



## LOCKED OUT MATH: GUNSMOKE AND GOLD

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Welcome to Locked Out Math: Gunsmoke and Gold. This is a fun, escape room experience that is ‘wild west’, ‘red-dead’ themed. This locked room is designed for grade 8+ students, but I’ve used (with great success) in grade 8-12 classes. Some of the main concepts students will **need** to solve the puzzles are listed below:

- Circle Geometry (need circle theorems)
- Logic and Reasoning
- Algebra with distance/speed/time
- Rates
- Probability
- Scale factors
- Unit Conversions
- Circular constructions with compass.

Completing the entire escape room is intended to take 60-120 minutes (depending on strength of students). This document includes instructions for each of the three parts, and all printable files. Each answer sheet includes scannable QR codes, so students may continue to play along for homework.

## INSTRUCTIONS

The room is split up in to three main parts. The description and goal of each is listed below:

1. Find where the safe is located (answer sheet is on back of letter)
2. Find the lock combination to the safe (optional printable ticket)
3. Locate the region on the map where the gold is buried (answer sheet is map)

These are all the materials included and directions on how to use them:

- **Description:** This gives students the story of what is going on. Groups play as sheriff/deputies on the hunt to lost gold after Wyatt Factor was murdered by Vector Slade.
- **Letter with Answer Sheet:** This should be printed off for each group participating at the start of the escape room. If you really want to give the students a challenge, they can attempt to solve the mystery without the answer sheet (I gave this challenge to colleagues for a fun staff collaboration activity).
- **Wyatt's Ranch:** This is where the majority of the clues/riddles/puzzles are for this escape experience. I recommend printing one large tabloid copy for all students. You can also access this digitally using this link (or scannable qr codes on answer sheets).
- **Wyatt's Journal:** This contains a probability puzzle used to unlock the safe, and two rate puzzles that are needed to find the location of the gold old the map.
- **Horses and Descriptions:** Part of the puzzle involves matching horses to descriptions to symbols that match the solved circle geometry problems. I recommend printing one large copy of all these sheets for everyone who is participating.
- **Safe:** Students should only be granted access to the safe once they have identified where it is hidden. I recommend printing one large copy for all students to view as they figure out where it was hidden.
- **Scannable Ticket:** This is a ticket for students to submit answers for the safe code. It also contains a scannable QR code if students want to finish finding the code for homework. This sheet is totally optional.
- **Mini-Safe Snswer Sheet:** This is for students to write down the lock code for the safe on to submit (I always emphasize to students not to yell out answers and ruin the experience for others.) It also has a scannable QR code to the safe.
- **Map:** This should only be given to each group after they have i) uncovered the safe, and ii) provided the lock combination for the safe. To succeed in finding the gold students need to submit a map with the correct region shaded in. It also contains a scannable QR code if students want to finish the escape room for homework.
- **Answers:** Answers to all puzzles are written here. There is also solutions to the algebra/probability problems. This particular escape room has been play tested many times.

## GUNSMOKE AND GOLD

Welcome to the wild frontier of Shadow Creek Valley, where you serve as the town's fearless sheriff, keeping the peace and upholding justice. Life has been quiet—until today.

This morning, you received a desperate letter from Rancher Wyatt Factor, one of the hardest working folks in the territory. He struck it rich—gold! But fortune brings danger, and word of his discovery spread fast. Now, a gang of ruthless outlaws, led by the infamous Vector Slade, is after him.

Unfortunately, you were too late. Wyatt was found slumped over his desk at the general store, his face planted in a half-finished ledger, numbers scrawled across the page. At first, folks thought he had just worked himself to death—but then someone noticed the bullet hole clean through his abacus. The Sigma Bandits had gotten to him first.

But Wyatt was no fool. Before they could take him out, he left behind a set of clues leading to his hidden gold.

Now, it's up to you. The gang is onto you, and they won't let anyone else get their hands on that treasure. Can you crack the clues, find the gold, and bring justice to Paradox Gulch before the outlaws catch up? Saddle up, Sheriff—this is a race against time!

If you are reading this, it means I am already in a heap of trouble—or worse. I do not have much time, so listen close.

A few weeks back, I struck gold out near Split Canyon. Kept it quiet, figured I would stash it safe until I could cash in proper. But word got out, and now Vector Glade and his Sigma Bandits are breathing down my neck. They want the gold, and I have no doubt they would kill to get it.

I am not about to let them have it, so I hid it where no outlaw would think to look. Trouble is, I do not reckon I will live long enough to dig it up myself. That is where you come in.

I left clues scattered around my ranch—numbers, symbols, things that might not mean much at first. But put them together right, and they will lead you straight to the stash. Start by locating my safe, the back of this letter should help you out.

I trust you will do what is right. If Glade gets to me before you do, just know—I was not about to go down easy.

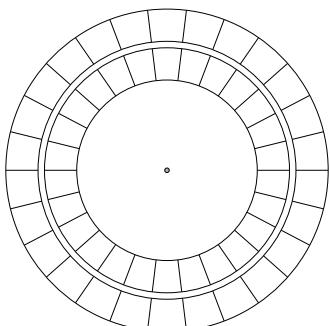
Stay sharp, Sheriff. You are my last hope.

With regards,

A large, stylized, handwritten signature of the letter 'W' in dark red ink, with a vertical line extending from its top right.

Wyatt Factor

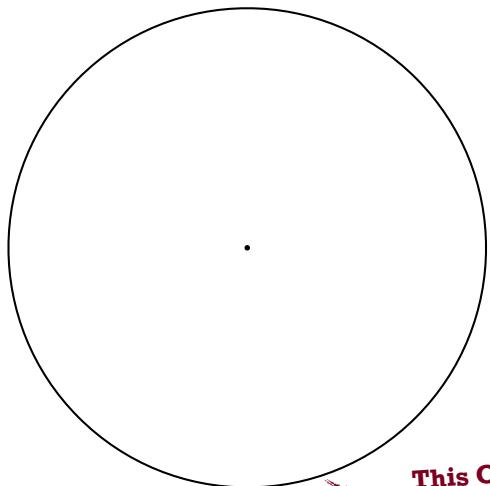
X	Q	C	K	J	P	M	O
S	C	P	L	W	E	M	Z
B	L	S	C	O	T	N	Q
Y	K	L	Z	N	T	V	K
M	R	D	O	A	E	X	D
H	D	Y	L	E	K	Z	N
T	Z	V	K	O	O	G	D
B	F	U	O	O	S	!	?



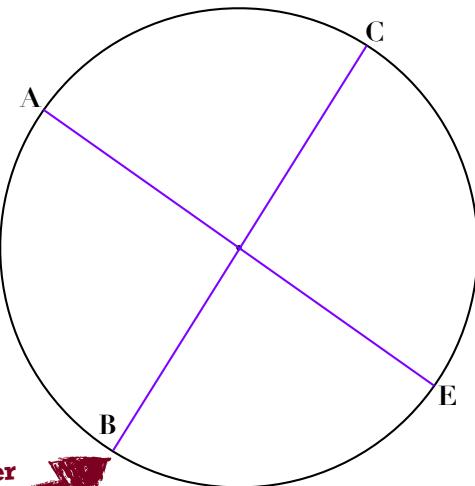
Name	Symbol	Value

What time is it?

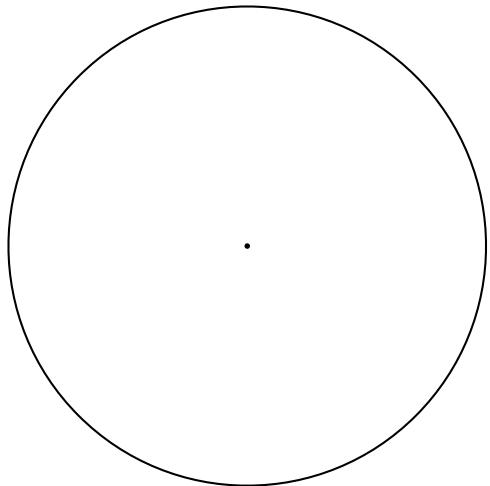
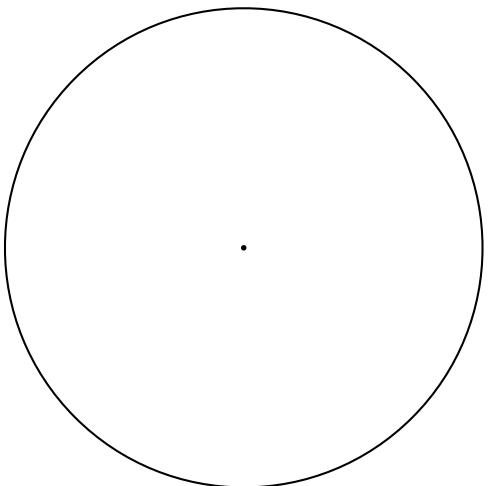
B, O, C, D, E



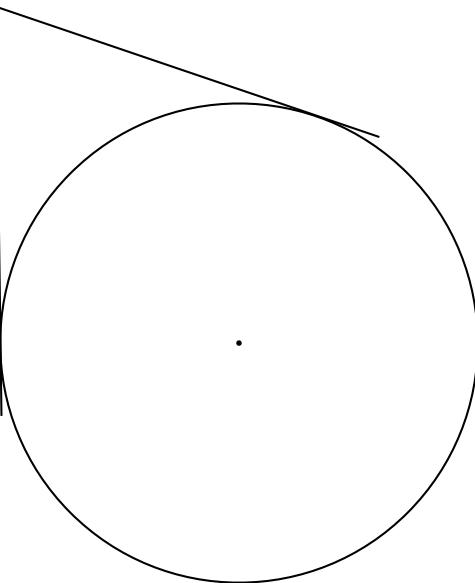
A, B, C, F, G, O



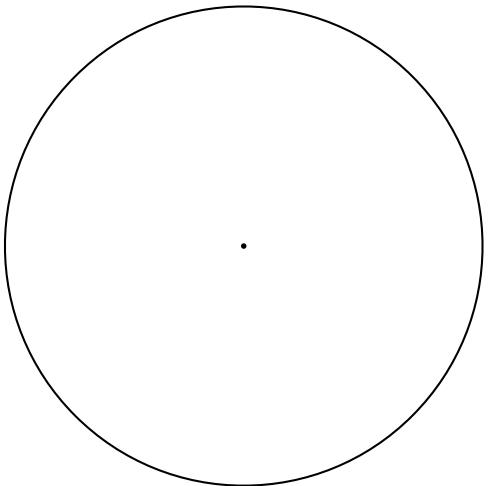
I, J, K, H, L, O



L, M, N, I, O



R, O, Q, N



M, N, P, Q, S

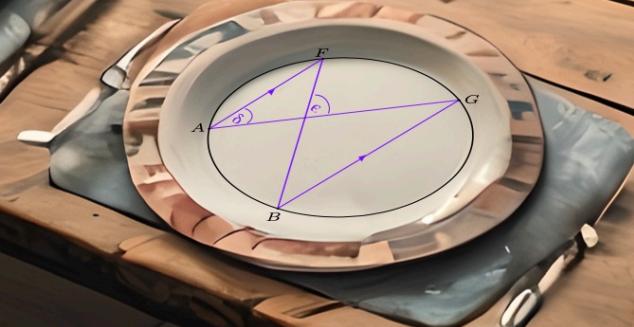
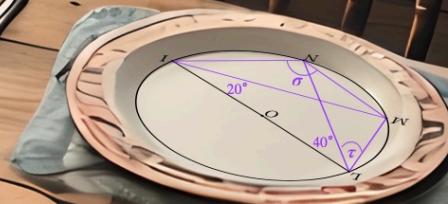
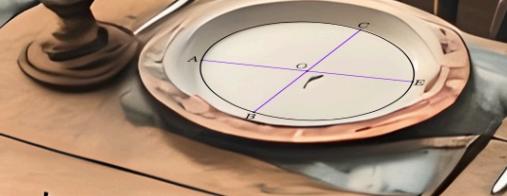
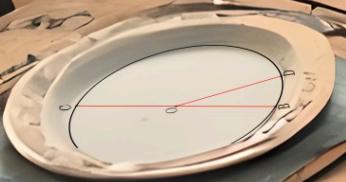
Straight Lines: BOC, AOE, LOI

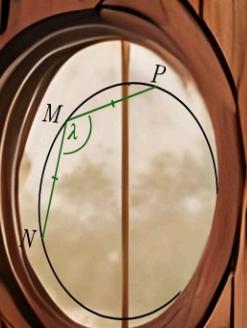
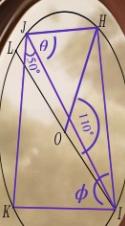
Tangents: NR, QR



X	Q	C	K	J	P	M	O
S	C	P	L	W	E	★	Z
B	L	S	C	○	T	N	★
Y	K	★	★	N	T	V	K
M	R	D	O	A	★	X	D
H	D	Y	★	E	K	Z	N
★	Z	★	K	O	G	D	
B	F	U	O	O	S	!	★

FOUR bullet holes in each row/column  
FOUR circles in each row/column  
Circle the letters that you don't shoot  
No continuous runs of bullet holes > 2.  
No continuous runs of circles > 2.  
DON'T SHOOT THE RED LETTERS





March 14: Darn fool cow made a break for it today. That stubborn heifer wandered off at a steady pace, covering 33 and one-third meters every minute. By the time I noticed, she was long gone.

Lucky for me, Cinder Hooves might have the fastest legs this side of Valley. Starting from the same spot, 15 hours later, he tore off at full speed and caught up to where the cow had wandered in just two hours flat. That horse never fails to impress.

April 20: Had ourselves a real showdown at the course today - Thunderbolt against Diamond Blaze, racing full tilt. We already knew Thunderbolt had the edge, running a full 12 kilometers per hour faster than Blaze, but we wanted to see just how much faster.

In 40 minutes, Thunderbolt ran 20 laps of the course - blazing fast. Both of 'em were giving it everything they had, but Diamond Blaze has got nothing on Thunderbolt.

April 30: Had myself a fine time at the saloon tonight. Ol' Rufus McGraw - sharpest gambler in the valley taught me a new game. Simple enough: you pull all the face cards (and aces) out of a deck, draw one at random, and win if the number has an odd number of positive divisors. Otherwise, you lose. Didn't think much of it at first, but wouldn't you know it? I won three times in a row. Got me thinking - what's the probability of winning at least once in three games? Figured it might just be a number worth remembering. I wrote the probability in lowest terms as  $\frac{a}{b}$  and worked it into my safe code. If I ever need a reminder, all I gotta do is think back to that lucky night at the saloon, with Rufus dealing and the whole place buzzing.

May 4: Finally got the gold buried today. Spent the better part of the morning making the map - wanted to be sure I could always find my way back if need be. Can't take any chances with the likes of Vector Glade sniffing around.

If Cinder Hooves ran full tilt from Gambler's Gulch, he'd reach the spot in 30 minutes flat. Thunderbolt, being the fastest of the lot, would make it there in 13 and one-third of a minute from Rustwater Springs. And Diamond Blaze, steady as ever, would take exactly 32 and a half minutes to get there at top speed from Dead Man's Point.

1. Dead Man's Point → 
2. Rustwater Springs → 
3. Gambler's Gulch → 

## DUST DEVIL

A sturdy brown stallion with a wild heart, Dust Devil is as untamed as the desert wind. Known for his sheer speed, he once outran a sandstorm, leaving nothing but a swirling cloud in his wake. He has a reputation for escaping pens and breaking past fences, always running toward the open plains where he truly belongs. But life on the frontier has left its marks—he's missing an ear, a testament to a close encounter with a rustler's rope that he barely managed to escape.

## SILVER GHOST

A ghostly grey mare In her *prime*, she was the fastest horse in the valley, known for vanishing into the mist just as quickly as she arrived. that appears and disappears like mist in the early morning. Riders whisper that she once helped an outlaw vanish into the fog when the sheriff was hot on his trail. With a silent gait and piercing eyes, Silver Ghost moves like a shadow, only truly seen when she wants to be.

## PINTO BANDIT

With his bold brown-and-white patches, Pinto Bandit looks as rebellious as he acts. Famous for slipping through ranch hands' fingers, he has an uncanny ability to dodge ropes and jump fences. He once won a high-stakes race after taking an unexpected shortcut through the town's general store—knocking over barrels but never slowing down. His painted coat, a mix of deep brown and bright white, makes him easily recognizable, yet he vanishes just as easily when he wants to.

## PENTAGON PETE

Pentagon Pete is a mystery wrapped in a legend. Some say the pentagon marking is a sign of good fortune, while others believe it's a bad omen. He was once bet on in a major race, but just before the finish line, he stopped abruptly—letting another horse win, as if he had a mind of his own. His sharp instincts and unpredictable nature have made him a favorite among gamblers and storytellers alike.

## PATCHWORK RANGER

This striking horse, with a massive white patch covering his body, looks like he's wearing a ranger's cloak. Once the trusted companion of a Texas lawman, Patchwork Ranger is known for his fearless nature. Even when surrounded by danger, he stands firm, ready to carry his rider to safety. His unique white markings contrast against his darker coat, making him stand out in any herd—just like the ranger who once rode him.

## STARSTRIDER

With star-shaped patches on his coat, Starstrider looks like he carries the night sky on his back. This horse is known for his endurance, once running for days across the prairie without tiring. Some cowboys believe making a wish while he gallops will bring good luck, but only if you can keep up with him.

## CINDER HOOVES

A fierce mustang with a mix of white, brown, and black patches, Cinder Hooves has a reputation for speed and unpredictability. Legends say that his hooves spark against the ground when he runs, leaving a trail of embers behind him. He once led an entire herd to escape from a group of wranglers, vanishing into the night like a ghost. His painted coat of black and white gives him the appearance of a rolling thundercloud just before a storm.

## DIAMOND BLAZE

A dazzling white stallion with a perfectly shaped rhombus patch, Diamond Blaze is the jewel of the racetrack. He's won more races than any horse in the territory, always finishing with a powerful burst of speed. Riders say his hooves barely touch the ground when he runs, like he's flying over the earth. His stark white coat gleams under the sun, making him one of the most recognizable—and admired—horses in the West.

## FROSTBITE FURY

A jet-black stallion with frosted white-tipped ears, Frostbite Fury is a horse that commands respect. Bred in the cold northern plains, he has the strength to charge through snowstorms without hesitation. Some say he once led a stranded cowboy to safety during a blizzard, never once slowing down until they reached shelter. His dark coat against the snowy landscape makes him look like a shadow moving through the ice and wind.

## THUNDERBOLT

Marked by a natural lightning bolt pattern, and a jet black coat, Thunderbolt is the fastest horse in the West. His hooves pound the ground like rolling thunder, and when he runs, it's as if a storm follows him. He's won every race he's entered, always leaving his rivals in the dust. Some say he was struck by lightning as a colt and has carried its energy ever since. His speed is unmatched, and his striking bolt-shaped marking makes him a legend on the frontier.









 $\delta$  $2\theta$  $\zeta$  $\psi$

Frostbite Fury

-

Starstrider

x

Dust Devil

+

Cinder Hooves

-

Silver Ghost

+

Thunderbolt

+

Diamond Blaze

+

a

+

Pentagon Pete

b

+

Patchwork Ranger

÷

Pinto Bandit



What is the code to the safe?

— — — —



What is the code to the safe?

— — — —



What is the code to the safe?

— — — —



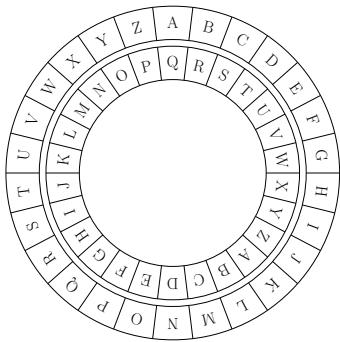
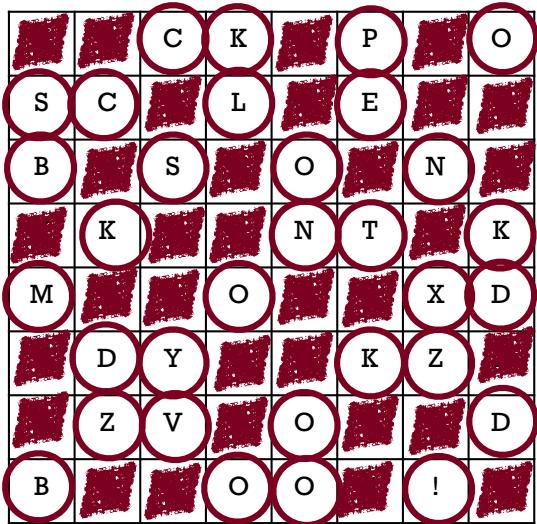
What is the code to the safe?

— — — —

Shade the region where Wyatt's gold is hidden

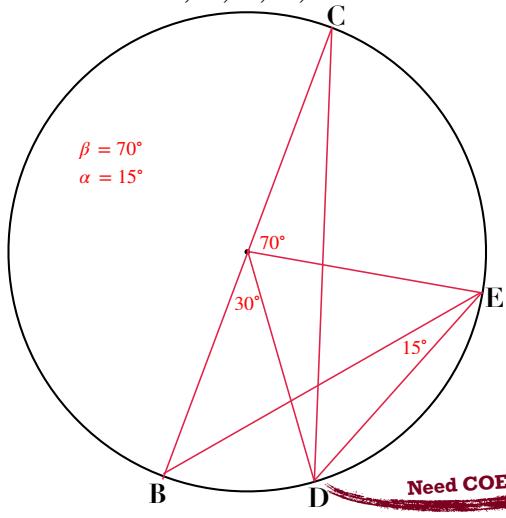


CKPOS CLEBSON KNT KMO XD DYK ZZ VOD BOO !  
SAFE IS BURIED ADJACENT TO APPLE TREE !

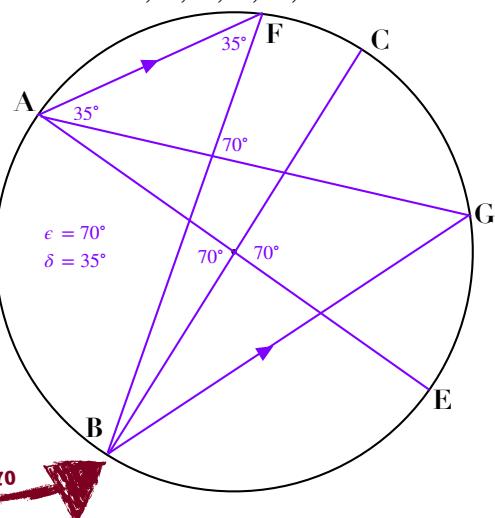


Name	Symbol	Value
Dust Devil	$\alpha$	15
Silver Ghost	$\theta$	55
Pinto Bandit	$\beta$	70
Pentagon Pete	$\lambda$	116
Patchwork Ranger	$\epsilon$	70
Starsstrider	$\tau$	30
Cinder Hooves	$\phi$	75
Diamond Blaze	$\gamma$	70
Frostbite Fury	$\delta$	35
Thunderbolt	$\sigma$	110

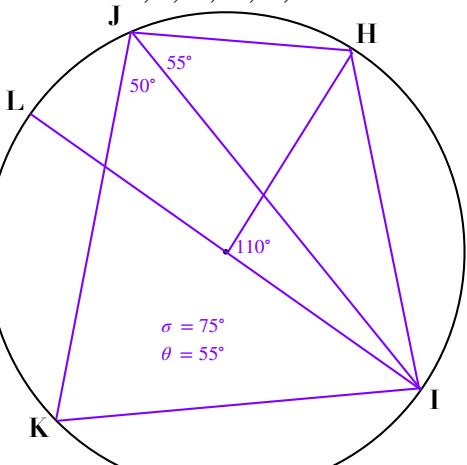
B, O, C, D, E



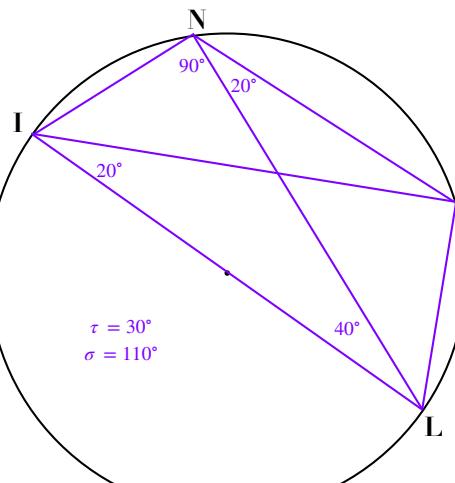
A, B, C, F, G, O



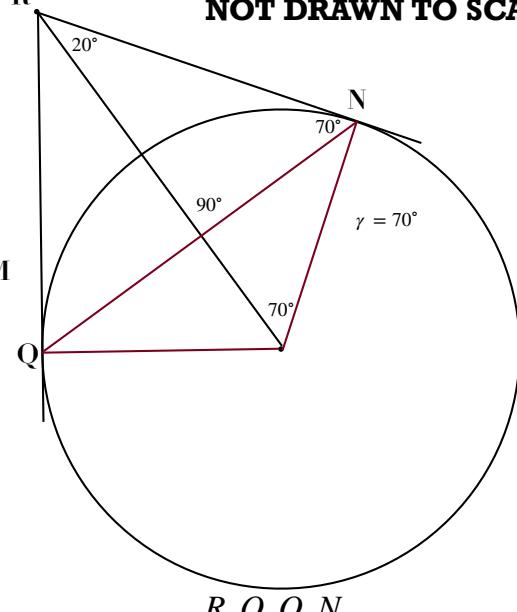
I, J, K, H, L, O



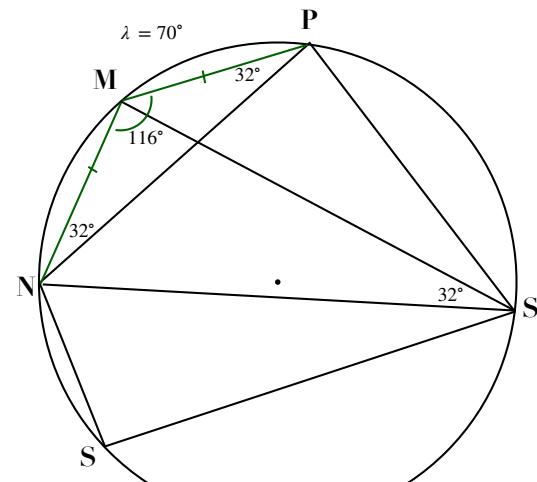
NOT DRAWN TO SCALE



L, M, N, I, O



R, O, Q, N



M, N, P, Q, S

Straight Lines: BOC, AOE, LOI

Tangents: NR, QR

## SOLUTIONS TO VARIOUS PROBLEMS

**March 14:** The cow is walking for 17 hours, while Cinder Hooves only for the last 2 hours. They cover the same distance.

	Speed	Distance	Time
Cow	$33 \frac{1}{3} \text{ m/min} = 2 \text{ km/hr}$	34 km	17
Cinder Hooves	17 km/hr	34 km	2

**April 20:** Each lap of the track is 1.2 km (from photo next to door). So the total distance travelled by Thunderbolt is  $20 \times 1.2 = 24\text{km}$

	Distance	Speed	Time
Thunderbolt	24 km	$s = 24 \text{ km} \div \frac{2}{3} \text{ hr} = 36 \text{ km /hr}$	$40 \text{ min} = \frac{2}{3} \text{ hr}$
Diamond Blaze		$s - 12 = 24 \text{ km/hr}$	$40 \text{ min} = \frac{2}{3} \text{ hr}$

**April 30:** In each round of the game there is a  $\frac{2}{9}$  chance of winning (only 4 and 9 have an odd number of positive divisors).

$$\begin{aligned}
 P(\text{Win at least once}) &= 1 - P(\text{Lose three times in a row}) \\
 &= 1 - \left(\frac{2}{9}\right)^3 \\
 &= \frac{721}{729} \\
 &= \frac{a}{b}
 \end{aligned}$$

**Safe Code:**

$$\begin{aligned}
 (\delta - \tau) \times (\alpha + \phi - \theta + \sigma + \gamma + a + \lambda - b) + \epsilon \div \beta \\
 (35 - 30) \times (15 + 75 - 55 + 110 + 70 + 721 + 116 - 729) + 70 \div 70 = 1616
 \end{aligned}$$

**May 4:** Cinder Hooves can reach the stashed gold in 30 minutes at 17 km/hr from Gambler's Gulch:

$$17 \frac{\text{km}}{\text{hr}} \times \frac{1}{2} \text{hr} \times \frac{2 \text{ units}}{\text{km}} = 17 \text{ units}$$

Thunderbolt can reach the gold in  $13\frac{1}{3}$  minutes from Rustwater Springs at 36 km/hr.

$$36 \frac{\text{km}}{\text{hr}} \times \frac{2}{9} \text{hr} \times \frac{2 \text{ units}}{\text{km}} = 16 \text{ units}$$

Diamond Blaze can reach the stashed gold in 32.5 minutes from Dead Man's Point at 24 km/hr:

$$24 \frac{\text{km}}{\text{hr}} \times \frac{13}{24} \text{hr} \times \frac{2 \text{ units}}{\text{km}} = 26 \text{ units}$$



Gambler's Gulch

Rustwater Springs

Dead Man's Point