Word Scramble

P	Q	E	T	T
K	Z	I	Z	O
K	M	I	M	P
H	N	O	T	E
R	O	I	B	X

Develop an Android or iPhone application that challenges users to find words on a 5 x 5 grid of random letters. Words can be composed of letters scanning horizontally (from left to right), vertically (from top to bottom) and diagonally (from upper-left to lower-right or lower-left to upper right). The same word cannot be formed more than once in the same location. For example, "top" can be found once, but "no" can be found in a few locations.

The score increases incrementally for each word that is found and longer words have a higher score than shorter ones. The game provides a bonus if all possible words have been found. This requires writing an algorithm to find all words for a given board. Note that there may be multiple words with a given string of characters. For example, "note" contains both "not" and "no". Otherwise scoring is left up to the group. A group may decide to score rarely used letters more highly than common ones (like in scrabble). Scoring for all played games should persist on the device so a top score list can be displayed.

The game allows single play or two player networked games. Single play can be either timed or untimed. Games are timed during network play. Both players use the same board in either basic or cutthroat mode in networked games. In basic network play, players use separate copies of the same board. In cutthroat mode both players work on the same board at the same time. If letters are used on one board to form a word, then the other player is blocked from finding that word.

Generated boards must contain at least one valid three, four or five letter word. Note that the supplied dictionary contains approximately 17K words with five letters or less. Use efficient algorithms and data structures! Storing all of the words in a list will result in a loss of points.

Math Scramble / Sliding Tiles

6	7	=	3	1
=	8	2	x	0
3	+	2	=	5
1	9	4	+	3
+	3	5	2	■

Develop an Android or iPhone game with two modes. The first allows users to define basic mathematic equations using digits 0 - 9 and the addition, subtraction and multiplication operators. This application should be targeted towards a younger audience learning basic mathematics. Equations can be formed either horizontally from left to right or vertically from top to bottom. Equations must include either the "+", "-" or "x" operators and the "=" symbol (i.e. 9 = 9 is not allowed).

A candidate equation is submitted by dragging a finger across the screen. If the equation is valid, then points are adde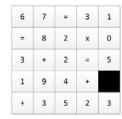d to the user's score. The line in blue would be worth five points. The same equations can be used exactly once (i.e. 2 + 3 = 5 and 5 = 3 + 2 represent the same equation).

Players can form new equations by moving tiles around the board (see the diagram below). It must be possible to form at least one mathematical equation on a given board.

In the second mode, the users are presented with a random board of numbers from 1 to 24. In this mode, the board also contains the empty black tile. The users must order the numbers sequentially in ascending order. The black tile must either be in the top left or bottom right position. It must be possible to solve the puzzle.

Players can either play alone or against a basic AI. This AI does not have to be particularly smart or fast, but it should be able to correctly order tiles in a reasonable amount of time. The AI difficulty setting should be adjustable. Please feel free to search the scientific literature for algorithms for the twenty four puzzle or sliding puzzle. Please cite any references used.

Variations on this mode should be possible. Allow users to select from 2 x 2, 3 x 3, 4 x 4 or 5 x 5 grids. The first mode can only be played on a 5 x 5 grid.