1.   The diagram shows part of a shape.
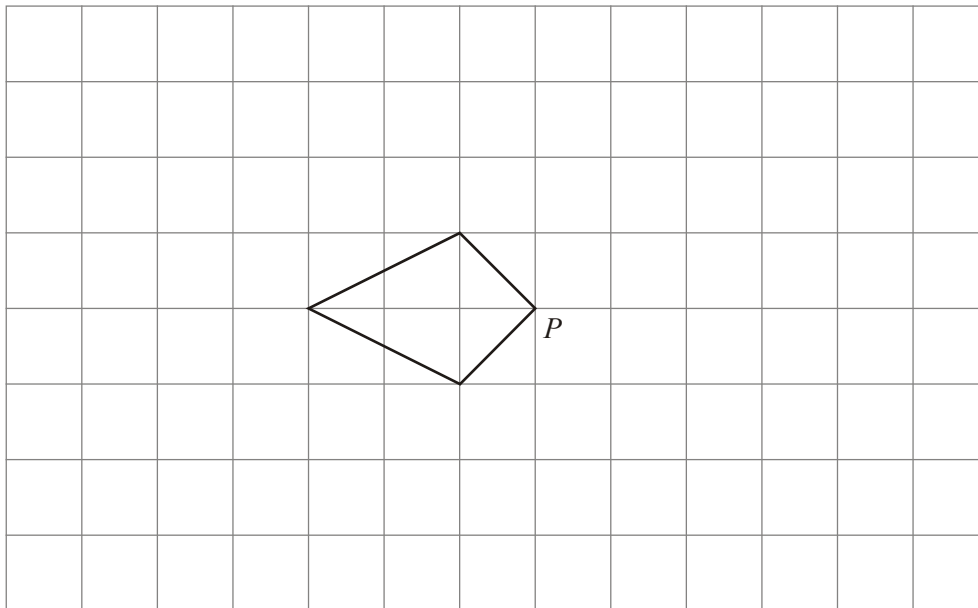
The shape has rotational symmetry of order 4 about the point *P*.
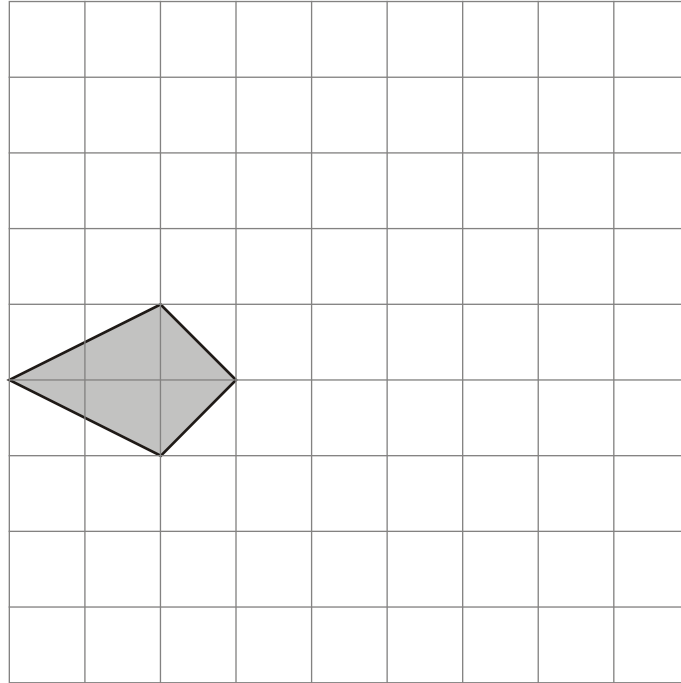

(a)   On the grid above, complete the shape.

(3)

(b)   On the grid below, show how the shaded shape will tessellate.

You should draw at least six shapes.

(2)
(Total 5 marks)

2.   Here is a list of 8 numbers.

ll   l6   l8   36   68   69   82   88

(a)   Write down **two** numbers from the list with a sum of 87

…………… , ……………
(1)

(b)   Write down a number from the list which is

(i)   a multiple of 9,

……………………..

(ii)   a square number.

……………………..
(2)

cube	multiple	factor	product

(c)   Use a word from the box to complete this sentence correctly.

        11 is a ………...…………… of 88

(1)

Here are the same 8 numbers drawn larger.

11   16   18   36

68   69   82   88

(d)   From these numbers, write down a number which has

        (i)   exactly **one** line of symmetry,

                                                        ……………………..

        (ii)   2 lines of symmetry **and** rotational symmetry of order 2,

                                                        ……………………..

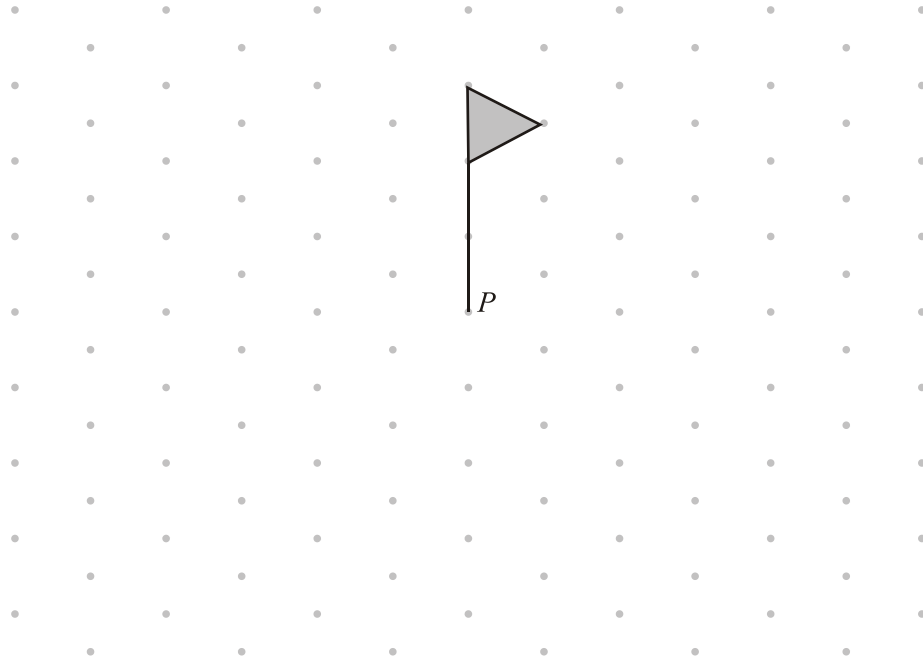   (iii)   rotational symmetry of order 2 but **no** lines of symmetry.

                                                        ……………………..
(3)
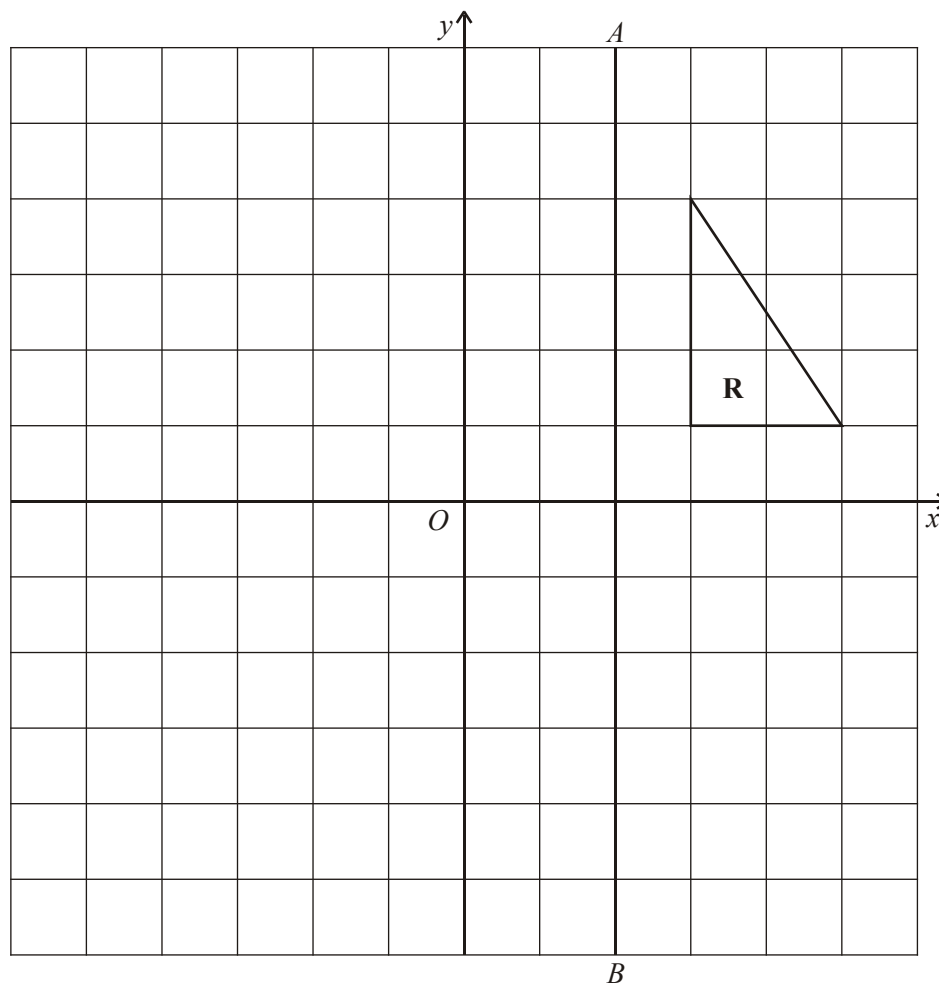**(Total 7 marks)**

3. The diagram shows part of a shape.
The shape has rotational symmetry of order 3 about the point *P*.

On the grid, complete the shape.

(Total 2 marks)
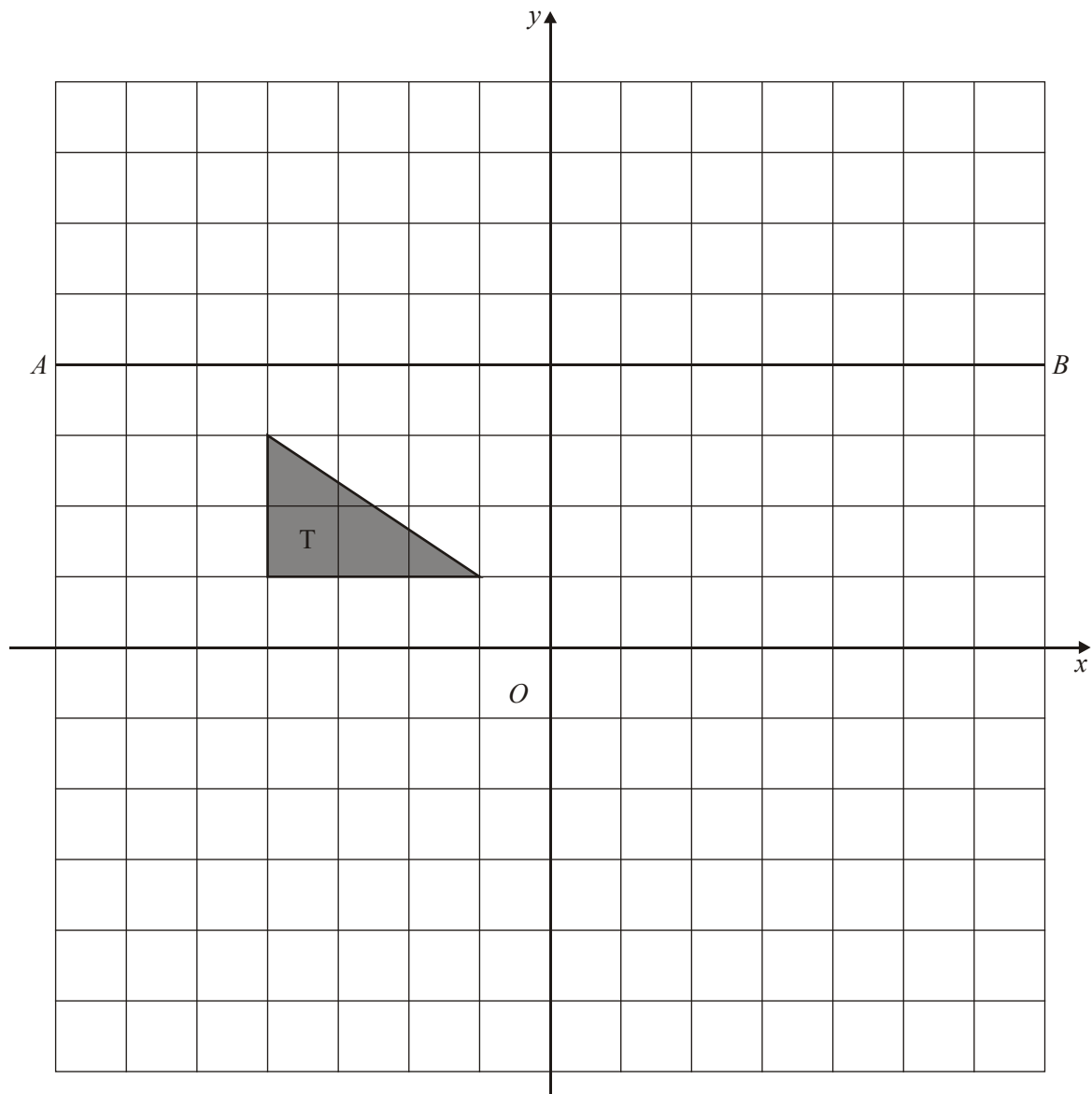
4.

(a)   Reflect triangle **R** in the line *AB*.
        Label the new triangle **S**.

(1)

(b)   Rotate triangle **R** a half turn about the point *O*.
        Label the new triangle **T**.

(2)
(Total 3 marks)

5.

(a)   Reflect triangle **T** in the line *AB*.
       Label the new triangle **P**.

(1)

(b)   Rotate triangle **T** a quarter turn anticlockwise, centre *O*.
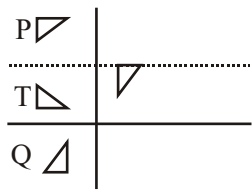   Label the new triangle **Q.**

(2)
(Total 3 marks)

1. (a)   3

                              B3 all 3 correct
                              B2 2 correct
                              B1 1 correct

(b)   2

                              B2 at least 5 correct
                              (B1 two pairs together at a single point (ignore remainder of diagram))

                                                                  [5]

2. (a)   18, 69   1
                              B1

(b) (i)   18 or 36   1
                              B1

    (ii)   16 or 36   1
                              B1

(c)   factor   1
                              B1

(d) (i)   18   3
                              B1 cao

    (ii)   11 or 88
                              B1

    (iii)   69
                              B1 cao

                                                                   [7]

3.   Correct shape   2
                              B2
                              (B1 for one complete flag or two correct poles)

                                                                   [2]

4.   (a)   Reflection in AB   1

vertices at (1, 1), (1, 4), (–1, 1)
  B1 for correct triangle S

(b)   180° rotation about O   2

vertices at (–3, –1), (–5, –1), (–3, –4)
  M1 for correct orientation
  A1 for correct position T

[3]

5.   (a)

(–4, 5), (–1, 7), (–4, 7)   1
  B1

(b)   (–1, –1), (–1, –4), (–3, –4)   2
  B2 fully correct
  (B1 correct orientation or 90° clockwise, centre O)

[3]

1.   This was another well answered question. Nearly ¾ of all candidates gained full marks in part (a), with a minority giving only one additional shape (order 2). The candidates found (b) more challenging, in some cases presenting an arrangement of the kite shape in such a way as to leave gaps. Candidates who put the kites together in a repeating pattern usually went on to gain full marks.

2.　　**Specification A**

Most candidates achieved some success but few gained full marks. Part (b)(i) (multiple of 9) was well answered but it was not unusual for candidates to then give "multiple" as their answer to part (c). In the final part (symmetry), candidates performed best on part (ii), perhaps helped by the fact that there were two possible answers.

Specification B

Most candidates were able to successfully access at least 4 marks on this question. In part (a) and (b) they were able to write down two numbers from the list with a sum of 87 and write down a number which was a multiple of 9 but found providing a square number a more challenging task. Although candidates clearly understood the term 'multiple', they very often went on to state that 11 was a *multiple* of 88.
Many candidates could identify the number with 2 lines of symmetry in (d) they had more trouble recognising that 18 was the required answer to (i) and 69 was the answer to (iii).

3.　　Most candidates drew shapes of order 2, 4 or 6, quite accurately. Some drew just one pole at 120°.

4.　　The majority of candidates attempted this question and nearly 30% of the candidates scored at least one mark. Many reflected the triangle in the *y*-axis whilst others reflected the triangle in the *x*-axis rather than in the line *AB*. Many were able to rotate the triangle by 180°, scoring one mark, but used an incorrect centre of rotation, often using the point (2, 0) instead of the origin. A third transformation was seen on a number of scripts, usually making a triangle appear in all 4 quadrants. Most triangles were labelled correctly.

5.　　Surprisingly the reflection in the line '*AB*' was not handled well. Many ignored the given line and substituted this by reflecting in the '*y*-axis' whilst others used the line '*AB*' but produced a translation rather than the reflection. Others gave multiple reflections that were not rewarded. Only 18% of the candidates gave the correct reflection. There were some better attempts in part (b) which involved a rotation through '90º' anticlockwise about the 'centre O'. Most recognised that the resulting triangle needed to be congruent to the given one with sides of '2' and '3' squares. Where the rotation had been performed correctly (about 43%) it often did not end up in the right location with only 15% scoring both marks in part (b). Many candidates did not label their diagrams. Much improvement in the performance in this question might have been achieved if the candidate had used tracing paper in both parts.