

7

2, 5, 10, 17, ...

Calculate the difference in the number of small squares each time.

This is a quadratic sequence.
The number of small squares is increasing by an ADDITIONAL 2 each time.

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