Math 44: Patterns and Modular (Clock) Arithmetic Name: $\qquad$

(1) The word "ABERCROMBIE!" begins in cells 1, 6, $\qquad$ $\longrightarrow$ $\qquad$ and $\qquad$ . (Fill in the blanks with the next four starting cells.)
(2) Describe, in words, using the term "multiple," all the cells in which the word "ABERCROMBIE!" begins, assuming that the pattern continues indefinitely out to the right:
(3) Where does the word "ABERCROMBIE!" fall in this set of cells, if we assume that the pattern continues to the left also? Draw it.

(4) Describe, in words, using the term "multiple," in which cells the letters "RO" fall, if we asssume that the pattern continues indefinitely to the left and to the right:
(5) Make up your own "linear" pattern, invent a puzzle question about it, and answer the question yourself:

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| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |


(6) The cells $\bigvee$ and , fall in columns $\qquad$ 2, 4, 6, $\qquad$ , and $\qquad$ . (Fill in the blanks with the numbers of the columns immediately preceeding and following columns 2 , 4, and 6.)
(7) The cells
 fall in rows $\qquad$ 2, $\qquad$
$\qquad$ and $\qquad$ . (Answer as in (6).)
(8) Describe your answer to (6) using the terminology of modular or clock arithmetic, and also using the word "multiples," assuming the pattern continues throughout the plane:

Describe your answer to (7) using the terminology of modular or clock arithmetic, and also using the word "multiples," assuming the pattern continues throughout the plane:
(9) Fill in with the pattern of problems 6-8:

(10) create your own pattern:

| 4 |  |  |  |  |  |
| :---: | :--- | :--- | :--- | :--- | :--- |


(11) The left hand side of the face
falls in columns $0,3,6$, $\qquad$
$\qquad$ and $\qquad$ .
(Fill in with the next columns after 0,3 , and 6 .)
(12) The eyes fall in rows $1,3,5$, $\qquad$ , $\qquad$ and $\qquad$ . (Fill in with the rows following 1,3 , and 5 .)
(13) What kind of numbers are the eye-rows? (Use the terminology of modular arithmetic.)
(14) What kind of numbers are the eye-columns? Use the terminology of modular arithmetic to describe them; assume the pattern continues throughout the plane.
(15) Fill in with either 0 or 1 :
$73 \equiv$ $\qquad$ $(\bmod 2)$
$74 \equiv$ $\qquad$ $(\bmod 2)$
$75 \equiv$ $\qquad$ $(\bmod 2)$


Fill in with either 0,1 , or 2 :

$\qquad$

(16) Fill in the chart on the right at the top of the page with the pattern of faces.

