C.S.I. MATH: WHO STOLE THE GOLDEN ORB?

In a distant galaxy, far away, there is a special planet which is very similar to Earth. It is full of oceans and land, and even the seasons such as summer and spring are the same. There is one major difference between this planet and Earth, however, and that is on this planet all the animals can talk and think like humans!
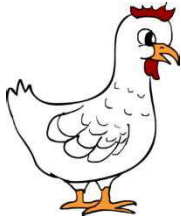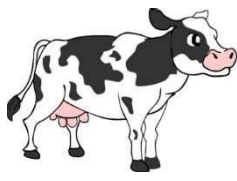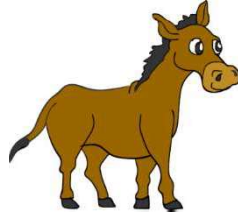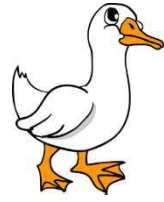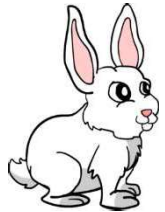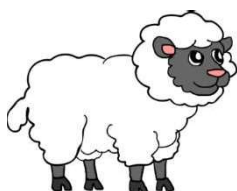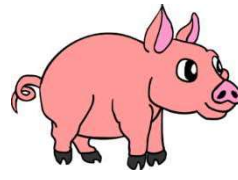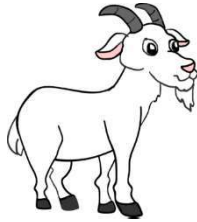
On this planet is one very special farm where, at the end of every winter, a magical plant appears and grows a golden orb. This golden orb has magical powers which bring about the end of winter and the start of spring. The magic from this golden orb causes warmer weather to arrive, insects to buzz, and new baby animals to be born.

A few weeks ago, the magical plant appeared and the golden orb started growing. All was going well – spring had started, flowers were starting to bloom, and new growth was happening around the land. One day, however, that all changed. The morning started off cold and rainy and when Sheriff Sam the horse went to check on the golden orb he found it missing! Someone had stolen it – all they left behind was a crumpled note which read:

IF YOU WANT TO SEE THE GOLDEN ORB AGAIN, YOU MUST FIRST AGREE TO MAKE ME RULER OF EVERYTHING!

Spring has stopped because someone has stolen the magical golden orb! Sheriff Horse Sam needs your help to figure out who stole the orb so spring can return! The most likely suspects are shown below.
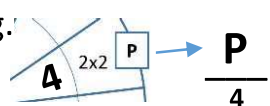
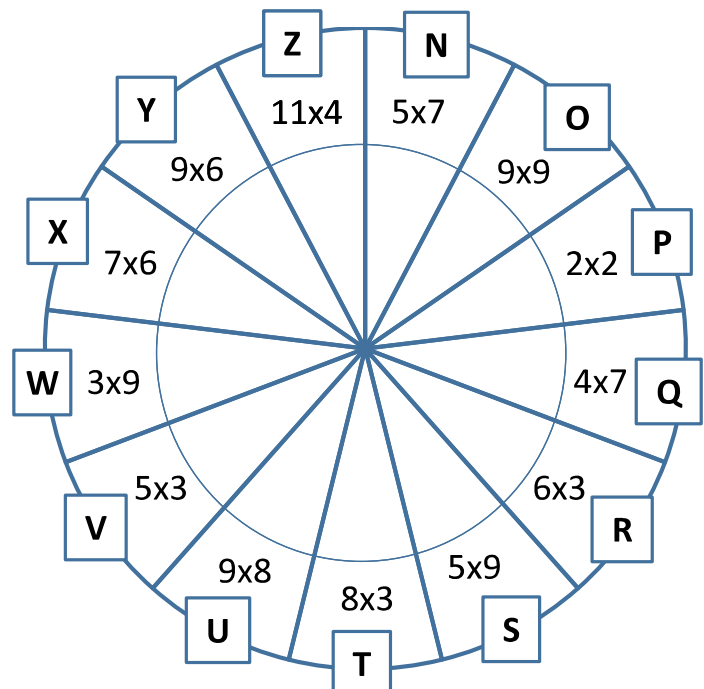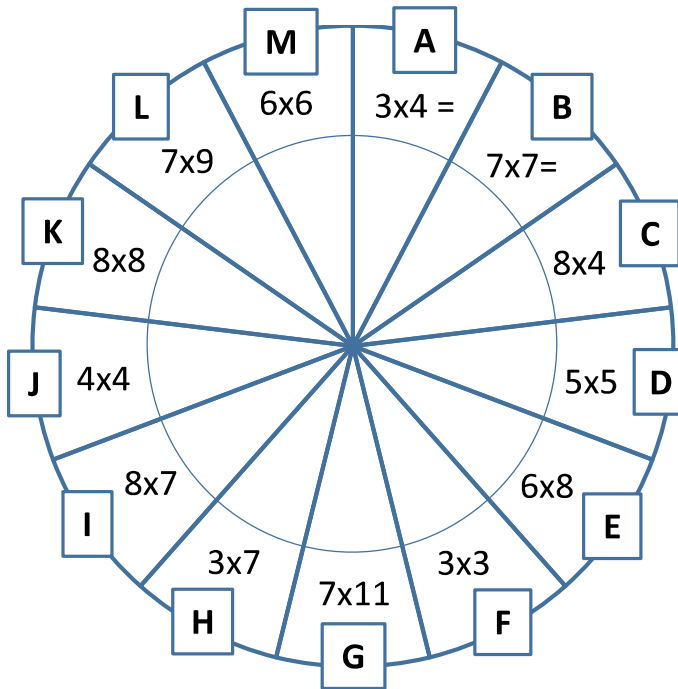| Suspect 1 Harriet the Hen	Suspect 2 Beauty the Cow	Suspect 3 Henry Horse	Suspect 4 Daisy Duck
Suspect 5 Robert the Rabbit	Suspect 6 Lisa the Lamb	Suspect 7 Oink	Suspect 8 Gary the Goat

AFTER YOU HAVE SOLVED EACH PAGE, COME BACK HERE TO CROSS SUSPECTS OFF THE LIST UNTIL YOU HAVE FOUND OUT WHO STOLE THE GOLDEN ORB!

HIDDEN MESSAGE

Near where the golden orb was stolen, you find two circles drawn on the ground. Each circle has a letter on the outside and equations on the inside. Below these circles are a bunch of numbers. It looks like whoever took the orb left a hidden message. Crack the message to read what it says.

Solve the problems, then fill in the message spaces with the letters that match the correct answers to read the secret message. This will let you cross off one suspect from the suspect list.

e.g. $\dfrac{P}{4}$

Left circle:
- M: 6x6
- A: 3x4 =
- B: 7x7=
- L: 7x9
- K: 8x8
- C: 8x4
- J: 4x4
- D: 5x5
- I: 8x7
- E: 6x8
- H: 3x7
- G: 7x11
- F: 3x3

Right circle:
- Z: 11x4
- N: 5x7
- Y: 9x6
- O: 9x9
- X: 7x6
- P: 2x2
- W: 3x9
- Q: 4x7
- V: 5x3
- R: 6x3
- U: 9x8
- S: 5x9
- T: 8x3

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56 _ | 21 12 15 48 _ _ _ _ | 54 81 72 18 _ _ _ _ | 81 18 49 _ _ _ | 81 9 _ _ | 77 81 63 25 _ _ _ _ .

35 81 27 _ _ _ | 25 81 _ _ | 27 21 12 24 _ _ _ _ | 54 81 72 ' 18 48 _ _ _ _ _ | 24 81 63 25 _ _ _ _ .

36 12 64 48 _ _ _ _ | 36 48 _ _ | 18 72 63 48 18 _ _ _ _ _ | 12 35 25 _ _ _

25 81 35 ' 24 _ _ _ _ | 18 48 45 56 45 24 _ _ _ _ _ _ !

12 63 45 81 _ _ _ _ | 24 12 64 48 _ _ _ _ | 24 21 48 _ _ _ | 21 48 35 _ _ _ | 81 9 9 _ _ _

54 81 72 18 _ _ _ _ | 45 72 45 4 48 32 24 _ _ _ _ _ _ _ | 63 56 45 24 _ _ _ _ .

CROSS THE ONE SUSPECT MENTIONED OFF YOUR SUSPECT LIST.

GIFT OF LIFE – PATTERNS

The golden orb was kept in a cave of wonders. This cave has a secret gate closing off the entrance. In order to get passed the gate, a green gift of life must be presented. A form of plant life which is over 50cm tall must be placed on an altar near the gate before it will open.

Before the orb was taken, spring had well and truly started. In the weeks leading up to the robbery, all of the suspects were growing their own plants. The plant shop owner had a sale 5 weeks prior to the golden orb being taken. He was able to tell you what type of plant he sold to each of the suspects, and also how fast each of the plants grow.

Work out the expected height of each of the plants on the week when the orb raid happened. Any suspect whose plant would not have been above 50cm during the week when the golden orb was taken can be crossed of the suspect list – they would not have been able to open the gate to the cave of wonders to take the golden orb!

CROSS THE TWO SUSPECTS OFF THE LIST WHOSE PLANT WOULD HAVE BEEN UNDER 50cm AT THE END OF WEEK 5.

| Suspect	Staring plant height (cm)	End of Week 1	End of Week 2	End of Week 3	End of Week 4	Raid Week 5
Harriet the Hen *Plant Name: Green Grower* Grows 7cm a week	20cm	27				
Beauty the Cow *Plant Name: Steady Pink* Grows 3cm a week	30cm					
Henry the Horse *Plant Name: Expanding Pansy* Doubles every week	2cm					
Daisy Duck *Plant Name: Tropical Lily* Grows 2.5cm a week	40cm					
Robert the Rabbit *Plant Name: Shrinking Flax* Shrinks 6cm a week	96cm					
Lisa the Lamb *Plant Name: Disappearing Shrub* Shrinks half every week	2048cm					
Oink *Plant Name: Rapid Red* Grows 13cm a week	1cm					
Greg the Goat *Plant Name: Bulgarian Blue* Grows 7.5cm a week	8cm					
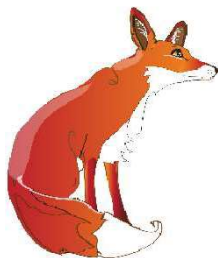
Decimals – Flower Power!

On this farm, flowers are very valuable, especially during spring. The animals trade flowers with each other for all kinds of goods and services. Furball the Fox has admitted he helped a masked figure to take the golden orb. He said that he did not know who the masked figure was, but they gave him a wheelbarrow of flowers to help.

Each suspect has bags of flowers at home. Work out the total weight of flowers each suspect has. The suspect with the largest amount of flowers left can be taken off the suspect list, as they wouldn't have had that much left if they had given any to the fox.

Make sure you remember to take out the weight of weeds in the bags, as weeds often get mixed up with the flowers, but they aren't worth anything!

CROSS THE SUSPECT WITH GREATEST WEIGHT OF FLOWERS OFF THE SUSPECT LIST
(Remember to remove the weights of the weeds!)

Suspect 1 Harriet the Hen		Suspect 2 Beauty the Cow		Suspect 3 Henry Horse		Suspect 4 Daisy Duck	
2.310	Lily	4.872	Zinnia	3.710	Daisy	5.371	Violets
+ 0.085	Magnolia	- 1.341	Weeds	0.102	Rose	1.004	Tulip
				-0.511	Weeds	-2.182	Weeds
Total weight of flowers =		Total weight of flowers =		Total weight of flowers =		Total weight of flowers =	

Suspect 5 Robert the Rabbit		Suspect 6 Lisa the Lamb		Suspect 7 Oink		Suspect 8 Gary the Goat	
2.310	Begonia	6.525	Lavender	1.093	Marigold	2.136	Sunflower
0.085	Daffodil	1.046	Aster	4.431	Orchid	3.537	Freesia
1.976	Aster						
		-4.701	Weeds	-2.925	Weeds	-2.200	Weeds
Total weight of flowers =		Total weight of flowers =		Total weight of flowers =		Total weight of flowers =	
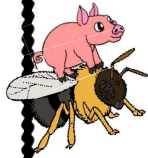
Fractions – Giant Insect Power!

At the start of every spring, giant insects start to arrive at the farm. Each of the suspects had tamed an insect, and they were all riding them to get around the farm. The insects loved helping out the animals, because in return they were given a delicious treat called sun-mana.

The golden orb is very heavy, so it is thought the culprit must have used their giant insect to help steal it. This would have been very tiring for the insect, so the insect who helped with the robbery must have eaten a lot of sun-mana after the robbery to get their energy back.

At the start of spring, each of the suspects were given one whole case full of sun-mana, and they had been using some of this sun-mana to feed their insects. It is known how much sun-mana each suspect had left before the raid, and the fraction of remaining sun-mana each insect had eaten since the golden orb was stolen. Calculate the total fraction of a sun-mana case each insect ate after the flower was stolen. The one suspect whose insect ate the least amount of sun-mana after the golden orb was stolen can be crossed off the list – they wouldn't have used their insect to steal the orb.
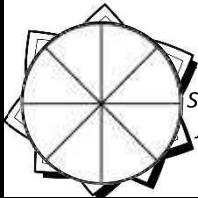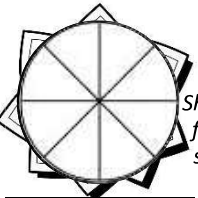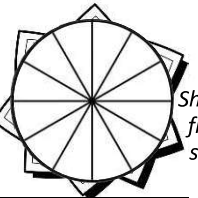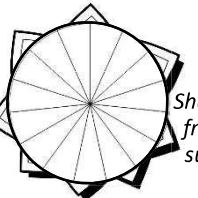
How to multiply fractions.

e.g. There was half of a cake left. James ate half of what was there. How much cake did James eat?

$\frac{1}{2} \times \frac{1}{2} = \frac{1 \times 1}{2 \times 2} =$ Multiply the top numbers together (numerators). $\frac{1 \times 1}{2 \times 2} = \frac{1}{4}$ *James ate a quarter*
Multiply the bottom numbers together (denominators). *of the cake*

CROSS OFF THE ONE SUSPECT WHOSE INSECT ATE THE **LEAST** AMOUNT OF SUN-MANA AFTER THE GOLDEN ORB WAS STOLEN.
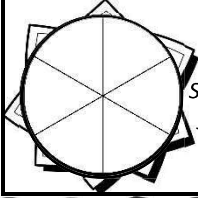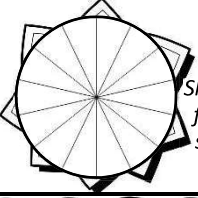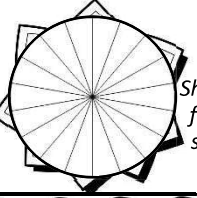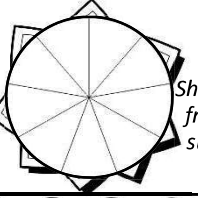
Harriet the Hen Rode an Aphid	Beauty the Cow Rode an Ant	Henry Horse Rode a Weevil	Daisy Duck Rode a Mosquito
Started with 1/2 and ate 1/4 of what was there. How much did the Aphid eat?	Started with 3/4 and ate 1/2 of what was there. How much did the Ant eat?	Started with 2/3 and ate 3/4 of what was there. How much did the Weevil eat?	Started with 4/5 and ate 1/3 of what was there. How much did the Mosquito eat?
$\frac{1}{2} \times \frac{1}{4} = \frac{1 \times 1}{2 \times 4} = $ ____	$\frac{3}{4} \times \frac{1}{2} = \frac{3 \times 1}{4 \times 2} = $ ____	$\frac{2}{3} \quad \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = $	$\frac{4}{5} \times \frac{1}{3} = $
Shade in the fraction of sun-mana eaten	*Shade in the fraction of sun-mana eaten*	*Shade in the fraction of sun-mana eaten*	*Shade in the fraction of sun-mana eaten*

Robert the Rabbit Rode a Mantis	Lisa the Lamb Rode a Cicada	Oink Rode a Bee	Gary the Goat Rode a Dragonfly
Started with 2/3 and ate 1/2 of what was there. How much did the Mantis eat?	Started with 1/2 and ate 1/7 of what was there. How much did the Cicada eat?	Started with 5/6 and ate 2/3 of what was there. How much did the Bee eat?	Started with 1/3 and ate 2/3 of what was there. How much did the Dragonfly eat?
$\frac{2}{3} \quad \frac{1}{2} = $	$\frac{1}{2} \quad \frac{1}{7} = $	$\frac{5}{6} \times \frac{2}{3} = $	$\frac{1}{3} \times \frac{2}{3} = $
Shade in the fraction of sun-mana eaten	*Shade in the fraction of sun-mana eaten*	*Shade in the fraction of sun-mana eaten*	*Shade in the fraction of sun-mana eaten*

WHO'S GOT THE TIME?

Spring is a busy time of year for many of the animals on the farm. Many have young that need looking after and they are often taking them for walks, or they are out dropping them off or picking them up from day-care. Many of the other animals are also are out collecting food, looking after their garden, or just enjoying the warmer weather.

On the day the golden orb disappeared, all of the suspects were seen both leaving from and returning to their houses.

It has been calculated how long it would take for a suspect to walk from their place to where the golden orb was being kept in the cave of wonders. Help Sheriff Harry the horse work out if the suspects would have had enough time to steal the golden orb or not.

CALCULATE THE TOTAL TIME EACH SUSPECT WAS AWAY FROM THEIR HOUSE IN MINUTES. CROSS THE TWO SUSPECTS WHO WOULD NOT HAVE HAD TIME TO WALK TO THE ORB AND BACK IN THE TIME THEY WERE AWAY FROM THEIR HOUSE.

Remember each hour has 60 mins, so 2 hours = 120 mins!

Suspect	Time Away	Total time away (mins)	Time to walk to orb and back from house	Time for crime? Yes or No!
Harriet the Hen *Claims she was dropping off chickens to day-care.*	11:30 - 12:45		60 mins	
Beauty the Cow *Claims she was out for a walk exploring new paddocks.*	11:55-12:40		Half an hour	
Henry the Horse *Claims he was taking his son out to practice galloping.*	10:50-11:30		3 quarters of an hour	
Daisy Duck *Claims she was out teaching all of her ducklings to swim.*	10:30-11:35		1 and a half hours	
Robert the Rabbit *Claims he was out looking after his vegetable garden.*	11:20-12:35		70 mins	
Lisa the Lamb *Claims she was out just enjoying the sun.*	10:25-11:30		1 hour	
Oink *Claims he was out gathering food - truffles.*	11:00-12:40		90 mins	
Greg the Goat *Claims he was out taking his kids for a walk.*	11:15-12:45		1 and a quarter hours	

THIS LEAVES ONLY ONE SUSPECT LEFT ON THE LIST:
THE SUSPECT WHO TOOK THE ORB WAS: _____