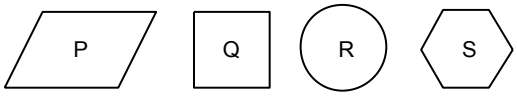
Gr. 9 Math 8.5 - 8.7 Worksheet on Line Symmetry & Rotational Symmetry

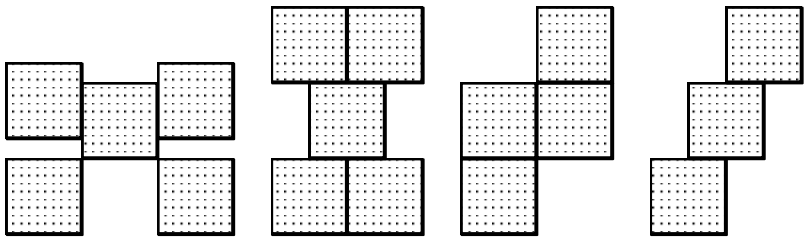
Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Which shapes have at least 2 lines of symmetry?



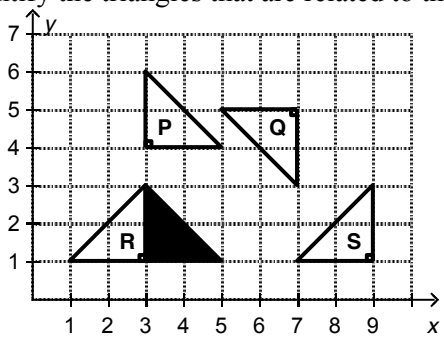
a. Shapes P, Q, S
b. Shapes P, S
c. Shapes Q, R, S
d. Shapes P, Q, R, S

____ 2. Which design has exactly one line of symmetry?



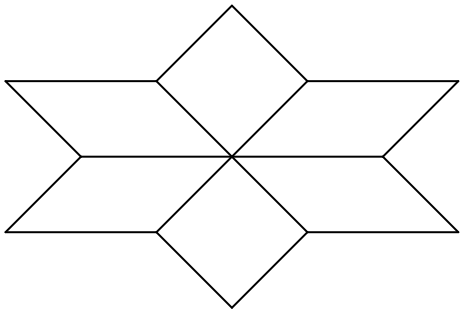
a. Design Q
b. Design R
c. Design S
d. Design P

____ 3. Identify the triangles that are related to the black triangle by a line of reflection.



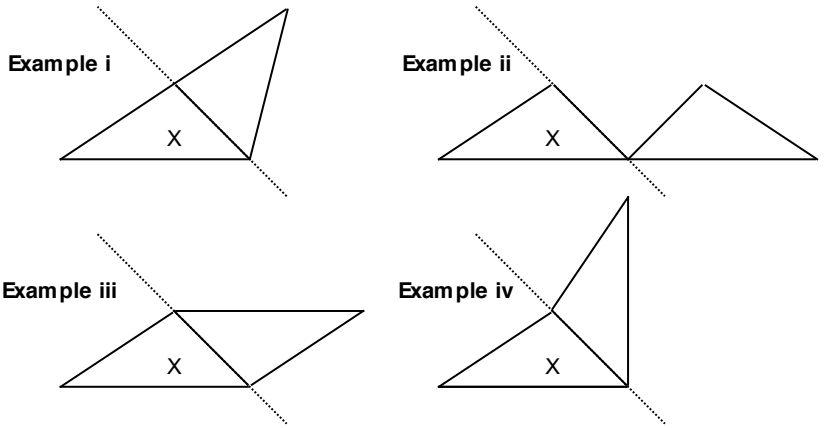
a. Triangles P, Q, R, S
b. Triangles Q, R
c. Triangles R, S
d. Triangles Q, R, S

____ 4. How many lines of symmetry does this tessellation have?



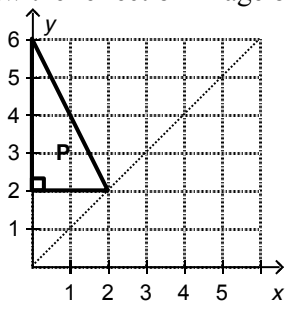
a. 6 b. 2 c. 4 d. 1

____ 5. Which example shows a reflection of triangle X in the dotted line?

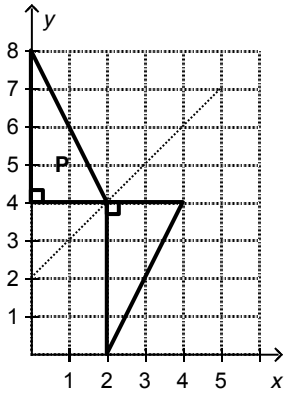


a. Example iii
b. Example i
c. Example ii
d. Example iv

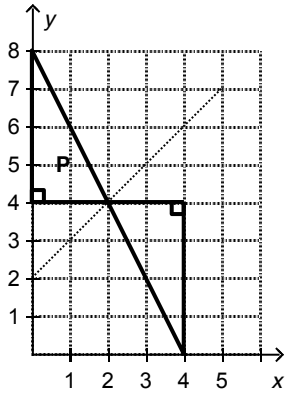
____ 6. Draw the reflection image of triangle P using the dotted line as a line of symmetry.



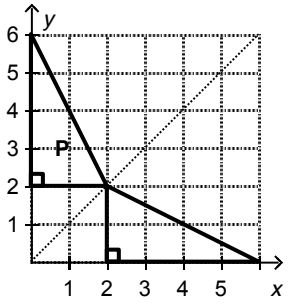
a.



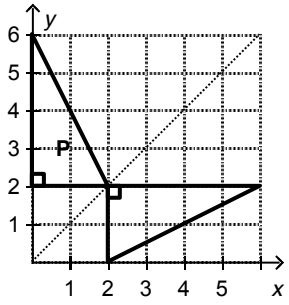
c.



b.



d.



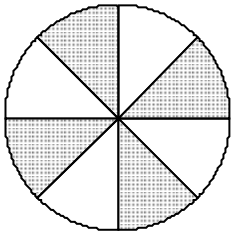
____ 7. What is the angle of rotation symmetry for a shape that has rotational symmetry of order 5?

a. 144° b. 36° c. 72° d. 75°

____ 8. The angle of rotation symmetry for a shape is 60°. What is the order of rotational symmetry?

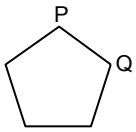
a. 6 b. 4 c. 3 d. 8

____ 9. What is the order of rotational symmetry and angle of rotation symmetry for this design?



a. 4; 90° b. 6; 120° c. 8; 60° d. 8; 45°

____ 10. Which figure shows the rotation image of pentagon A after a 216° clockwise rotation about its centre?



Pentagon A

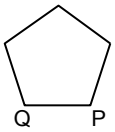


Figure i

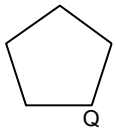


Figure ii

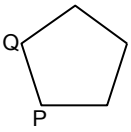


Figure iii

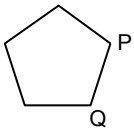


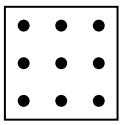
Figure iv

a. Figure iii b. Figure i c. Figure iv d. Figure ii

____ 11. Describe the rotational symmetry and line symmetry of this parallelogram.

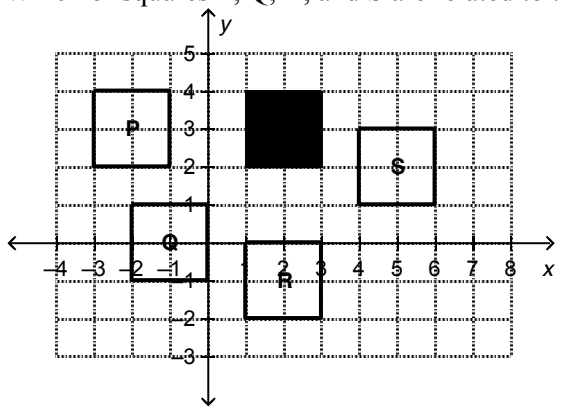
a. Rotational symmetry of order 2 about the centre; no line symmetry
b. Rotational symmetry of order 2 about the centre; 1 line of symmetry through the centre
c. Rotational symmetry of order 1 about the centre; 1 line of symmetry through the centre
d. No rotational symmetry; no line symmetry

____ 12. Describe the rotational symmetry and line symmetry of this diagram.



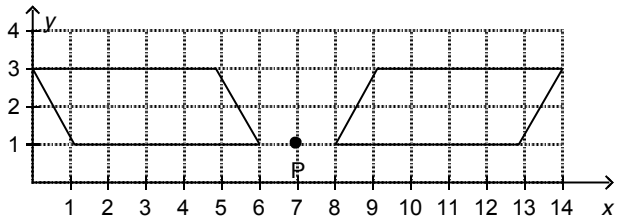
a. Rotational symmetry of order 2 about the centre; 4 lines of symmetry through the centre
b. Rotational symmetry of order 4 about the centre; 2 lines of symmetry through the centre
c. Rotational symmetry of order 2 about the centre; 2 lines of symmetry through the centre
d. Rotational symmetry of order 4 about the centre; 4 lines of symmetry through the centre

____ 13. Which of squares P, Q, R, and S are related to the shaded square by line symmetry?



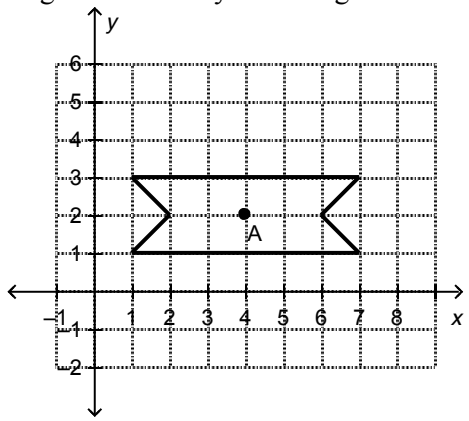
a. Squares P, R, and S
b. Squares P, Q, R, and S
c. Squares P and R
d. Squares P, Q, and R

____ 14. Determine whether the two parallelograms are related by line symmetry, by rotational symmetry about point P, by both types of symmetry, or by neither.



a. Rotational symmetry
b. Neither
c. Line symmetry
d. Rotational symmetry and line symmetry

____ 15. If this hexagon is rotated 90° clockwise about point A, how many lines of symmetry will there be in the diagram formed by the hexagon and its image?

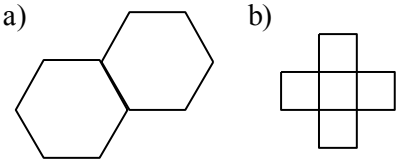


a. 4
b. 1
c. 2
d. 0

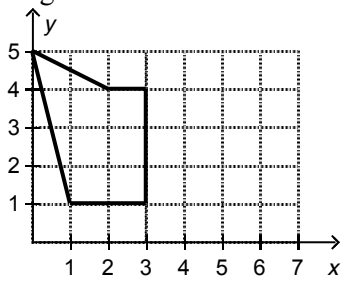
Short Answer

16. State the number of lines of symmetry in each design.

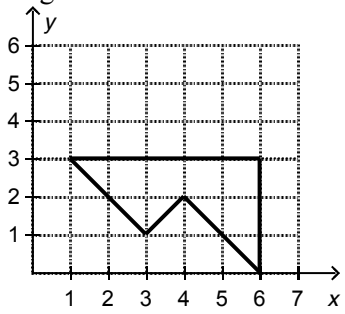
a) b)



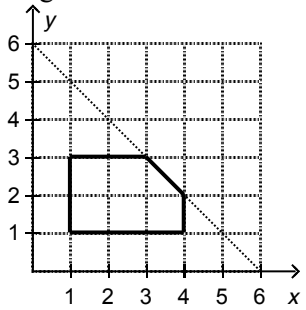
17. This polygon is one-half of a shape. Use the dotted line as a line of symmetry to complete the shape by drawing its other half.



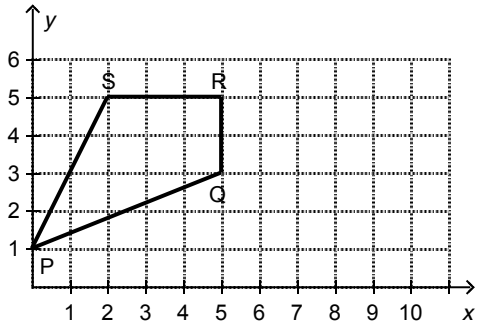
18. This polygon is one-half of a shape. Use the dotted line as a line of symmetry to complete the shape by drawing its other half.



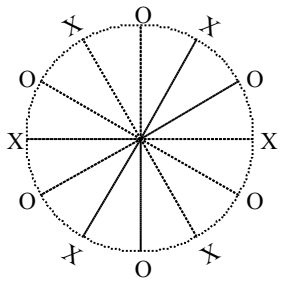
19. This polygon is one-half of a shape. Use the dotted line as a line of symmetry to complete the shape by drawing its other half.



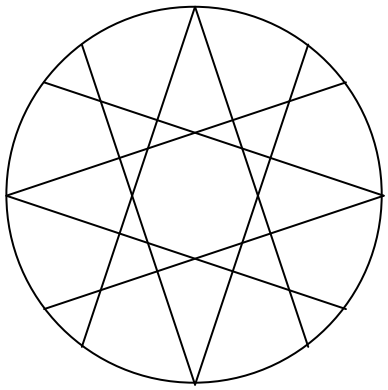
20. This polygon is one-half of a shape. Use a vertical line through 5 on the *x*-axis as a line of symmetry to complete the shape by drawing its other half. Write the coordinates of the larger shape formed by PQRS and its image.



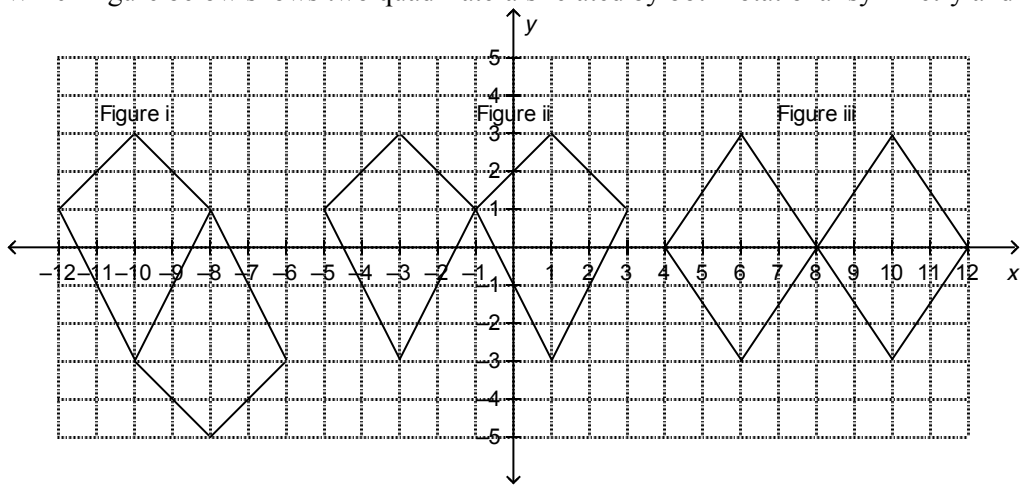
21. What is the order of rotational symmetry and angle of rotation symmetry for this design?



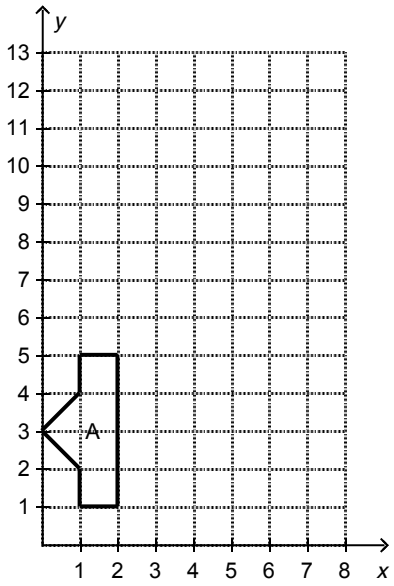
22. What is the order of rotational symmetry and angle of rotation symmetry for this design?



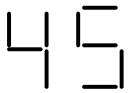
23. Which figure below shows two quadrilaterals related by both rotational symmetry and line symmetry?



24. Determine whether polygon A and its image are related by line symmetry after each transformation:
    i) a translation R3
    ii) a translation U6
    iii) a reflection in a vertical line through 4 in the *x*-axis
    iv) a reflection in a horizontal line through 7 in the *y*-axis

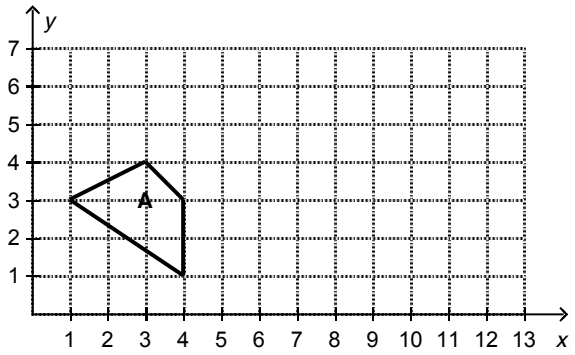


25. Marleesa says these digits do not have line symmetry or rotational symmetry. Is she correct? If not, explain her mistake.

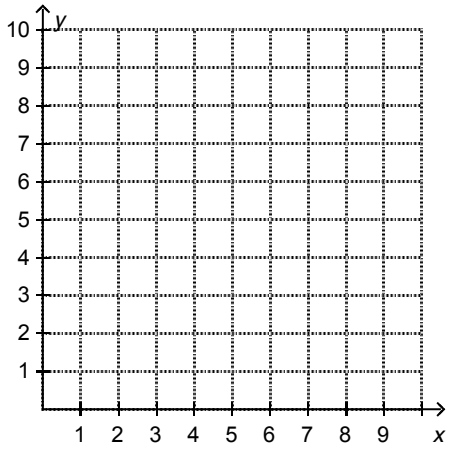


Problem

26. a) Reflect shape A in the oblique line through (0, 7) and (7, 0). Label the image shape B.
    b) Reflect shape B in the vertical line through 6 on the *x*-axis. Label the image shape C.
    c) Reflect shape C in the oblique line through (5, 0) and (12, 7). Label the image shape D.



27. a) On the grid below, plot the points A(2, 5), B(2, 6), C(4, 8), D(6, 6), and E(5, 5). Join the points to form polygon ABCDE.
    b) Reflect polygon ABCDE in the oblique line through the points (0, 0) and (8, 8). Draw the reflection image.
    c) Write the coordinates of the larger shape formed by ABCDE and its image.
    d) Describe the larger shape and its symmetry.



28. This square is part of a larger shape that is to be completed by three rotations.

a) Rotate this square:

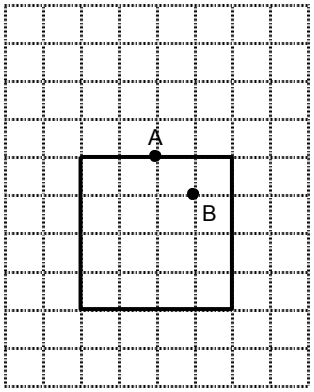
i) 90° clockwise about point A

ii) 180° about point B

iii) 180° about point A

Draw each rotation image.

b) Outline the shape formed by the square and all its images. What is the order of rotational symmetry and angle of rotation symmetry for the final shape?

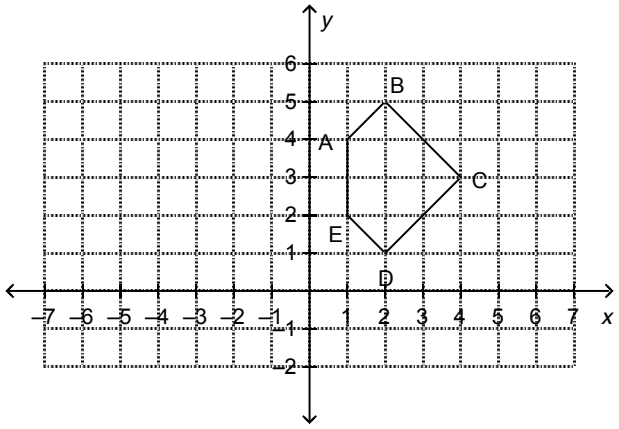


29. This pentagon is part of a larger shape that is completed by rotating the pentagon 180° about the point (1, 3).

a) Draw the rotation image.

b) List the coordinates of the vertices of the larger shape.

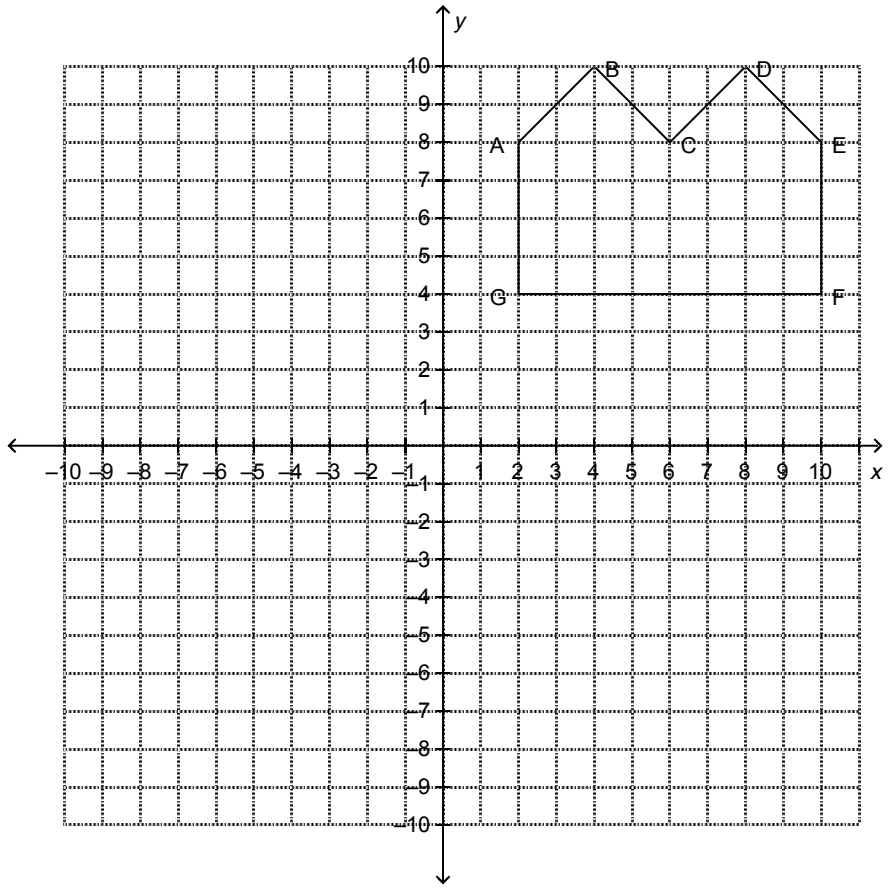
c) Describe the symmetry in the larger shape.



30. The polygon below and its transformation image form a diagram.

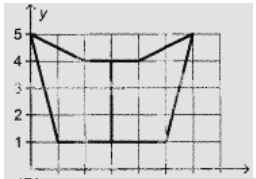
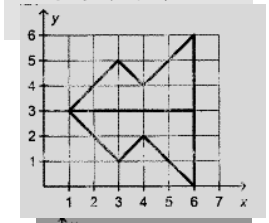
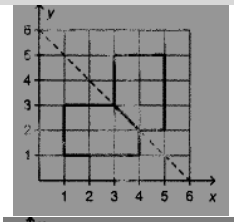
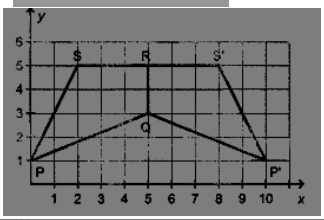
a) Find a transformation of the polygon that does **not** result in a diagram with line symmetry or rotational symmetry. Draw the image and list the coordinates of the vertices of the larger shape. How do you know the diagram does not have symmetry?

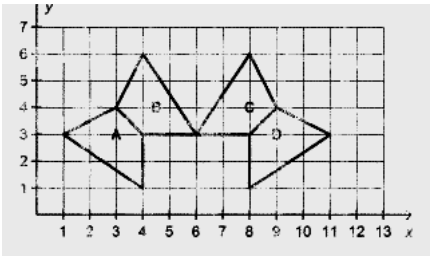
b) Find a transformation of the polygon that does result in at least one type of symmetry. Draw the image and list the coordinates of the vertices of the larger shape. How do you know the diagram has symmetry?

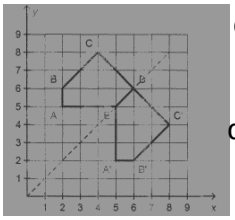


Grade 9 Math

Unit 8 – Similarity & Transformations **8.5 – 8.7 Worksheet Key**

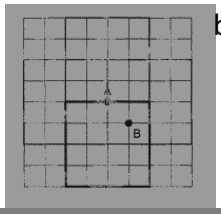
1. C
2. D
3. D
4. B
5. D
6. B
7. C
8. A
9. A
10. A
11. A
12. D
13. D
14. C
15. A
16. a) 2 b) 4
17. 
18. 
19. 
20. 

21. 6, 60˚
22. 4, 90˚
23. Figure iii
24. i) No line of symmetry
    ii) Horizontal line through 6 on y-axis.
    iii) Vertical line through 4 on x-axis.
    iv) Horizontal line through 7 on y-axis.
25. She is not correct. Neither digit has line symmetry, but 5 has rotational symmetry of order 2.
26. 

27. 

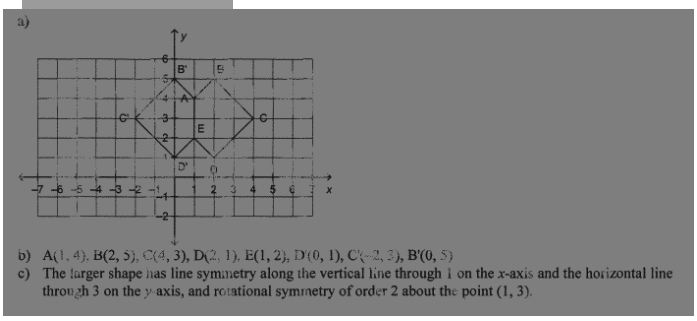
c) E (5,5) A(2,5) B(2,6) C(4,8)
C'(8,4) B'(6,2) A'(5,2)

d) 7-sided polygon with a line of Symmetry along DE.

28. 

b) rotational symmetry of order 4

Angle of rot. sym. = 90˚

29. 

30.