

## SYMMETRY ACTIVITY GEOMETER'S SKETCHPAD

In this activity we will investigate four types of symmetry with respect to the x-axis, the y-axis, the line  $y = x$  and the line  $y = -x$ .

1. Using *graph* create axes and using the scalar point at (1,0) increase the scale to  $x \text{ max} = 10$ ,  $x \text{ min} = -10$ .
2. Change the *segment tool* to the *line tool* and change display "preferences" to show labels on all new objects.
3. Plot four points from the relation  $x = y^2 - 4$  (calculate x for  $y = 0$ ,  $y = 1$ ,  $y = 2$ ,  $y = 3$ ). Calculate the points here:
4. *Select* the points (use the shift key) in pairs and construct three segments between the four points.
5. *Select* the x axis and then go to transform "mark mirror". The x axis has now been marked as an axis of symmetry.
6. Using the shift key *select* the four points and the three segments go to the transform menu and click "reflect".
7. Measure the coordinates of the points A and A', B and B', C and C', and D and D'. Record the coordinates here:

Describe the pattern that exists between corresponding points that are symmetric about the x – axis.

8. Using your answer to number 7, predict the pattern that would exist between corresponding points symmetric about the y-axis.
9. Test your prediction on a new sketch by plotting four points of the function  $y = -x^2 + 12$ . (Calculate y for  $x = 0$ , 1, 2, 3) Record the points here:
10. Draw in the three segments using the Construct menu.

11. *Select* the  $y$  – axis go to Transform “mark mirror”
12. *Select* the four points and the segments go to Transform “reflect”.
13. Measure and record the corresponding sets of ordered pairs here.

Did your prediction hold true?

14. In a new sketch plot the points (1, 1) and (2,2). *Select* the two points and Construct the line through the points. Measure the equation of the line. Record the equation here.
15. Plot four ordered pairs from the function  $xy=10$  (calculate  $y$  for  $x = 1, 2, 2.5, 3$ ) again connect the points using segments.
16. Using Transform mark the line as the mirror and use Transform to reflect the graph over the line.
17. How would you describe the symmetry of this graph? Symmetric about the .....
18. Measure and record the coordinates of corresponding points here:

How would you describe the pattern of the coordinates of corresponding points?

19. Plot the opposites of all the points you got in problem 18. Describe what happened.
20. Plot the  $y = -x$  line. Mark the  $y= -x$  line as a mirror.
21. *Select* the points and segments in the first quadrant and reflect them over the  $y = -x$  line. What happened? How would you describe this symmetry and the pattern that exists between corresponding pairs of coordinates.