In Summary

Key Idea

- A single error in reasoning will break down the logical argument of a deductive proof. This will result in an invalid conclusion, or a conclusion that is not supported by the proof.

Need to Know

- Division by zero always creates an error in a proof, leading to an invalid conclusion.
- Circular reasoning must be avoided. Be careful not to assume a result that follows from what you are trying to prove.
- The reason you are writing a proof is so that others can read and understand it. After you write a proof, have someone else who has not seen your proof read it. If this person gets confused, your proof may need to be clarified.

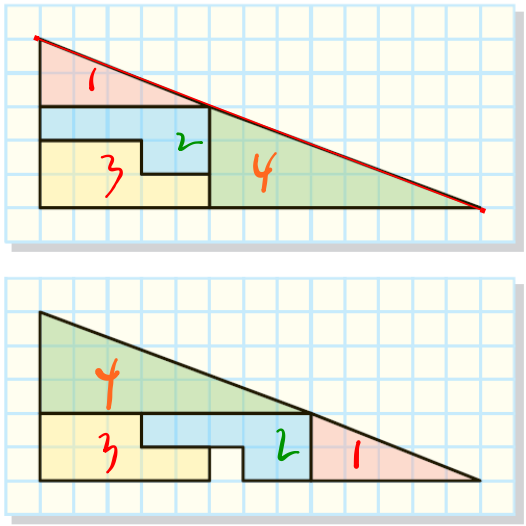
HOMEWORK...

p. 42: #1 - 10 (omit #8)

Questions

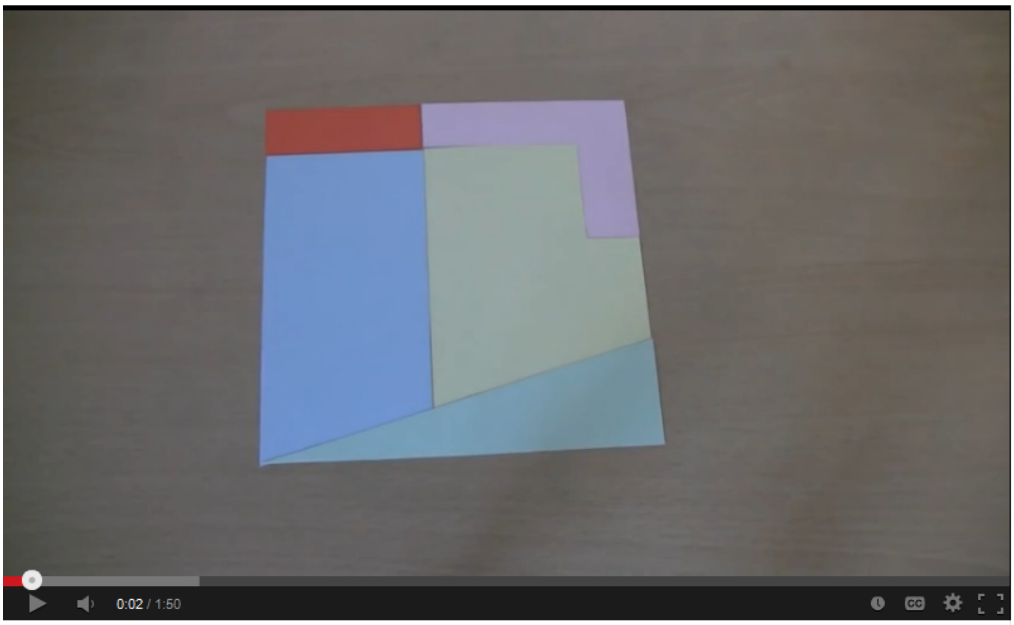
4, 9, 7

4. Noreen claims she has proved that $32.5 = 31.5$.



Is Noreen's proof valid? Explain.

* slopes of triangles are not equal... 1 extra unit



A Maths Puzzle: The Missing Square Solution

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7. According to this proof, $2 = 1$. Determine the error in reasoning.

Let $a = b$.

$a^2 = ab$	Multiply by a.
$a^2 + a^2 = a^2 + ab$	Add a^2.
$2a^2 = a^2 + ab$	Simplify.
$2a^2 - 2ab = a^2 + ab - 2ab$	Subtract $2ab$.
$2a^2 - 2ab = a^2 - ab$	Simplify.
$2(a^2 - ab) = 1(a^2 - ab)$	Factor.
$2 = 1$	Divide by $(a^2 - ab)$.

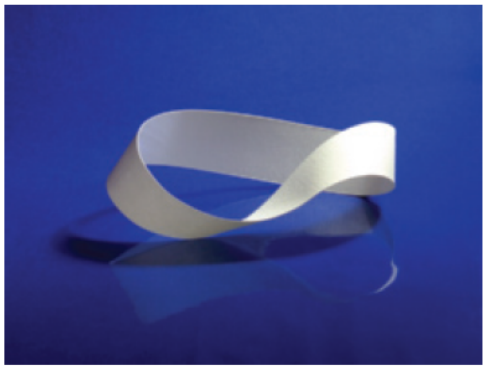
$\div 0$

error

$a^2 = ab$

$a^2 - ab = 0$

9. Brittney said she could prove that a strip of paper has only one side. She took a strip of paper, twisted it once, and taped the ends together. Then she handed her friend Amber a pencil, and asked Amber to start at any point and draw a line along the centre of the paper without lifting the pencil. Does a strip of paper have only one side? Why or why not?



9. e.g., In general, strips of paper have two sides, a back and a front. A mark made on the front will not continue to the back unless the paper is turned over. When joined as described in the question, the piece of paper has only one side and is called a Mobius strip. A single, continuous mark can be made along the paper without turning it over.

10. Brenda was asked to solve this problem:

Three people enjoyed a meal at a Thai restaurant. The waiter brought a bill for $30. Each person at the table paid $10.

Later the manager realized that the bill should have been for only $25, so she sent the waiter back to the table with $5.

The waiter could not figure out how to divide $5 three ways, so he gave each person $1 and kept $2 for himself.

Each of the three people paid $9 for the meal.

$9 \cdot 3 = 27$

The waiter kept $2.

$27 + 2 = 29$

What happened to the other dollar?

Does the question make sense? How should Brenda answer it?

Mystery of the Missing Dollar Puzzle

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3,015

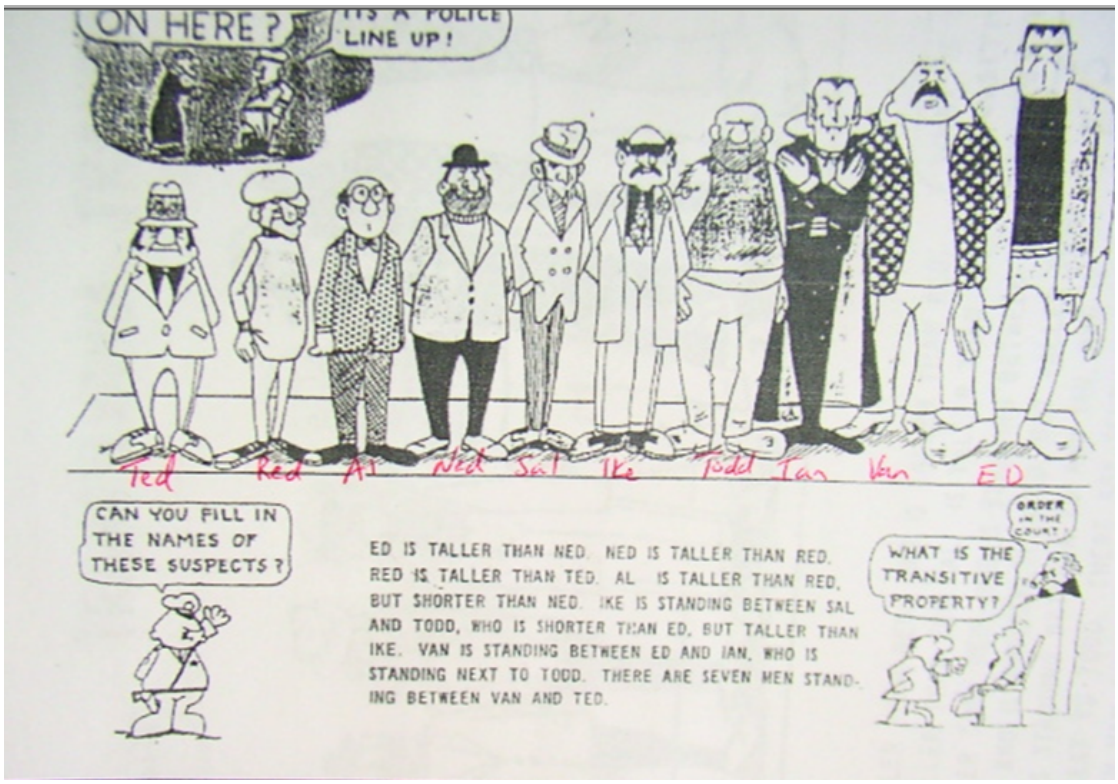
14 1

NAME: Key

House Number	Teacher	Costume	Treat
3	Mr. Watters	Minnie Mouse	Kit Kat
5	Mr. Svare	Sponge Bob	Snickers
9	Mr. Stewart	Frankenstein	Mars
11	Mr. Hallihan	Skeleton	Twix
13	Mr. Savage	Barney	Smarties

Explain your reasoning and show all your work below!

	House #					Costume					Treat				
	3	5	9	11	13	MM	Skele	Barney	Sponge	Frank	Snickers	Smarties	Twix	Kit Kat	Mars
Svare	X	✓	X	X	X	X	X	X	✓	X	✓	X	X	X	X
Stewart	X	X	✓	X	X	X	X	X	X	✓	X	X	X	X	✓
Hallihan	X	X	X	✓	X	X	✓	X	X	X	X	X	✓	X	X
Watters	✓	X	X	X	X	✓	X	X	X	X	X	X	X	✓	X
Savage	X	X	X	X	✓	X	X	✓	X	X	X	✓	X	X	X


ON HERE?
IT'S A POLICE LINE UP!
Ted
Red
Al
Ned
Sal
Ike
Todd
Ian
Van
ED
CAN YOU FILL IN THE NAMES OF THESE SUSPECTS?
ED IS TALLER THAN NED. NED IS TALLER THAN RED. RED IS TALLER THAN TED. AL IS TALLER THAN RED, BUT SHORTER THAN NED. IKE IS STANDING BETWEEN SAL AND TODD, WHO IS SHORTER THAN ED, BUT TALLER THAN IKE. VAN IS STANDING BETWEEN ED AND IAN, WHO IS STANDING NEXT TO TODD. THERE ARE SEVEN MEN STANDING BETWEEN VAN AND TED.
ORDER IN THE COURT!
WHAT IS THE TRANSITIVE PROPERTY?

- What is the missing phone number?

765 - 2387

- Explain your reasoning and show all your work below!

210

	sum
21×10	
3×7×5×2	
7×6×5	18

descending

336

3×4×4×7

3×2×2×4×7

6×7×8

2×2×2×6×7

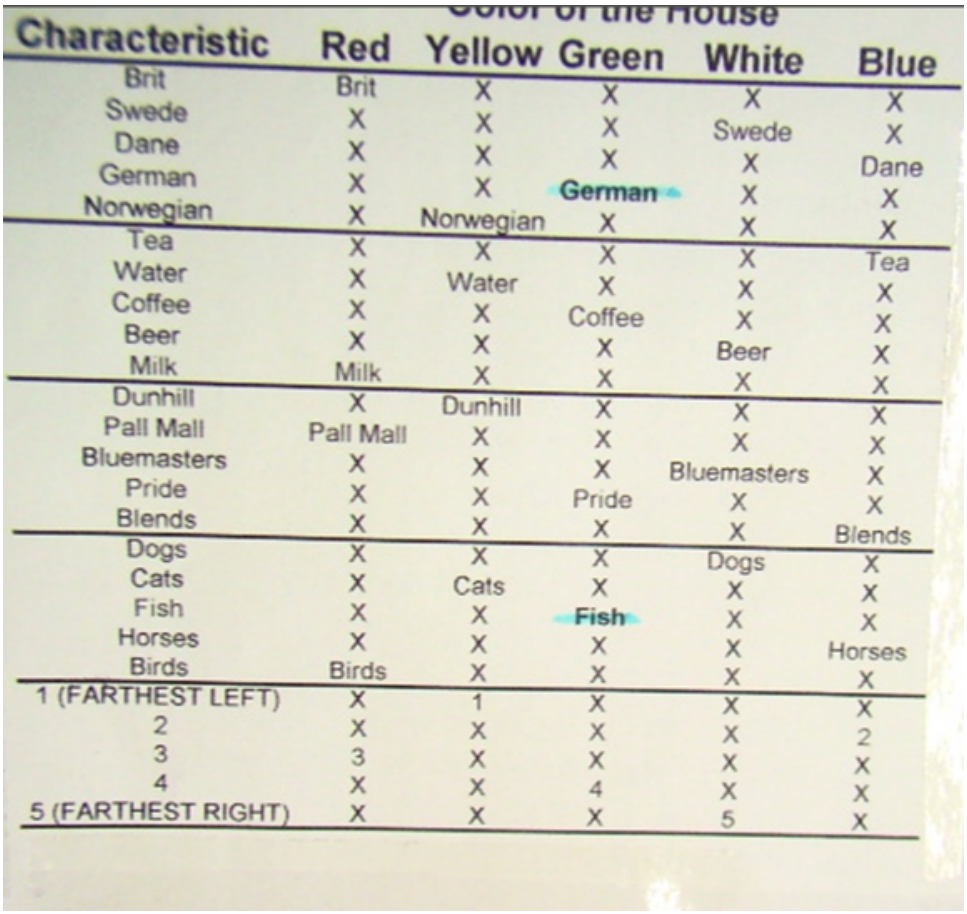
2×4×6×7

2×3×3×7

ascending order

2nd last position


5 < 8 < 9
1 < 7 > 4
2 < 6 > 3
6 > 2 < 4
3 < 8 > 5
9 > 1 < 7
7 > 1 < 3
9 > 2 < 6
8 > 4 < 5
2 < 9 > 6
5 > 4 > 3
1 < 7 < 8
8 > 7 > 5
2 < 9 > 1
6 > 3 < 4
4 > 3 > 1
8 > 6 < 7
5 < 9 > 2
1 < 6 < 7
4 < 5 > 2
3 < 8 < 9
3 < 5 < 8
7 > 1 < 9
4 > 2 < 6
9 > 4 > 2
6 > 3 < 8
7 > 5 > 1



Characteristic	Color of the House				
	Red	Yellow	Green	White	Blue
Brit	Brit	X	X	X	X
Swede	X	X	X	Swede	X
Dane	X	X	X	X	Dane
German	X	X	German	X	X
Norwegian	X	Norwegian	X	X	X
Tea	X	X	X	X	Tea
Water	X	Water	X	X	X
Coffee	X	X	Coffee	X	X
Beer	X	X	X	Beer	X
Milk	Milk	X	X	X	X
Dunhill	X	Dunhill	X	X	X
Pall Mall	Pall Mall	X	X	X	X
Bluemasters	X	X	X	Bluemasters	X
Pride	X	X	Pride	X	X
Blends	X	X	X	X	Blends
Dogs	X	X	X	Dogs	X
Cats	X	Cats	X	X	X
Fish	X	X	Fish	X	X
Horses	X	X	X	X	Horses
Birds	Birds	X	X	X	X
1 (FARTHEST LEFT)	X	1	X	X	X
2	X	X	X	X	2
3	3	X	X	X	X
4	X	X	4	X	X
5 (FARTHEST RIGHT)	X	X	X	5	X

1.6 Reasoning to Solve Problems

GOAL

Solve problems using inductive or deductive reasoning.

EXPLORE...

- Suppose that you are lost in the woods for hours and come upon a cabin. In the cabin, you find a lantern, a candle, a wood stove with wood in it, and a match. What do you light first?

Match -> Candle -> Lantern -> Wood

SAMPLE ANSWER

I would light the match first. If I didn't, I couldn't light any of the other items. I would light the candle next, since it would stay lit for longer than the match and would allow me to light the other two items. Also, it's less likely that I would make an error or fail when lighting the candle. The lantern and the stove would be more difficult to light.

APPLY the Math

p. 46

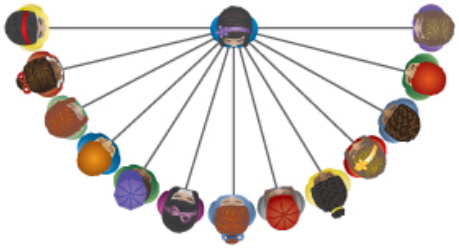
182, 196, 143, (91)

EXAMPLE 1 Using reasoning to solve a problem

The members of a recently selected varsity basketball team met each other at their first team meeting. Each person shook the hand of every other person. The team had 12 players and 2 coaches. How many handshakes were exchanged?

14x13 14x14 13x11 14x13 / 2 194 14x14-2

Kim's Solution



I decided to think about how many times each person shook hands. There were 14 people in total, so person 1 shook hands with each of the other 13 people.

13 handshakes

Person 2 had already shaken hands with person 1. Person 2 shook hands with each of the remaining 12 people.

13 + 12 handshakes

13 + 12 + 11 + 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 91 handshakes

This pattern of handshakes continued until there were two people left when the last handshake happened.

Your Turn

Discuss, with a partner, whether Kim used inductive or deductive thinking in her solution. How do you know?

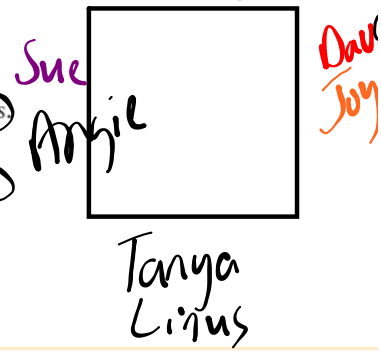
Answer

Kim used inductive reasoning. To solve the problem, Kim determined the new number of handshakes based on the pattern identified in the first two cases. I know that Kim used inductive reasoning because the result was specific to this number of people, not a generalization that would be true for any number of people.

EXAMPLE 2 Using reasoning to solve a problem

Sue signed up for games at her school's fun night. Seven other people were assigned to her group, making up four pairs of partners. The other members of her group were Dave, Angie, Josh, Tanya, Joy, Stu, and Linus. When the games started, Dave and his partner were to the left of Stu. Across from Dave was Sue, who was to the right of Josh. Dave's brother's partner, Tanya, was across from Stu. Joy was not on Stu's right.

Name the four pairs of partners.



Vicky's Solution

Dave
Angie
Josh
Tanya
Joy
Stu
Linus
Sue

I drew a rectangle to represent a table. I made a list of the students' names so I could cross them off as I put them in place.

~~Dave~~
Angie
Josh
Tanya
Joy
~~Stu~~
Linus
Sue

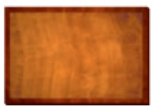
Dave

Stu

The first names I wrote in were Dave and Stu, since they were the first two mentioned. It didn't matter where I started, as long as I kept the relationships of left, right, and across the table. I crossed Dave and Stu off my list.

~~Dave~~
Angie
~~Josh~~
Tanya
Joy
~~Stu~~
Linus
~~Sue~~

Dave



Sue

Stu
Josh

I knew that Sue was across from Dave and to the right of Josh. I crossed Sue and Josh off my list.

~~Dave~~
Angie
~~Josh~~
~~Tanya~~
Joy
~~Stu~~
~~Linus~~
~~Sue~~

Linus
Tanya

Dave

Sue

Stu
Josh

The next clue mentioned that Dave's brother and his partner Tanya were across from Stu. The only male name left was Linus, so Linus and Tanya were partners. I crossed their names off my list.

~~Dave~~
~~Angie~~
~~Josh~~
~~Tanya~~
~~Joy~~
~~Stu~~
~~Linus~~
~~Sue~~

Linus
Tanya

Dave
Joy

Sue
Angie

Stu
Josh

If Joy was not on Stu's right, then she must have been on his left. Therefore, she must have been Dave's partner. So, the last person to match was Angie with Sue.

The four pairs of partners were Linus and Tanya, Dave and Joy, Sue and Angie, and Stu and Josh.

The partners sat together, on the same side of the table.

Your Turn

Discuss with a partner whether inductive or deductive reasoning was used for this solution. How do you know?

Answer

Vicky used deductive reasoning. She used the given information to deduce the seating arrangements. The language in her explanation followed the pattern of *if* . . . *then* statements, which may be present in deductive reasoning.

In Summary

Key Idea

- Inductive and deductive reasoning are useful in problem solving.

Need to Know

- Inductive reasoning involves solving a simpler problem, observing patterns, and drawing a logical conclusion from your observations to solve the original problem.
- Deductive reasoning involves using known facts or assumptions to develop an argument, which is then used to draw a logical conclusion and solve the problem.

HOMEWORK...

p. 48: #1 - 13
(OMIT #5, 8, 10, 11)

Attachments

1s6e1 finalt.mp4

1s6e2 final.mp4