Puzzled Pint ⌊π⌋/24

March 2024
Mathematics

Give us Feedback!

Answer Sheet

Welcome to Puzzled Pint!

Tonight

- We're here to help! This is not a competitive event. Ask the Game Control volunteers (GC) for hints as often as you'd like. The goal is to have fun, not to be frustrated!

The Puzzles

- Each puzzle's solution is a short word or phrase. How do you find it? That's for you to discover!
- Need a code sheet or solving resources? Check out the Resources page on Puzzled Pint's webpage: http://www.puzzledpint.com/resources/
- You can use anything to help solve: Use your phone: the internet is fair game! Think your brother might have an insight? Give him a call!
- While each month has a theme, you need no special knowledge of the theme to solve the puzzles.

About Puzzled Pint

- We're an all-volunteer 501c3 organization.
  - Help us run locally: Talk with Game Control about how you can volunteer.
  - Help us run globally: https://www.patreon.com/PuzzledPint

We are always looking for puzzle sets for future months! Check out how you can could write puzzle for Puzzled Pint by going here: http://www.puzzledpint.com/info/author/

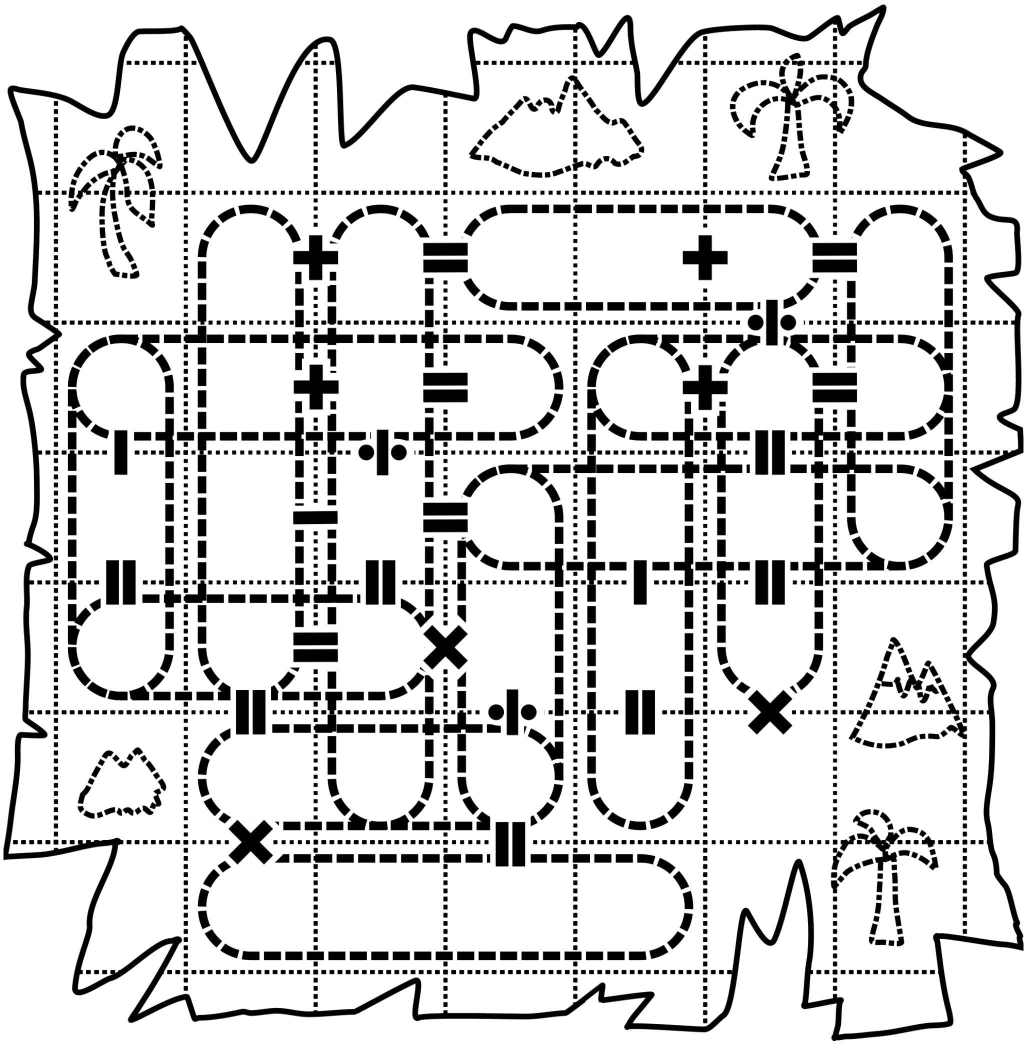
Team Name:	**Start Time:**
Team Size:	**End Time:**

Puzzle Answers	
Arithmetic Island	
Light Angles	
Cooking Ratios	
Basic Graphs	
Checkpoint! Have GC verify your answers to receive the Meta puzzle.	
Meta: 88.8888... MPH	
Bonus: Roman Adder (optional)	

How did tonight go? Email feedback@puzzledpint.com or fill out the survey with the QR code above.

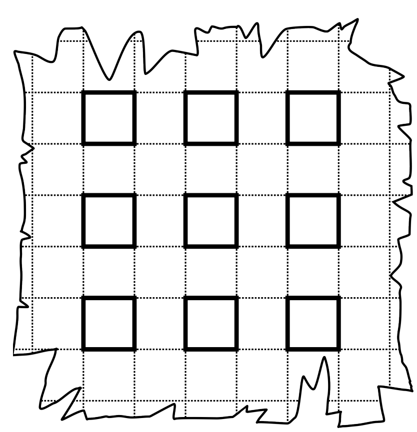
Arithmetic Island

You've been stranded on an island with only this confusing map to help you.



Across
Feathery wrap
Tranquil
Narcotic shrub
Pupil's place
_____ d'oeuvres
Crew tool
Greek T

Down
Alleviate
Circle part
Taxi
Tilling tool
Western alliance (abbr.)
Questionable, in slang
Sealed resting place



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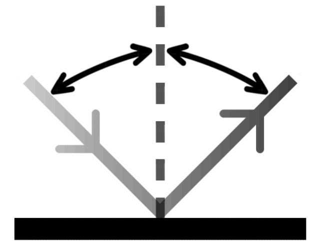
Light Angles

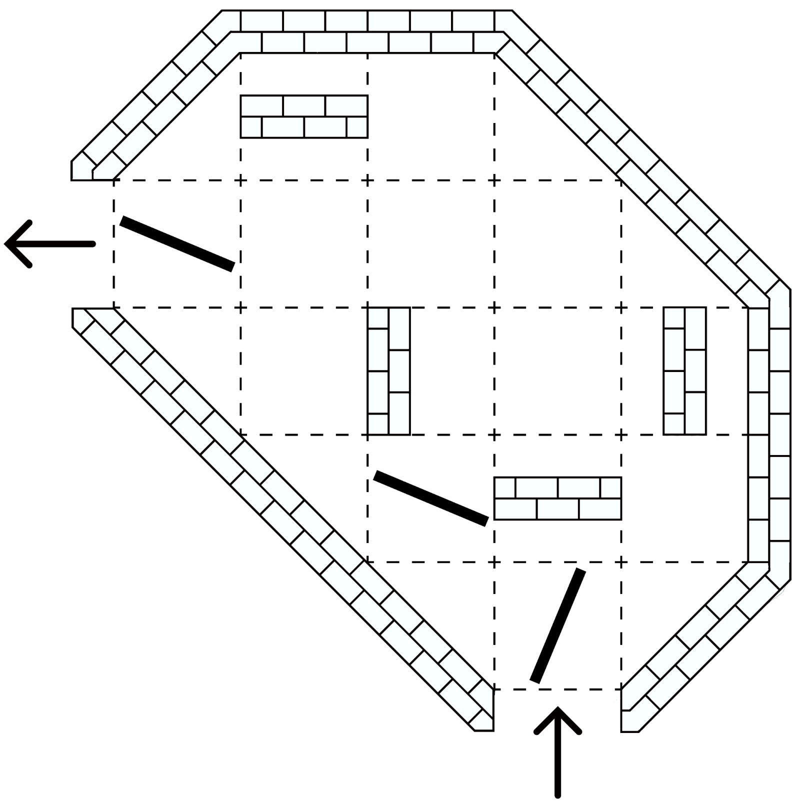
*What are these angles? What is the light **signaling**?*

Put all of the mirrors into the box so light enters from the ↑, exits from the ←, and bounces off all of the mirrors. When a beam of light reflects off of a mirror, it bounces back at the same angle that it approaches the mirror (example shown on the right). The beam of light will always pass through either the corner or the center of the side of the boxes.

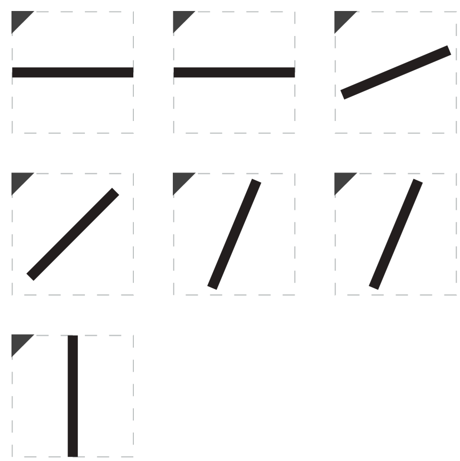


The walls in the chamber (inside and outside) are not reflective, and the dashed grid lines are transparent.

Three of the ten mirrors have already been installed. You decide to label the remaining seven and make a note so you can remember their order.



MIRRORS:



The black triangles are at the top left corners of the mirrors.

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Cooking Ratios

Cooking is all about math —
trying to get proportions just right.

You have 10 units of SPICE, 9 units of BUTTER and 9 units of FLOUR. You want to make three recipes — cake, pie, and muffins — each of which require whole-number amounts of flour, spice and butter. Unfortunately, you've lost the recipe book! However, you remember the following things:

- ☐ In total the recipes will use up all of the ingredients.
- ☐ Each recipe uses a unique amount of each ingredient.
- ☐ For each ingredient, a unique amount is used across the three recipes.
- ☐ For the cake, the units of flour plus the units of spice equals the units of butter.
- ☐ For the muffin, the units of butter plus the units of spice equals the units of flour.
- ☐ Only the cake uses more units of butter than spice.
- ☐ The cake's units of spice plus the muffin's units of spice equals the pie's units of spice.
- ☐ The cake uses the least amount of flour and the least amount of spice.
- ☐ The muffin uses four more units of flour than the cake.

	Cake	Pie	Muffin
SPICE	____ (1)	____ (2)	____ (4)
BUTTER	____ (3)	____ (5)	____ (8)
FLOUR	____ (6)	____ (7)	____ (9)

_ _ _ _ _   _ _ _ _

(1) (2) (3) (4) (5)   (6) (7) (8) (9)

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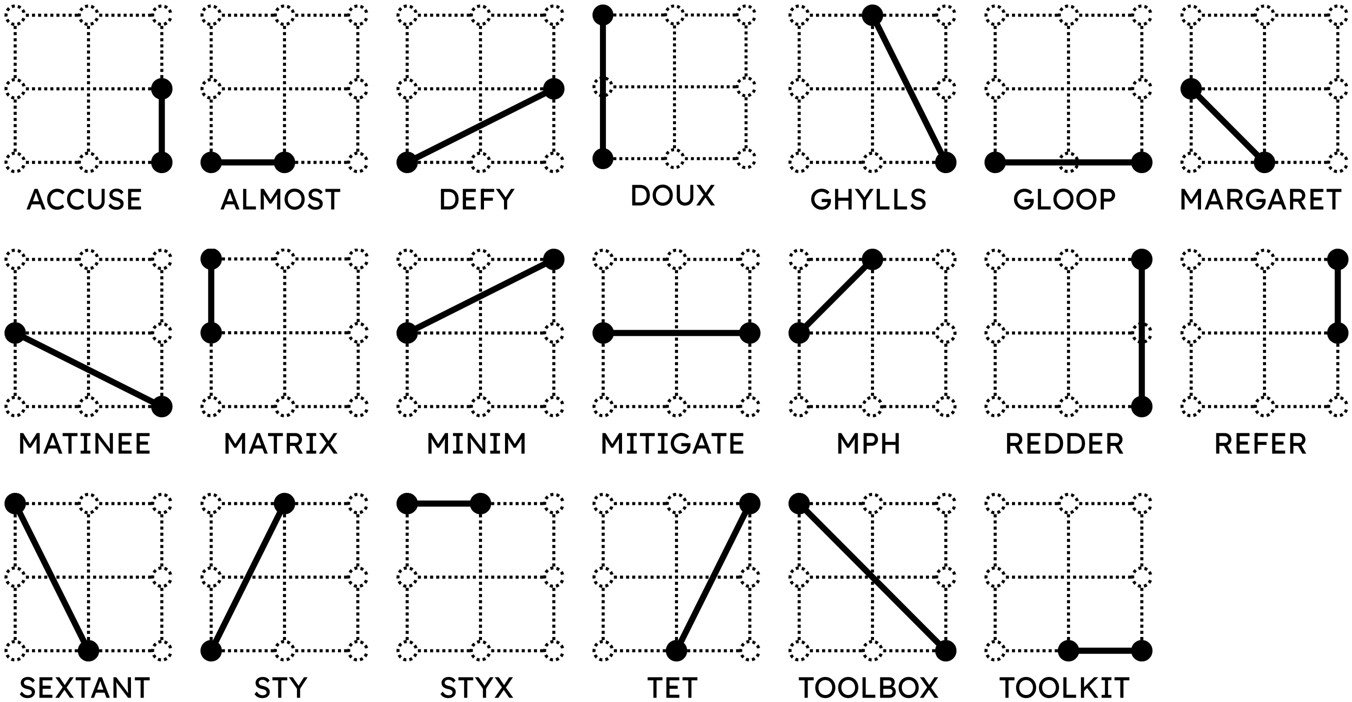
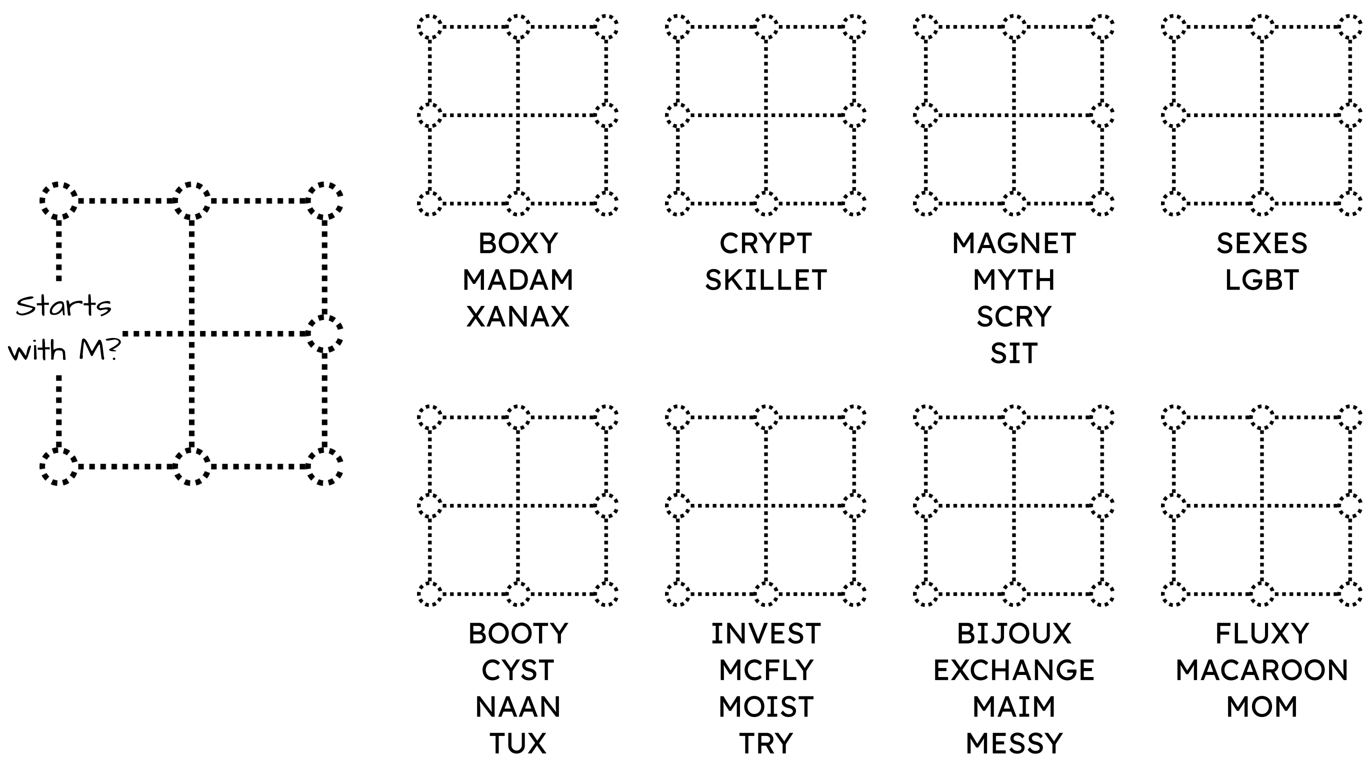
Basic Graphs

*Line segments connect two **points**.*
*Look closely to find the **properties** that connect them.*

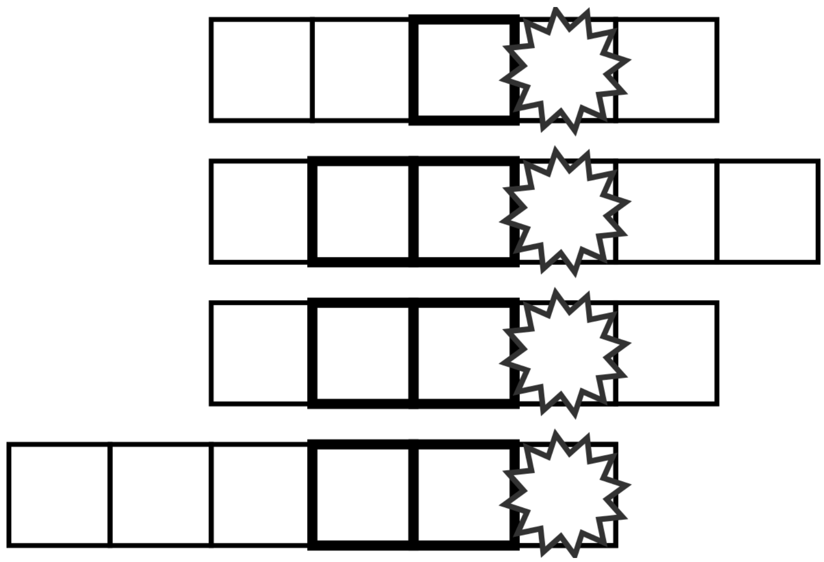
EXAMPLES:





88.8888… MPH

What should the mathematician do when she’s late driving to work?



Roman Adder (Page 1/2)

What sort of game is this?

In the equations on the next page, replace each letter with a Roman numeral so that the equations are mathematically correct. Every 'word' follows standard Roman numeral rules.

The same values are used for all of the letters across all of the equations — if A represents I (1) in the first equation, then any instance of A in any other equation is also I (1).

In addition, *you can't have 2 letters standing for the same Roman numeral in the same word.* (E.g., in the word MATH, it's not possible for both T and H to correspond to the numeral I (1)).

The letters I (1), V (5), X (10), L (50), C (100), D (500), and M (1000) take their normal Roman numeral values.

In the diagram at the bottom of the second page, fill in the columns associated with each Roman numeral with the corresponding letters in alphabetical order.

How Roman Numerals Work[1]:

1. Numerals are generally written largest to smallest (Ms before Ds, Ds before Cs, etc.)
2. When I, X, C or M are repeated, their sum represents the value (XX = 10 + 10 = 20).
3. A numeral can't appear more than 3 times in a row (e.g., you can't write 40 as XXXX).
4. V, L, and D are never repeated.
5. Placing a numeral *after* one of greater value results in their sum (e.g, VI = 5 + 1 = 6).
6. When an I, X, or C is *before* a numeral of greater value, it's subtracted from the following numeral.
7. When an I, X or C is *between* two numerals of greater value, it's subtracted from the numeral on its right (e.g., XIV = 10 + (5 - 1) = 14).

[1] Adapted from www.cuemath.com/numbers/roman-numerals.

Roman Adder (Page 2/2)

Puzzled Pint ⌊π⌋/24 BONUS

Rules Summary:

- Each letter is replaced by a single Roman numeral.
- Each letter represents the same Roman numeral across all equations.
- Within each word, each distinct Roman numeral is assigned to a single letter.
- Roman numerals are assigned to themselves, e.g. M = M.

```
  M A T H
+ P I
  M O R E
```

```
  J U L I E
+ A N T
  M U N R O E
```

```
  B U L K Y
+ C A P E
  G U C C I
```

```
  J A Z Z
+ S U X X I X
  M C U R L Y
```

```
  S M A S H
+ S A L E
  G N A W
```

```
  B A A T H
+ D O R R Y
  Q U A C K
```

```
  M U F F Y
+ A C E
  M U S A V I
```

1	5	10	50	100	500	1000
I	V	X	L	C	D	M
I			L	C	D	
	V	X				M