



## Teacher Notes for Pin Board

Compatibility: TI-83/83+/83+SE/84+/84+SE

Run The Program Called: **PINBOARD**

### ► Summary

Pinboard allows the user to explore properties and definitions of triangles and quadrilaterals on an 8x8 unit grid.

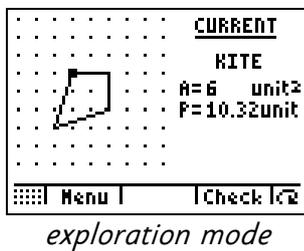
### ► Features



There are two modes: **CHALLENGE** and **EXPLORATION**.

In **EXPLORATION** mode, the user can create any shape on the grid, have it named and have both its area and perimeter calculated.

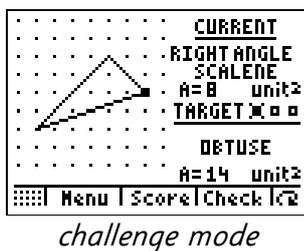
In **CHALLENGE** mode, the user can select - or have randomly selected for them - the name of a shape and an area. The user's task is to create the named shape with the required area.



To create and check a shape, the arrow keys are used to move the highlighted vertex around the grid. To select another vertex, press the **GRAPH** button (under the  $\cup$  icon).

To check a shape, press **TRACE**, under the word "Check".

To refresh the screen, in case any edges of the shape are "corrupted" when moving the vertices, press **Y=** (under the grid icon).



#### CHALLENGE mode - further details

There are a total of 40 pre-stored challenges - 20 each for triangles and quadrilaterals.

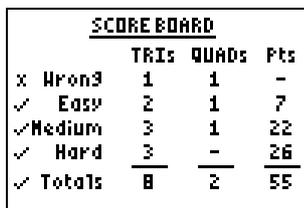
You can opt to have only **3 ATTEMPTS** or **UNLIMITED ATTEMPTS** to correctly create the target shape. When 3 attempts are selected, a tally of these is kept on the pinboard screen in the 3 boxes to the right of the word TARGET.

If you choose to **SELECT CHALLENGE**, then you are presented with a screen detailing the difficulty level and the required shape. Use the arrow keys and **ZOOM** (under "More") to move through these levels, pressing **TRACE** to select.

If you choose **RANDOM CHALLENGE**, you can decide on the difficulty from **EASY**, **MEDIUM** or **HARD**.

The player scores points for each shape that they correctly create. Easy difficulty challenges are worth 4, 3 or 2 points, depending on the number of attempts required to correctly create the shape. Medium are worth 7, 6 or 5 points; Hard are worth 10, 9 or 8 points.

The score board screen shows the number of questions correctly answered, for each type of shape and difficulty, plus the totals for these correctly answered questions.



When all the triangle challenges have been completed, the program automatically progresses the user to quadrilateral questions, and vice versa. When no further challenges can be completed, the user is notified and their final score is displayed.

When in **3 ATTEMPTS** mode, if the player fails to create a shape after 3 attempts, then that challenge question is “locked” and not able to be re-attempted until another challenge (of any difficulty) has been correctly completed.

On the select challenge screen, under the “Pts” heading:

- = signifies the question is still available to be attempted
- x = the question is locked.
- a number = points awarded for that question when it was completed.

### ► Suggestions

There are many ways in which this program can be used with students. The teacher or students can be responsible for setting themselves target shapes to create, or the in-built **CHALLENGE MODE** can be used.

For students new to using the program, it is recommended to:

1. initially introduce the class to using **PINBOARD** by selecting **EXPLORATION MODE** and exploring how many different named shapes they could create....
2. The teacher can ask the class a variety of questions, such as:
  - ◇ think about what makes a shape have a certain name, and test these theories
  - ◇ how many different rhombuses have area  $12 \text{ unit}^2$ ?
  - ◇ make a (specified) quadrilateral with the smallest possible area. How many different quadrilaterals are there with this smallest area? And how many have the largest possible area?
  - ◇ how many different isosceles triangles can you have with an area of  $12 \text{ unit}^2$ ? And what is meant by different?
  - ◇ make a (specified) triangle with the smallest/largest possible area
3. To use the program’s in-built challenges, move the students onto **CHALLENGE MODE** with **UNLIMITED ATTEMPTS** on **RANDOM CHALLENGE** and **EASY DIFFICULTY**, with progression to **3 ATTEMPTS** to focus their attention and prevent guesswork becoming the predominant strategy.

### ► Technical Notes

The program can recognise the following shapes:

- **TRIANGLE MODE:** obtuse-angled triangle, right-angled triangle, acute-angled triangle and whether it is isosceles or scalene (equilateral triangles are not possible on this unit grid - the proof of this claim is left to the reader to discover!)
- **QUADRILATERAL MODE:** quadrilateral, trapezium, isosceles trapezium, parallelogram, rectangle, rhombus, square, kite.

Where the four vertices of the quadrilateral do not form a “legal” quadrilateral, this is detected. No name, area or perimeter is displayed for these shapes.

### ► Acknowledgements

This program was originally inspired from an idea by Derek Ball in a consultation document for BECTa, 2002.