Contents: Chapter 6

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Chapter 6:
Problem Solving

R & G Guessing

AL'S

WE DELIVER AL'S PRODUCE

PRODUCE EMPORIUM

FRESH

I love Al's Produce Emporium.

Al's always has the best fruits and veggies.

FRUIT

What did you get?

A peach and an apple for 99 cents.

Oooh, yummm. How much did the apple cost?

I'll give you a hint. The peach costs 15 cents more than the apple.

Hmmm... I'm stumped.

Take a guess.

There's no way I'll guess right.

Guess. How could you tell if your guess is right?

Probably not, but you can usually learn something by taking a guess.

I don't even know where to begin.

Try to pick a number that makes sense.

Let's see...

If each fruit costs 50 cents, then the apple and the peach would cost 100 cents.

Since the apple costs less than the peach, the apple costs less than 50 cents.

Apples 50¢/ea. + Peaches 50¢/ea. = ~~100¢~~

I'll guess 40 cents.

Now, check to see if your guess works.

Squeeze Squeeze

If the apple costs 40 cents...

...and the peach costs 15 cents more...

...then the peach costs 40+15=55 cents.

Apples 40¢/ea. + Peaches 55¢/ea.

Is this guess right?

Together, a 40-cent apple and a 55-cent peach cost 40+55=95 cents.

Nope, too low.

Your guess was too low, but 95 cents is only 4 cents lower than 99 cents.

Apples ~~40¢/ea.~~ + Peaches ~~55¢/ea.~~ = ~~95¢~~

You're right! And to add 4 cents to the total cost, I can add 2 cents to the cost of each fruit.

If the apple costs 42 cents, then the peach is 57 cents, and together they cost 42+57=99 cents.

Bingo!

Apples 42¢/ea. + Peaches 57¢/ea. = 99¢

FREE SAMPLES

Guessing worked!

Try one more.

As you know, every pipfruit has either 2 seeds or 5 seeds.

If 8 pipfruits have a total of 25 seeds, how many of the pipfruits have 5 seeds?

FREE SAMPLES*

* CAUTION: Results may vary

PiPfruit 2 for 1

Try it.

If there are 4 of each...

...then the 4 five-seed pipfruits have 5+5+5+5=20 seeds...

...and the 4 two-seed pipfruits have 2+2+2+2=8 seeds.

That makes a total of 20+8=28 seeds.

Too high.

5 + 5 + 5 + 5 = 20 seeds

2 + 2 + 2 + 2 = 8 seeds

To get less than 28 seeds, I need less five-seed pipfruits.

I'll try 3 five-seed pipfruits, and 5 two-seed pipfruits.

3 five-seed pipfruits have 5+5+5=15 seeds.

5 two-seed pipfruits have 2+2+2+2+2=10 seeds.

That makes a total of 15+10=25 seeds.

Nailed it!

5 + 5 + 5 = 15 seeds

2 + 2 + 2 + 2 + 2 = 10 seeds

If 8 pipfruits have a total of 25 seeds, then 3 of the pipfruits have 5 seeds.

Well done.

Wait! Don't eat that!

CHOMP!

Pipfruits are for curing baldness.

Uh oh.

There we were, stranded on a small beach with only a small pile of coconuts for the three of us.

ZZZZ

We decided that in the mornin', we would split the coconuts equally.

But, in the middle o' the night, Rocky decided not to wait 'til mornin' to claim his share.

NNNN

Z Z Z

He awoke, split the coconuts into three equal piles, and hid his pile in a small cave.

He put the other two piles back into one 'n' fell back to sleep.

Later that night, Jelly Roger did the same.

He split the remaining coconuts into three equal piles...

...then hid his share behind a small waterfall.

He put the other coconuts back into one pile 'n' fell back to sleep.

Before dawn, I awoke and split the remaining coconuts into three equal piles.

I hid my share in a nearby shrubbery.

A shrubbery?

Aye, a shrubbery.

Alas, when we woke up, there were only 8 coconuts left.

Who can figure the number o' coconuts that were in the original pile?

Try it.

We could guess and check.

I think I have a better idea.

What if we work backwards?

We could retrace the pirates' steps!

Let's begin at the end.

When Captain Kraken went to sleep, he left a pile of 8 coconuts on the beach.

Right before that, there were two piles of 4 coconuts...

...since Captain Kraken hid the third pile in a shrubbery.

So, Captain Kraken hid 4 coconuts.

The three piles Captain Kraken made had a total of 4+4+4=12 coconuts!

So, there were 12 coconuts when he woke up.

How many coconuts did Jelly Roger hide?

When Jelly Roger went to sleep, he left a pile of 12 coconuts on the beach.

Right before that, there were two piles of 6 coconuts...

...since Jelly Roger hid his pile behind a waterfall.

So, Jelly Roger hid 6 coconuts.

The three piles Jelly Roger made had a total of 6+6+6=18 coconuts!

So, there were 18 coconuts when he woke up.

Now we can find out how many coconuts Rocky found in the original pile.

When Rocky went to sleep, he left a pile of 18 coconuts on the beach.

Right before that, there were two piles of 9 coconuts...

...since Rocky hid the third pile in a cave.

How many coconuts were in the original pile?

So, Rocky hid 9 coconuts.

The three piles Rocky made had a total of 9+9+9=27 coconuts!

So, before you all went to sleep, there were 27 coconuts!

Let's try it forwards. When Rocky woke up, there were 27 coconuts. He hid 9, and left 18.

When Jelly Roger woke up, there were 18 coconuts. He hid 6, and left 12.

And when you woke up, there were 12 coconuts. You hid 4, and left 8.

That works!

Aye. In the mornin', we felt ashamed for not trustin' each other.

We gathered the hidden coconuts 'n' shared them equally.

And, lucky for us, we weren't stranded on a remote island, after all!

Ms. Q. Drawing

If Alice is 5th in line, and Belle is 12th, how many little monsters are standing between Alice and Belle?

12 minus 5 is 7.

I don't think that's right.

12 minus 5 is *definitely* 7.

But, I don't think 7 is the answer.

I made a drawing.

If Alice is 5th, and Belle is 12th...

...then the monsters standing 6th, 7th, 8th, 9th, 10th, and 11th are between them.

That's 6 monsters, not 7.

Very good, Grogg.

Sometimes, a drawing can be very helpful for solving a problem.

How could drawing a picture help you solve *this* problem?

Sam is 3 years older than Tom, who is 1 year older than Ron. Pam is 2 years older than Tom, but 2 years younger than Quinn.

Sam, Tom, Ron, Quinn, and Pam line up from youngest to oldest. Who stands in the middle?

I'll draw Sam.

He's going to have a cool superhero cape and a mask.

You do not need to ***draw*** all five monsters, Grogg!

We can just write an "S" to stand for Sam.

Who stands in the middle?

Sam is 3 years older than Tom, who is 1 year older than Ron.

We can write a T for Tom three lines below Sam.

S

T

R

And an R for Ron one line below Tom.

Then, since Pam is two years older than Tom, we can write a P for Pam two lines above the T.

Q

S

P

T

R

And since Pam is 2 years younger than Quinn, I'll draw Quinn up here, 2 lines above Pam.

Now, we can see that if they line up, Ron is the youngest, Quinn is the oldest, and Pam is in the middle.

Very good.

A drawing can help you organize information quickly.

Sometimes, a drawing can be used in unexpected ways.

How could a drawing help you solve ***this*** problem?

Five teams are in a beastball league. Each team plays every other team once. How many games are played all together?

I'll draw one of the teams...

...they're going to be awesome-looking crocadillos!

That's not the point of the drawing, Grogg.

The drawing is supposed to help us solve the problem.

How can a drawing help here?

I'll just start by drawing a place for each team to stand.

Grogg, you did ***not*** need to make up names for every team.

We could have just used A, B, C, D, and E.

AlligOphers

ElephrOgs

BulldOgs

DinOstars

crOcadillOs

I see how this might help!

The Alligophers have to play the Bulldogs, the Crocadillos, the Dinostars, and the Elephrogs.

AlligOphers

ElephrOgs

BulldOgs

DinOstars

crOcadillOs

We can draw lines to connect the Alligophers to all four of the other teams.

Each line stands for one game. So, these four lines stand for four games.

That ***is*** helpful!

We just need to draw lines to connect all of the teams to each other.

The number of lines we draw is the total number of games.

AlligOphers

ElephrOgs

BulldOgs

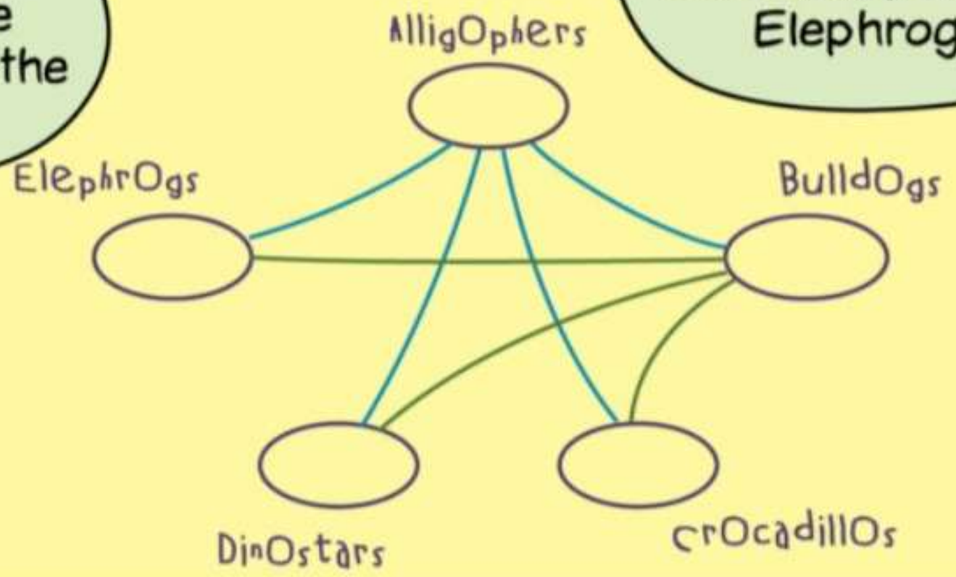
DinOstars

crOcadillOs

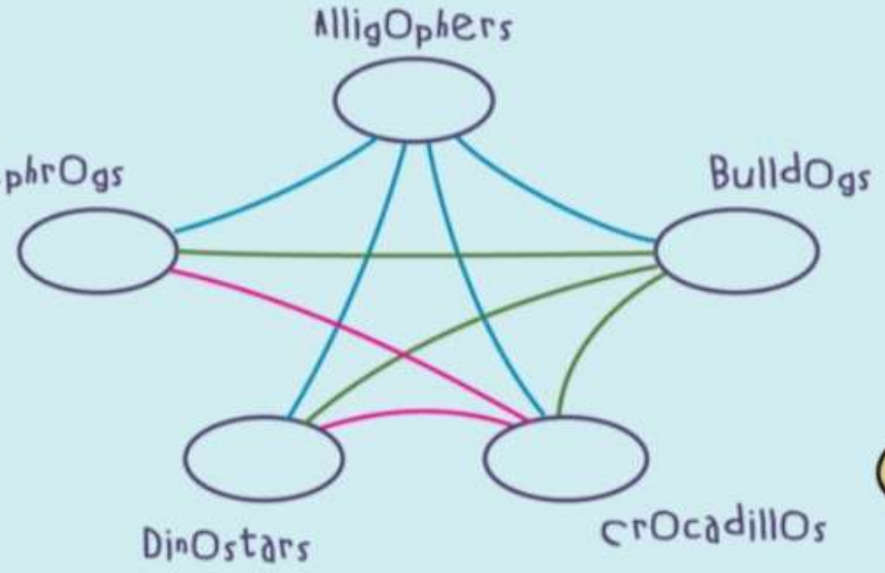
Let's connect the Bulldogs to all the other teams.

We already drew the line for the Bulldogs versus the Alligophers.

The Bulldogs also need to play the Crocadillos, the Dinostars, and the Elephrogs.

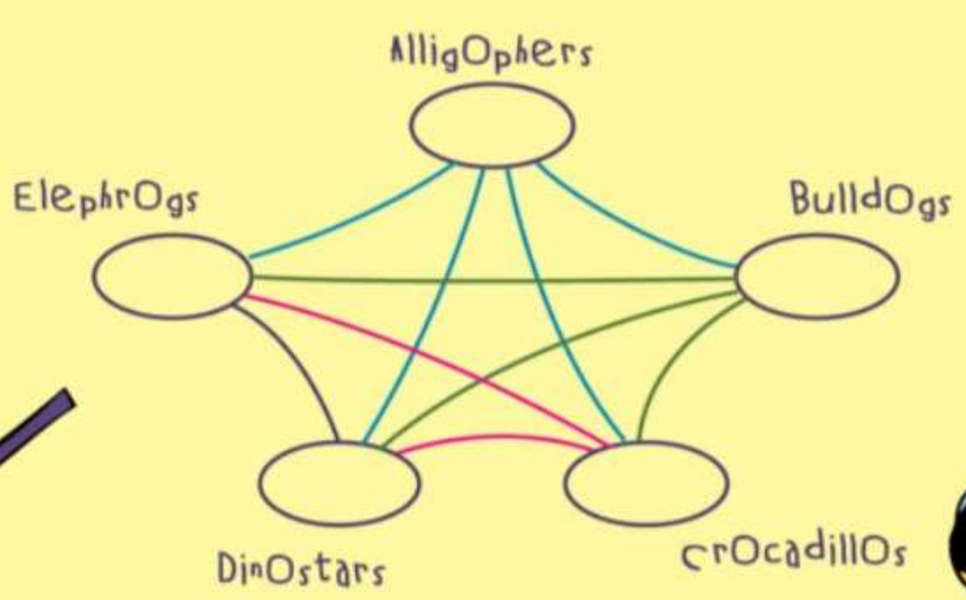


Next, we can connect the Crocadillos to the Dinostars and the Elephrogs.



And that leaves just two teams that aren't connected...

...the Dinostars and the Elephrogs.



How do we know that we drew all of the lines?

Every team has four lines connecting it to all four other teams.

So, all of the teams are connected to each other.

We drew 10 lines, so the teams played a total of 10 games!

Excellent work!

What are you drawing now, Grogg?

I'm just finishing up my mascot sketches!

MATH TEAM

Math Meet

Today, you four will get to test your skills against the brand new bots in your very first Math Meet!

The bots have been programmed to know all of the math you know, and they can compute very quickly and accurately.

But, the bots still have some flaws.

They're not always great at reading the questions.

We invited local news personality Slim Weatherby to host the meet!

And now...

Get out there and do your best!

Please welcome the Little Monsters of Beast Academy and their opponents... the Bots.

Today's Math Meet will consist of six questions. The first five are each worth one point, and the final question is worth two. The team with the most points wins the meet. Teams, test your buzzers, please.

ding!

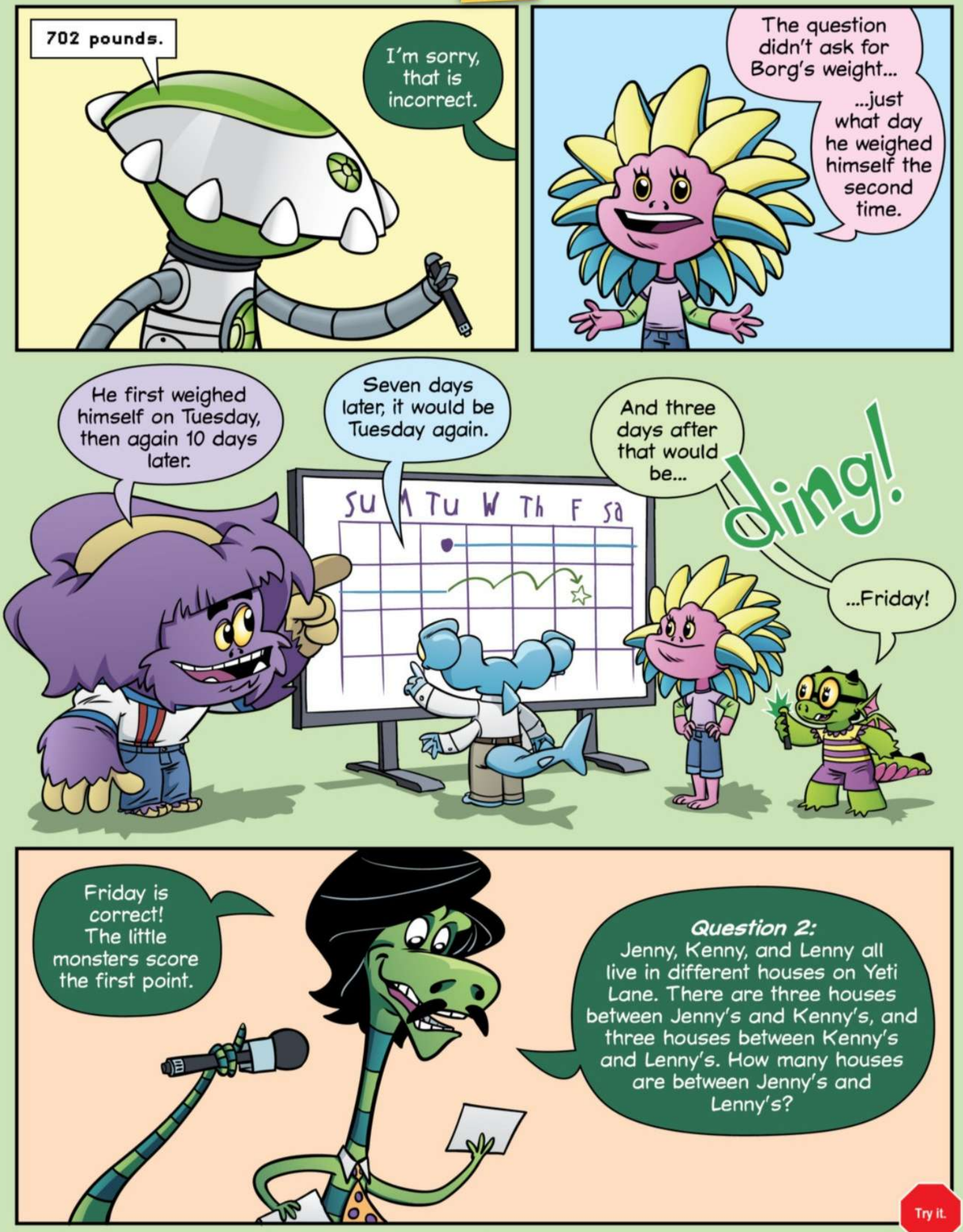
bzzzt!

Great! If everyone is ready for the first question, let's begin.

Question 1:
On Tuesday, Borg weighed 567 pounds. Ten days later, he weighed himself a second time and was 135 pounds heavier. On what day of the week did Borg weigh himself the second time?

bzzzt!

Try it.


702 pounds.
I'm sorry, that is incorrect.
The question didn't ask for Borg's weight...
...just what day he weighed himself the second time.
He first weighed himself on Tuesday, then again 10 days later.
Seven days later, it would be Tuesday again.
And three days after that would be...
ding!
...Friday!
Friday is correct! The little monsters score the first point.
Question 2:
Jenny, Kenny, and Lenny all live in different houses on Yeti Lane. There are three houses between Jenny's and Kenny's, and three houses between Kenny's and Lenny's. How many houses are between Jenny's and Lenny's?
Try it.

I'm almost done with my picture...

Grogg! Forget about the chimneys--

J

K

L

bzzzt!

7.

7 is correct! The score is now tied, 1 to 1.

Question 3: Marty flips 1 penny, 2 nickels, 3 dimes, and 4 quarters. Each coin lands either heads or tails. The five coins that land heads are worth 46 cents. How many coins land tails?

We can use 46 cents to figure out which coins landed heads.

To make 46 cents, you definitely need a penny--

I got it!

ding!

Try it.

5 coins!

5 is correct! The little monsters are back in the lead.

How'd you do that so fast, Grogg?

I ignored the part about 46 cents.

There were 1+2+3+4=10 coins, and 5 landed heads.

So, the other 5 coins landed tails.

Oh, yeah. That was easy.

Question 4:
A candy store sells 1-cent Flummies, 2-cent Gummies, and 5-cent Yummies. Marge buys 7 candies for 25 cents.

How many Yummies did she buy?

Can you solve it?

I think we better try guessing.

If she bought 7 Flummies, that would only cost 7 cents.

1+1+1+1+1+1+1 = 7 ✗

If she bought 7 Gummies, that would be 14 cents.

2+2+2+2+2+2+2 = 14 ✗

So, she had to buy at least some Yummies.

7 Yummies cost 35 cents. That's too much.

5+5+5+5+5+5+5 = 35 ✗

It only takes 5 Yummies to cost 25 cents.

So, she had to buy less than 5 Yummies.

Let's try 3 Yummies.

1+1+1+1+1+2+2=9
1+1+1+1+1+2+5=12
1+1+1+1+1+5+5=15
1+1+1+1+2+2+2=10
1+1+1+1+2+2+5=13
1+1+1+1+2+5+5=16
1+1+1+1+5+5+5=19
1+1+1+2+2+2+2=11
1+1+1+2+2+2+5=14
1+1+1+2+2+5+5=17
1+1+1+2+5+5+5=20
1+1+1+5+5+5+5=23
1+1+2+2+2+2+2=12
1+1+2+2+2+2+5=15
1+1+2+2+2+5+5=18

Quick, I think the Bots have almost got it.

If she bought 3 Yummies, the most she could spend is 23 cents.

So, she had to buy more than 3, but less than 5 Yummies. So, she must have bought--

5+5+5+2+2+2+2 = 23 ✗

bzzzt!

1+1+1+2+5+5+5=20
1+1+1+5+5+5+5=23

1+1+2+2+2+2+2=12
1+1+2+2+2+2+5=15
1+1+2+2+2+5+5=18
1+1+2+2+5+5+5=21
1+1+2+5+5+5+5=24
1+1+5+5+5+5+5=27

1+2+2+2+2+2+2=13
1+2+2+2+2+2+5=16
1+2+2+2+2+5+5=19
1+2+2+2+5+5+5=22
1+2+2+5+5+5+5=25
1+2+5+5+5+5+5=28

4 Yummies.

4 is correct. The bots tie the score again, 2 to 2.

Question 5:
Some elefinches are perched in a tree. Each time a car drives by, half of the elefinches fly away, but two come back. After three cars pass, there are 7 elefinches in the tree. How many elefinches were in the tree before the three cars passed?

How many?

We can work backwards.

When the third car drove by, half of the birds left, but two came back.

That left 7 birds in the tree.

So, before the two birds came back, there were just 7−2=5 birds in the tree.

VRRROOOOOOOM

And before the third car scared half the birds away, there were 5+5=10 birds in the tree.

Now, we can figure out how many birds there were before the second car drove by.

The second car scared half of the birds, but two came back.

So, before the two birds came back, there were just 10−2=8 birds in the tree.

ZOOM ZOOM

And before the second car scared half of them off, there were 8+8=16 birds in the tree.

Finish the problem.

The first car scared half the birds, but two came back.
So, before two birds came back, there were 16−2=14 birds in the tree.

And before the first car scared half the birds away...

Rumble Rumble

There were 14+14=...

bzzzt!

28 elePinches.

28 is correct!
The score is now Bots: 3, Little Monsters: 2.
Remember, the last question is worth 2 points.

Oh, no! We were so close!

We need to get the last question right to beat the bots.

Question 6:
Ayana sold a total of 100 cups of lemonade on Thursday, Friday, Saturday, and Sunday. She sold 2 more cups on Friday than she sold on Thursday. She sold twice as many cups on Saturday as she sold on Friday. On Sunday, she sold as many cups as she sold on the other three days combined. How many cups did she sell on Sunday?

Try it.

Guessing could take forever.

I have an idea.

We don't care about Thursday, Friday, or Saturday.

We only care about Sunday.

Maybe we can ignore the other information.

She sold the same amount Sunday as she sold on all the other days combined!

To sell 100 cups total, she needed to sell 50 from Thursday to Saturday, and 50 on Sunday.

ding!

50 cups!

Thursday	Friday	Saturday	Sunday

50 + 50 = 100

50 is correct! The Little Monsters win the first ever Math Meet against the Bots.

Please give a big round of applause to the team of Alex, Lizzie, Winnie, and Grogg!