

HurkleQuest Play-by-Email Games 01

The Hurkle Hiders [Bob & George] • HurkleHiders@aol.com

A bunch of years ago, we invented a simple game called **Hurkle** and published the first primitive version of Hurkle as a computer game in *People's Computer Company*, April 1973.

The Hurkle is a happy beast that lives in another galaxy on a planet named Lirht that has three moons. Hurkles are favorite pets of the Gwik, the most intelligent denizens of Lirht.

Paraphrased from "The Hurkle Is a Happy Beast," a story by Theodore Sturgeon, science fiction hall-of-fame author who lived in Eugene, Oregon.

We have invented new versions of Hurkle called **HurkleQuest** that use colors of the rainbow as "fuzzy feedback" clues.

- Hurkle hides in an interesting place such as a whole number on the number line, a grid point in Quadrant 1, a grid point in Quadrants 1 – 4, a town in Oregon, a state in the USA, a location on Mars, et cetera, et cetera.
- We send email invitations to play HurkleQuest by email.
- Players guess Hurkle's hiding place, typically three guesses each turn, and send their guesses by email to HurkleHiders@aol.com.
- The Hurkle Hiders send a color clue for each guess:
RED: very hot, very close to Hurkle's hiding place.
ORANGE: hot, close to Hurkle's hiding place, but not as close as RED.
YELLOW: warm, not as close as RED or ORANGE, but closer than GREEN.
GREEN: cool, not as close as YELLOW, ORANGE, or RED, but closer than BLUE.
BLUE: cold, far from Hurkle's hiding place, but closer than VIOLET.
VIOLET: very cold, very far from Hurkle's hiding place.

We have played HurkleQuest with teachers and their students, grades 1 through 6, in classrooms, by USPS mail, and by email.

Read stories of HurkleQuest games at Curriki.org.

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Go to **www.curriki.org** and, in the search box, enter **hurklequest**.

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HurkleQuest Number Line Games

Hurkle's hiding place is a number in a **domain** (set of numbers) such as whole numbers 0 to 100, 0 to 150, or 0 to 200. The domain can be adjusted to reinforce math standards for a specific grade level.

Make a big number line and post it on a wall, then play HurkleQuest on the Number Line. We use 3-inch wide adding-machine paper tape to make number lines. We bought a bunch of rolls at Staples, and procured the picture over yonder by a raid on the Staples web site.



- www.staples.com
- Item 531194. 3 inches by 150 feet. \$0.99

$\begin{array}{cccccccccccc} + & - & + & - & + & - & + & - & + & - & + & - \\ 0 & 1 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & & & \end{array}$
 et cetera, et cetera
 and so on out to 100 or 150 or 200 or more

Hurkle likes to use meter sticks and metric tape measures as number lines. Every centimeter mark is a possible Hurkle hiding place. Serendipity! Play HurkleQuest and learn a bit about the world-standard metric system of measurement units.

Hurkle loves the **four-sided meter stick** available from many suppliers of school math and science stuff. Of the four sides, our favorite is the side calibrated in centimeters, the right stuff for HurkleQuest in the domain of whole numbers 0 to 100. Every centimeter mark is a possible hiding place. Another side is calibrated in decimeters, another in millimeters, and one side is not calibrated. We pilfered the picture from:



- www.enasco.com/ProductDetail.do?sku=SB19024T
- Product Number: SB19024T. Price: \$7.65 (2007-09-18)

For the domain 0 to 150, Hurkle recommends a 150-centimeter tape measure that we found many moons ago, but can't locate now – we will keep looking. One side is yellow with every centimeter numbered big and bold. The other side is centimeter-numbered and decimeters are in alternating red, white, and green. Every centimeter is a possible hiding place.

Next: descriptions of HurkleQuest on the Number Line games that we have run.

HurkleQuest on the Number Line 0 to 100 is a beginner's game – first grade and up. Hurkle's hiding place is a **whole number** in the **domain** of whole numbers 0 to 100. We use a meter stick as a number line. Every centimeter mark from 0 to 100 is a possible hiding place.

HurkleQuest on the Number Line 0 to 150. Hurkle's hiding place is a whole number in the domain of whole numbers 0 to 150. We use a 150-centimeter metric tape measure as a number line. Every centimeter mark from 0 to 150 is a possible hiding place.

Variations of the above HurkleQuest on the Number Line games:

- Guesses must be sent in expanded form #1. Send 23 as 2 tens and 3 ones. Send 135 as 1 hundred, 3 tens, and 5 ones. Model the numbers with Base-10 blocks.
- Guesses must be sent in expanded form #2. Send 23 as $20 + 3$. Send 135 as $100 + 30 + 5$. Model the numbers with Base-10 blocks.
- Guesses must be sent in expanded form #3. Send 23 as $2 \times 10 + 3$. Send 135 as $1 \times 100 + 3 \times 10 + 5 \times 1$. Model the numbers with Base-10 blocks.

HurkleQuest in Composite Number Land. Hurkle's hiding place is a **composite number** in the domain of whole numbers 0 to 200. To get a color clue, a guess must be a composite number.

HurkleQuest in Prime Number Land. Hurkle's hiding place is a **prime number** in the domain of whole numbers 0 to 200. To get a color clue, a guess must be a prime number.

HurkleQuest in Integer Land. Hurkle's hiding place is an **integer** in the domain of integers -100 to 100 . The domain includes natural numbers, opposites (negatives) of natural numbers, and zero (0).

Below is a color diagram of the neighborhood around Hurkle's hiding place.

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Hurkle's hiding place is at the center of the red interval.

- The orange intervals are wider than the red interval.
- The yellow intervals are wider than the orange intervals.
- The green intervals are wider than the yellow intervals.
- The blue intervals are wider than the green intervals.
- The violet intervals just keep going and going and going – never-ending.

As you play, gather data. At the end of each game, organize the data and analyze the data. Use the data to begin learning about color clues as a **function** of distance from Hurkle's hiding place. In each number line game, we use the same color clues for distance from Hurkle's hiding place. Each game you play, you grab more data and learn more about color as a function of distance from Hurkle's hiding place. You and your students can explore data to obtain information, and then use the information to develop strategies for finding Hurkle's hiding place.

Special Numbers

We frequently pick a "special" number as Hurkle's hiding place. When the players have guessed Hurkle's hiding place, we tell them about the special number. Here are some special numbers in the domain of whole numbers 0 to 100.

- Prime numbers: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97
- Square numbers: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100
- Triangular numbers: 1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91
- Cubic numbers: 1, 8, 27, 64
- Factorial numbers: 1, 2, 6, 24
- Perfect numbers: 6, 28
- Fibonacci numbers: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89

Some numbers are special in more than one way:

- 1 is a square number, a triangular number, a cubic number, a factorial number, and a Fibonacci number.
- 2 is a prime number, a factorial number, and a Fibonacci number.
- 3 is a prime number, a triangular number, and a Fibonacci number.
- 5 is a prime number and a Fibonacci number.
- 6 is a triangular number, a factorial number, and a perfect number.
- 8 is a cubic number and a Fibonacci number.
- 13 is a prime number and a Fibonacci number.
- 21 is a triangular number and a Fibonacci number.
- 28 is a triangular number and a perfect number.
- 36 is a square number and a triangular number.
- 55 is a triangular number and a Fibonacci number.
- 64 is a square number and a cubic number.
- 89 is a prime number and a Fibonacci number.

HurkleQuest on the Number Line players learn about whole numbers, natural numbers, integers, the number line, distance on the number line, prime numbers, composite numbers, square numbers, triangular numbers, cubic numbers, factorial numbers, perfect numbers, Fibonacci numbers, et cetera, et cetera. They invent search strategies based on "fuzzy feedback" color clues.

Play together, learn together!

HurkleQuest in Quadrant 1

Post a big sheet of graph paper on a wall and play HurkleQuest in Quadrant 1. Hurkle suggests: Buy a roll of centimeter graph paper 76.2 centimeters wide by 30.48 meters long (30 inches by 100 feet). Cut off hunks that are the right size for 2-dimensional HurkleQuest games.

- Go to www.etacuisenaire.com. Search for IN5034. Graph paper on a roll, 1 cm grid.

HurkleQuest in Quadrant 1. Two-dimensional game. Hurkle's hiding place is a point (x, y) in Quadrant 1, where $0 \leq x \leq 50$ and $0 \leq y \leq 50$. There are $51 \times 51 = 2601$ possible hiding places.

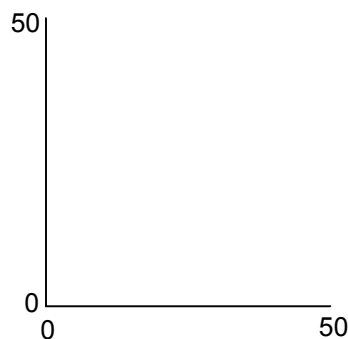
Hurkle's hiding place is a point (x, y) in Quadrant 1 of a two-dimensional space.

x and y are whole numbers.

x is a whole number from 0 to 50 ($0 \leq x \leq 50$).

y is a whole number from 0 to 50 ($0 \leq y \leq 50$).

There are $51 \times 51 = 2601$ possible Hurkle hiding places

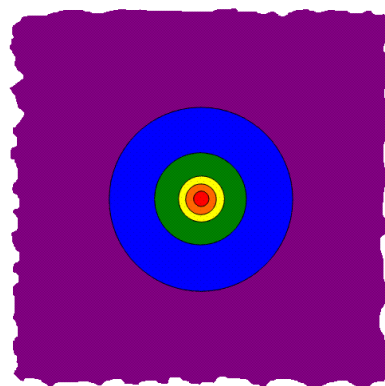


Each turn you send three guesses to HurkleHiders@aol.com. If your guesses are $(20, 30)$, $(40, 50)$, and $(60, 70)$, send them as shown here:

- Guess #1: $(20, 30)$
- Guess #2: $(40, 50)$
- Guess #3: $(60, 70)$

We measure and calculate the **distance** of each guess from Hurkle's hiding place. The distance is the length of the line segment connecting your guess and Hurkle's hiding place. We send a color clue for each of your guesses. Here are the possible clues:

- RED: Very Hot. Very close to Hurkle's hiding place.
- ORANGE: Hot. Close to Hurkle's hiding place, but not as close as RED.
- YELLOW: Warm. Not as close as ORANGE, but closer than GREEN, BLUE, or VIOLET.
- GREEN: Cool, not as close as YELLOW, closer than BLUE.
- BLUE: Cold. Far from Hurkle's hiding place.
- VIOLET: Very cold. Very far from Hurkle's hiding place.



HurkleQuest in Quadrants 1, 2, 3, and 4

Post a big sheet of graph paper on a wall and play HurkleQuest in Quadrants 1, 2, 3, and 4. Hurkle suggests: Use centimeter graph paper 76.2 centimeters wide by 30.48 meters long (30 inches by 100 feet). Cut off hunks that are the right size for 2-D HurkleQuest games.

- Go to www.etacuisenaire.com. Search for IN5034. Graph paper on a roll, 1 cm grid.

HurkleQuest in Quadrants 1, 2, 3, and 4. Two-dimensional game. Hurkle's hiding place is a point (x, y) in Quadrant 1, 2, 3, or 4, where $-25 \leq x \leq 25$ and $-25 \leq y \leq 25$.

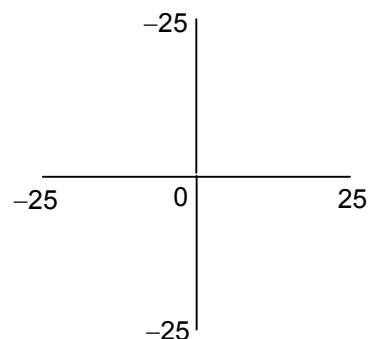
Hurkle's hiding place is a point (x, y) in Quadrant 1, 2, 3, or 4 of a rectangular coordinate system.

x and y are integers.

x is an integer -25 to 25 ($-25 \leq x \leq 25$).

y is an integer -25 to 25 ($-25 \leq y \leq 25$).

There are $51 \times 51 = 2601$ possible Hurkle hiding places.



Each turn you send three guesses to HurkleHiders@aol.com. If your guesses are $(15, 20)$ in Quadrant 1, $(-10, 18)$ in Quadrant 2, and $(-12, -13)$ in Quadrant 3, send them like this:

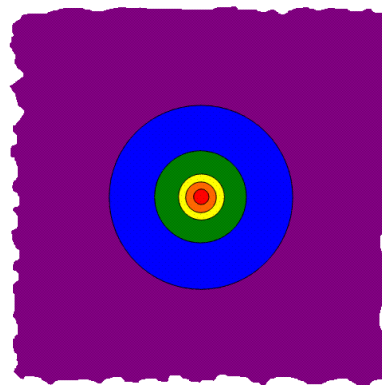
Guess #1: $(15, 20)$

Guess #2: $(-10, 18)$

Guess #3: $(-12, -13)$

We measure and calculate the **distance** of each guess from Hurkle's hiding place. The distance is the length of the line segment connecting your guess and Hurkle's hiding place. We send a color clue for each of your guesses. Here are the possible clues:

- RED: Very Hot. Very close to Hurkle's hiding place.
- ORANGE: Hot. Close to Hurkle's hiding place, but not as close as RED.
- YELLOW: Warm. Not as close as ORANGE, but closer than GREEN, BLUE, or VIOLET.
- GREEN: Cool, not as close as YELLOW, closer than BLUE.
- BLUE: Cold. Far from Hurkle's hiding place.
- VIOLET: Very cold. Very far from Hurkle's hiding place.



HurkleQuest in Oregon

Post a map of Oregon on a nearby wall and play HurkleQuest in Oregon. Hurkle's hiding place is a hamlet, village, town, or city in Oregon.

Each turn, send three guesses to the HukelHiders@aol.com.

Guess #1: A hamlet, village, town, or city in Oregon

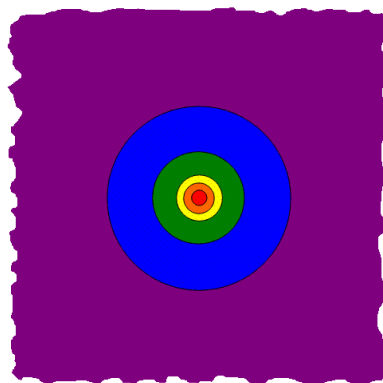
Guess #2: A hamlet, village, town, or city in Oregon

Guess #3: A hamlet, village, town, or city in Oregon



The Hurkle Hiders use a **metric tape measure** to measure the **distance** in **centimeters** from each guess to Hurkle's hiding place, then use the **map scale** to calculate the distance in kilometers. This distance is as the Western Meadowlark (Oregon's state bird) flies. It is the length of a **line segment** connecting a guess to Hurkle's hiding place. We return a color clue for each guess.

- RED: Very Hot. Very close to Hurkle's hiding place.
- ORANGE: Hot. Close to Hurkle's hiding place, but not as close as RED.
- YELLOW: Warm. Not as close as ORANGE, but closer than GREEN, BLUE, or VIOLET.
- GREEN: Cool, not as close as YELLOW, closer than BLUE.
- BLUE: Cold. Far from Hurkle's hiding place.
- VIOLET: Very cold. Very far from Hurkle's hiding place.



We use the American Automobile Association Oregon/Washington map (ISBN 1-56251-992-1). To request a map, contact AAA at 1-800-529-3222 or send email to auttvl@aaaoregon.com.

The **map scale** is **1 : 1,013,760**. One centimeter on the map represents 1,013,760 centimeters in real-world Oregon. We converted 1,013,760 centimeters to meters and kilometers.

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| • Map scale: 1 centimeter : 1,013,760 centimeters | 1 cm : 1,013,760 cm |
| • Map scale: 1 centimeter : 10,137.60 meters | 1 cm : 10,137.60 m |
| • Map scale: 1 centimeter ; 10.137.60 kilometers | 1 cm : 10.13760 km |
| • Map scale: 1 centimeter : 10.14 kilometers (rounded) | 1 cm : 10.14 km |

We measured distances on the map in centimeters and then used the map scale (1 cm : 10.14 km) to convert the distances to kilometers. These are NOT driving distances. They are distances as the Western Meadowlark might fly in a straight line between the two points.

	Centimeters	Convert to kilometers
NW corner of OR to SE corner of OR	71.0	$(71.0 \text{ cm})(10.14 \text{ km/cm}) = 720 \text{ km}$
Brookings to Astoria	45.3	$(45.3 \text{ cm})(10.14 \text{ km/cm}) = 459 \text{ km}$
Pendleton to Baker City	12.5	$(12.5 \text{ cm})(10.14 \text{ km/cm}) = 127 \text{ km}$
Klamath Falls to Bend	20.3	$(20.3 \text{ cm})(10.14 \text{ km/cm}) = 206 \text{ km}$
Lakeview to Burns	18.5	$(18.5 \text{ cm})(10.14 \text{ km/cm}) = 186 \text{ km}$

Suppose that Hurkle's hiding place is Newport, Oregon and a team sends these guesses:

Guess #1: Eugene
 Guess #2: Bend
 Guess #3: Baker City

We measure, calculate, look up stuff, and reply:

Guess #1: Corvallis Clue: GREEN
 Guess #2: Bend Clue: VIOLET
 Guess #3: Baker City Clue: VIOLET

Corvallis is in Benton County and is the home of Oregon State University.

Latitude: 44.57 N. Longitude: 123.28 W.
 Elevation: 69 meters.
 Area: 35 square kilometers.
 Population: 49,807 (2006 estimate).

Bend is in Deschutes County and calls itself "the sunny side of Oregon."

Latitude: 44.07 N. Longitude: 121.31 W.
 Elevation: 1106 meters.
 Area: 83 square kilometers.
 Population: 75,290 (2006 estimate).

Baker City is in Baker County on the Historic Oregon Trail..

Latitude: 44.78 N. Longitude: 117.83 W.
 Elevation: 1049 meters.
 Area: 18 square kilometers.
 Population: 10,035 (2006 estimate).

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Look for more HurkleQuest stuff at www.curriki.org.

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