## Student Activity: To investigate the square root of two and the square root of three

**Use in connection with the interactive file, 'Square root 2' and 'Square root 3', on the Student's CD.**

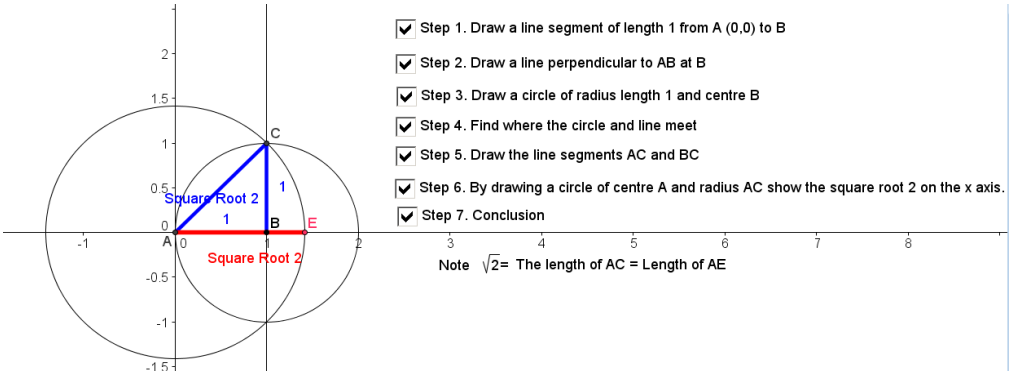



**Fig. 1**

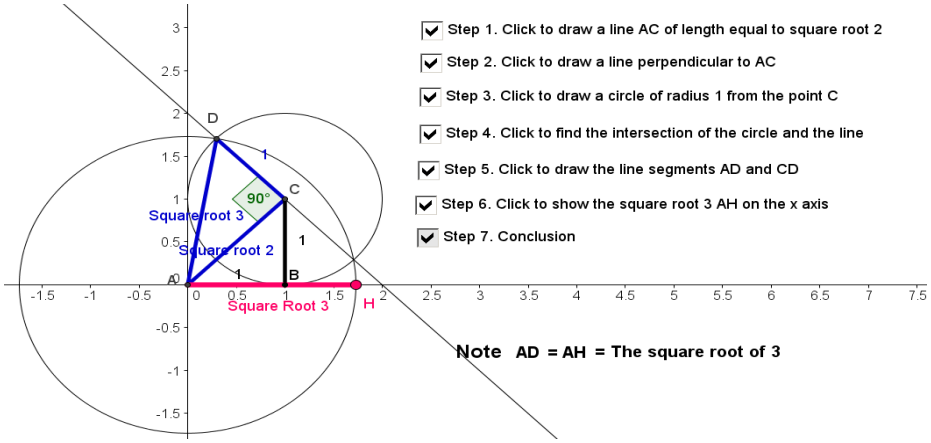



**Fig.2**

1. What is meant by the square root of a number?

   _____

2. Given that $\sqrt{a}$ is the positive square root of a, answer the following:
   a. $\sqrt{9} =$
   b. $\sqrt{16} =$
   c. $\sqrt{2500} =$
3. What is $\sqrt{1}$ ? Represent this length on a line using centimetres as the units.

   _____

4. What is $\sqrt{4}$ ? Represent this length on a line using centimetres as the units.

   _____

5. Estimate $\sqrt{2}$ . _____
6. In the interactive file "Square root two", what type of triangle is formed by the points ABC and can Pythagoras' theorem be applied to this triangle?

   _____

7. What are the lengths of side $|AB|$ and $|BC|$ ?

   _____

8. Using Pythagoras' theorem, what is the length of side $|AC|$ ?

   _____

   _____

9. What line segment is $|AC|$ equal to on the number line?

   _____

10. With the help of the interactive file, construct the square root of two below and show its position on the number line.

11. In the interactive file "Square root three", what type of triangle is formed by the points ACD and can Pythagoras' theorem be applied to this triangle?

    _____

12. In the interactive file "Square root three", what are the lengths of $|AC|$ and $|CD|$ ?

    _____

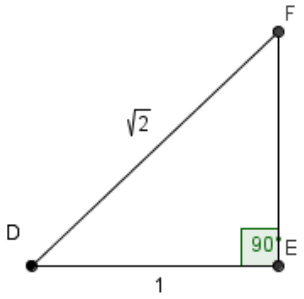
13. Using Pythagoras' theorem, what is the length of side $|AD|$ ?

    _____

14. What line segment is $|AD|$ equal to on the number line? _____

15. With the help of the interactive file, construct the square root of 3 below and show its position on the number line.

16. Using $|DE|$ as one unit, find the length of the line segment $|EF|$ in the following diagram and the measure of the angles $|DFE|$ and $|EFD|$.




17. Find the length and width of an A4 sheet of paper.

18. Find the length and width of an A3 sheet of paper.

19. What do you notice about the ratio between the length of the A3 sheet of paper and the A4 sheet of paper?

20. What do you notice about the ratio between the width of the A3 sheet of paper and the A4 sheet of paper?

21. Draw conclusions between the ratio of an A3 sheet of paper in comparison to an A4 sheet of paper correct to 3 decimal places and $\sqrt{2}$.

22. Check if this ratio holds true for other paper sizes?
©http://www.papersizes.org/a-paper-sizes.htm

| Size | Height x Width (mm) |
|---|---|
| 4A0 | 2378 x 1682 mm |
| 2A0 | 1682 x 1189 mm |
| A0 | 1189 x 841 mm |
| A1 | 841 x 594 mm |
| A2 | 594 x 420 mm |
| A3 | 420 x 297 mm |
| A4 | 297 x 210 mm |
| A5 | 210 x 148 mm |
| A6 | 148 x 105 mm |
| A7 | 105 x 74 mm |
| A8 | 74 x 52 mm |
| A9 | 52 x 37 mm |
| A10 | 37 x 26 mm |

**Challenge**

23. Given rectangle *AEFC* below represents an A3 sheet of paper :

a. What is the ratio of length (longest side) to width for rectangle AEFD in terms of x and y?

_____

Rectangle *AEFC* is folded in two to give 2 rectangles as shown *ABDC* and *BEFC*. What is the ratio of length (longest side) to width for rectangle *ABCD*?

_____

_____

b. Write an expression for the relationship of x to y which will preserve the same ratio of length to width for rectangle *ABDC* as the ratio of length to width for *AEFC*.