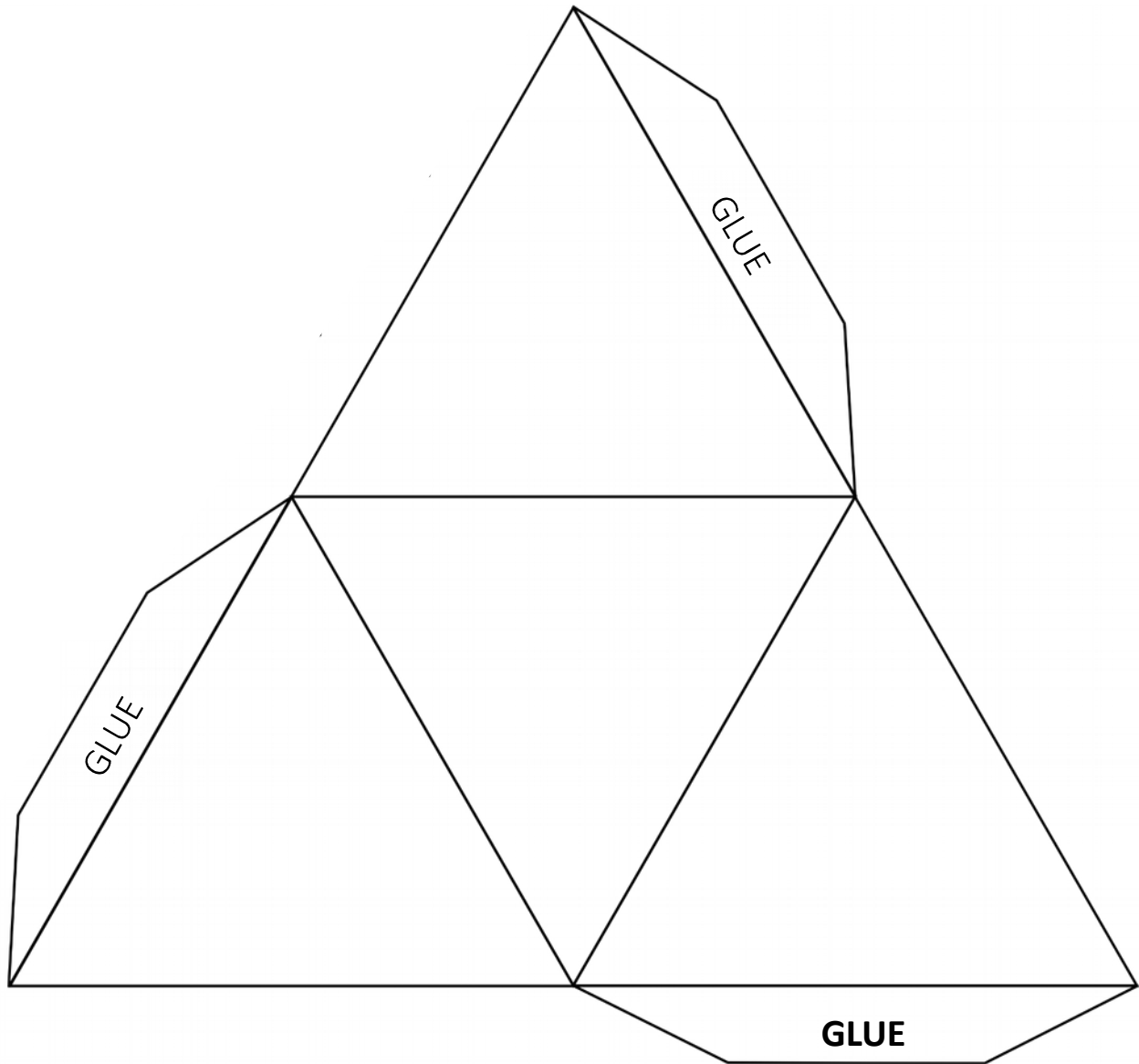


## PAPER MODEL OF A TETRAHEDRON

Instructions:

- cut out the shape
- fold each tab
- glue each tab and hold for a few seconds

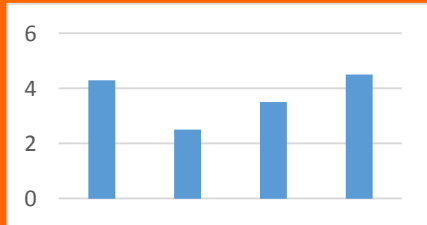


<https://goo.gl/6ldJHR>

## FLASHCARDS WITH EXAMPLES OF DIFFERENT KINDS OF GRAPHS

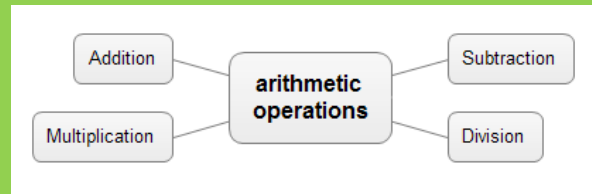
### BAR CHART

→ to show absolute frequencies or quantities



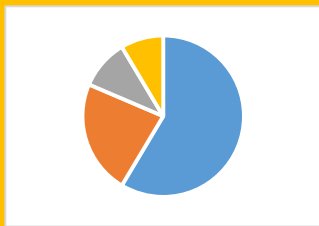
### MIND MAP

→ to show relationships



### PIE CHART

→ to show relative frequencies and percentages



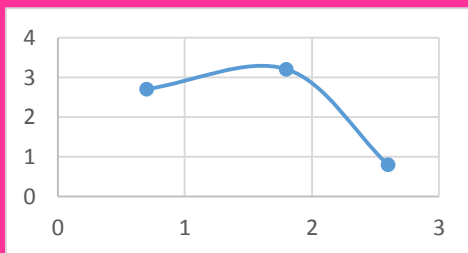
### TABLE

→ to organize information



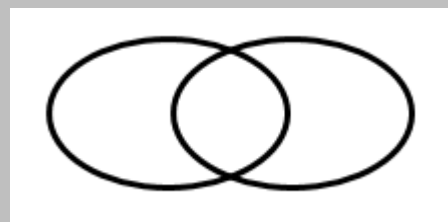
### LINE GRAPH

→ to show a trend



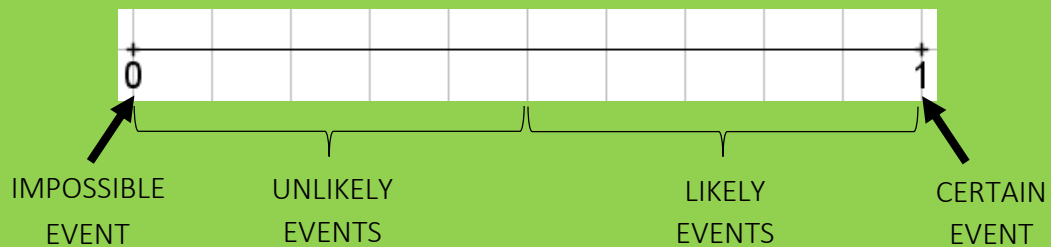
### VENN DIAGRAM

→ to show similarities and differences



# POSTER ABOUT THEORETICAL PROBABILITY

## THE PROBABILITY LINE



## THEORETICAL PROBABILITY

$$P(\text{event}) = \frac{\# \text{ of desired outcomes}}{\# \text{ of possible outcomes}}$$

“the probability of an event is given by the number of desired outcomes divided by the number of possible outcomes”





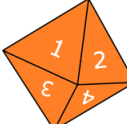


the probability of picking  
a yellow ball from the urn is

$$\frac{3}{10}$$

<https://goo.gl/8rbRNc>

# POSTER ABOUT SYMMETRY, EQUI-PROBABILITY AND FAIRNESS

## THE PLATONIC SOLIDS: the only 5 fair dice!



Shape	Name	Number of possible outcomes	Theoretical probability for each outcome
 <a href="https://goo.gl/KLSJ6d">https://goo.gl/KLSJ6d</a>	Tetrahedral die	4	$\frac{1}{4} = 0,25 = 25\%$
 <a href="https://goo.gl/jwlyr7">https://goo.gl/jwlyr7</a>	Cubical die	6	$\frac{1}{6} = 0,1\bar{6} = 16, \bar{6}\%$
 <a href="https://goo.gl/ZcqpIC">https://goo.gl/ZcqpIC</a>	Octahedral die	8	$\frac{1}{8} = 0,125 = 12,5\%$
 <a href="https://goo.gl/qE5Mmn">https://goo.gl/qE5Mmn</a>	Dodecahedral die	12	$\frac{1}{12} = 0,08\bar{3} = 8, \bar{3}\%$
 <a href="https://goo.gl/gKsBqJ">https://goo.gl/gKsBqJ</a>	Icosahedral die	20	$\frac{1}{20} = 0,05 = 5\%$



← This rubber is **NOT** a fair die  
because it is **NOT** symmetrical!

<https://goo.gl/6xot0H>

## POSTER ABOUT EXPRESSING OPINIONS, GIVING REASONS AND AGREEING / DISAGREEING

ASKING OPINIONS (QUESTIONS)	GIVING OPINIONS (ANSWERS)	
What do you think?	I think that...	I don't think that ...
	I believe that ...	I don't believe that...
	In my opinion...	
Do you agree?	I agree  <a href="https://goo.gl/KY5VLj">https://goo.gl/KY5VLj</a>	I disagree  <a href="https://goo.gl/KY5VLj">https://goo.gl/KY5VLj</a>
Why?	Because...	

## POSTER ABOUT COMPARATIVES AND SUPERLATIVES

### MATHEMATICAL SYMBOLS

=	"is equal to..."
≠	"is not equal to..." / "is different from..."
>	"is greater than..."
<	"is less than..."

### COMPARATIVES AND SUPERLATIVES



COMPARING TWO THINGS	
$P(\text{"pick" } \text{yellow}) = P(\text{"pick" } \text{green})$	"yellow is as likely as green"
$P(\text{"pick" } \text{orange}) > P(\text{"pick" } \text{blue})$	"orange is more likely than blue"
$P(\text{"pick" } \text{pink}) < P(\text{"pick" } \text{yellow})$	"pink is less likely than yellow"
COMPARING MORE THAN TWO THINGS	
"The most likely color is orange"	
"The least likely color is pink"	

<https://goo.gl/8rbRNc>

## LEADER



<https://goo.gl/bXlJgP>

- Makes sure that everyone cooperates
- Focuses work around the learning task

“It’s your turn”

“Now we have to...”

“What do you think?”

## SECRETARY



<https://goo.gl/sK3kYG>

- Keeps time
- Asks help

“We only have ... minutes”

“Teacher can you help us? We don’t understand/can’t remember...”

“How do you say ... in English?”

## SPOKESPERSON



<https://goo.gl/jicBby>

- Presents the group’s work

“This is our graphical representation.  
We used a ... because ...”

“The most frequent outcome is ...”

“We think that our die is/isn’t fair  
because ...”

# Experimental probability



<https://goo.gl/FkFB2g>

**MATERIAL:** a tetrahedral die

**PURPOSE:** establish if it is a fair die or not

**PROCEDURE:** roll the die 100 times, record each roll and then analyse the results



<https://goo.gl/fdsBDw>

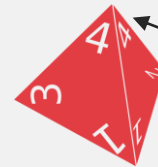
a) Before you start, do your predictions!

Outcome	Occurences
1	
2	
3	
4	

**Remember!**

Outcome: the number on the die

Occurences: how many times?



Here the outcome is 4!

<https://goo.gl/KLSJ6d>

What do you think is the most likely outcome? Why? \_\_\_\_\_



<https://goo.gl/6hVnSf>

b) Roll the die 100 times. Record each roll in the table!

Outcome	Occurences
1	
2	
3	
4	



<https://goo.gl/KW1FDV>

c) Complete the table below with your results and answer the questions.

Outcome	Absolute frequency	Relative frequency	Percentage
1			
2			
3			
4			
Total			

- What's the most frequent outcome? \_\_\_\_\_
  - What's the least frequent outcome? \_\_\_\_\_
  - What kind of graphical representation best represents you results? \_\_\_\_\_
- Why? \_\_\_\_\_



<https://goo.gl/s8V94I>

d) Open an Excel worksheet, copy your results in a table and do their graphical representation.



## CONCLUSION: answer the questions

<https://goo.gl/nFVcGS>

- Are your predictions different from your results? \_\_\_\_\_
- Do you think you get the same results if you do the experiment again?

☐ Yes

☐ No

Why? \_\_\_\_\_

- Is your die a fair die? Why? \_\_\_\_\_

\_\_\_\_\_



## EVALUATION: evaluate your work

<https://goo.gl/0CsXjW>

Focus	--	-	+	++
I asked questions when I did not understand.				
I worked seriously.				
I helped friends in trouble.				
I enjoyed the experience.				



# Experimental probability



<https://goo.gl/FkFB2g>

**MATERIAL:** a tetrahedral die

**PURPOSE:** establish if it is a fair die or not

**PROCEDURE:** roll the die 100 times, record each roll and then analyse the results



a) Before you start, do your predictions!

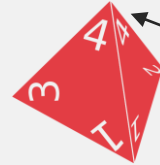
Outcome	Occurences
1	
2	
3	
4	

<https://goo.gl/fdsBDw>

**Remember!**

Outcome: the number on the die

Occurences: how many times?



Here the outcome is 4!

<https://goo.gl/KLSJ6d>



b) Roll the die 100 times. Record each roll in the table!

Outcome	Occurences
1	
2	
3	
4	

<https://goo.gl/6hVnSf>



c) Complete the graphical representation of the results.

<https://goo.gl/s8V94l>


1 = ■

2 = ■

3 = ■

4 = ■



**CONCLUSION:** is your die a fair die? ☐ yes ☐ no

<https://goo.gl/nFVcGS>



## EVALUATION: evaluate your work

Focus	--	-	+	++
I asked questions when I did not understand.				
I worked seriously.				
I helped friends in trouble.				
I enjoyed the experience.				

## EVALUATION GRID

The student can...

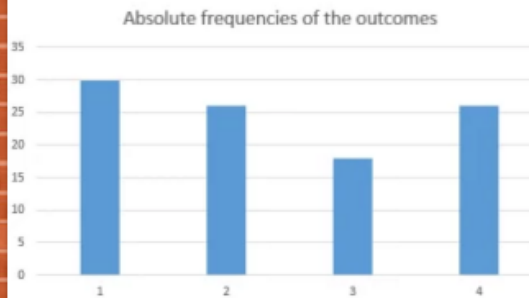
	Student 1	Student 2	Student 3	Student 4	Student 5	Student 6	Student 7	Student 8	Student 9	Student 10	Student 11	Student 12	Student 13
theoretically predict probabilities.													
collect data.													
calculate absolute frequency.													
calculate relative frequency.													
convert between decimal numbers and percentages.													
analyse results.													
choose an appropriate graph to represent data.													
represent data graphically.													
interpret results.													
compare theoretical and experimental probabilities.													
evaluate own work using given criteria.													
cooperate with others.													
know and use the subject specific language.													
use language for predicting, hypothesizing and justifying.													

## LEVELS

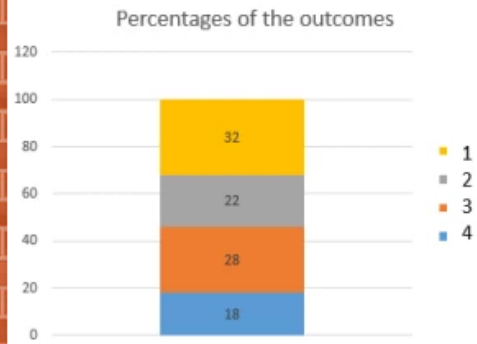
- 1 Basic (in a limited way)
- 2 Intermediate (in a correct way)
- 3 Advanced (in an appropriate and effective way)

# Is your die a fair die?

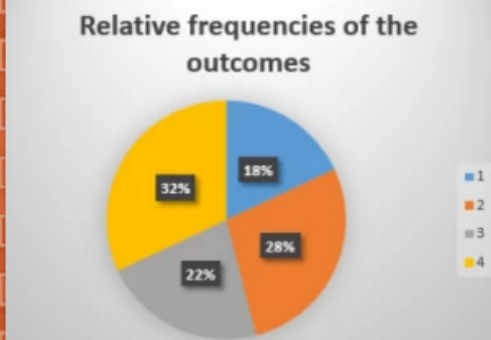
Group 1



Group 3

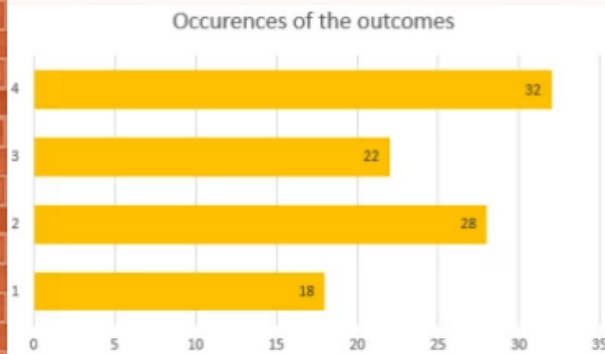


Group 2

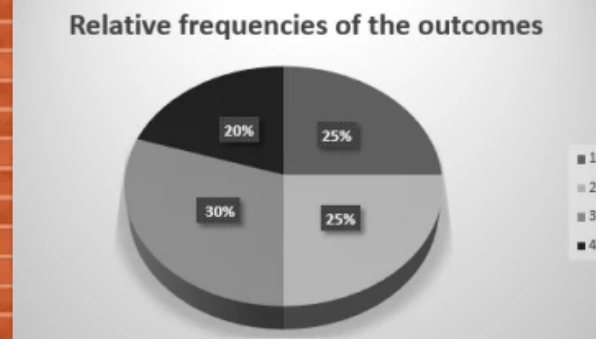


Group 4

Yes it is a fair die!



Group 5



# Experimental probability



**MATERIAL:** one euro coin

**PURPOSE:** establish if it is a fair coin or not

**PROCEDURE:** toss the coin 10 times, then 50 times, then other 100 times. Record each toss and then analyse the results



a) Before you start, do your predictions!

Outcome	Occurences		
	10 tosses	50 tosses	100 tosses
Head			
Tail			

**Remember!**

Outcome: the face of the coin

Occurences: how many times?

Here the outcome is Tail!

<https://goo.gl/xNYFb2>

What do you think is the most likely outcome in case of 100 tosses? Why? \_\_\_\_\_



b) Toss the coin 10 times, then 50, then other 100. Record each toss in the table!

Outcome	Occurences		
	10 tosses	50 tosses	100 tosses
Head			
Tail			



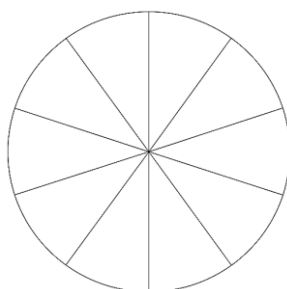
c) Complete the table below with your results and answer the questions.

Outcome	Percentage		
	10 tosses	50 tosses	100 tosses
Head			
Tail			
Total			

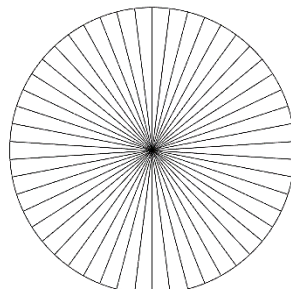
- What's the most frequent outcome in case of 100 tosses? \_\_\_\_\_
- Is it the same as for 10 or 50 tosses? \_\_\_\_\_



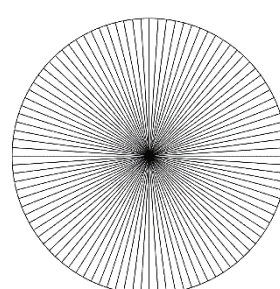
d) Complete the graphical representation of the results.



10 tosses



50 tosses



100 tosses

Head ■  
Tail ■



## CONCLUSION: answer the questions

<https://goo.gl/nFVcGS>

- Are your predictions different from your results? \_\_\_\_\_
- Do you think you get the same results if you do the experiment again?

☐ Yes

☐ No

Why? \_\_\_\_\_

- Is your coin a fair coin? Why? \_\_\_\_\_

\_\_\_\_\_



## EVALUATION: evaluate your work

<https://goo.gl/OCsXjW>

Focus	--	-	+	++
I was able to answer all the questions.				
I have understood the difference between theoretical and experimental probability.				

# Experimental probability



**MATERIAL:** one euro coin

**PURPOSE:** establish if it is a fair coin or not

**PROCEDURE:** toss the coin 10 times, then 50 times, then other 100 times. Record each toss and then analyse the results



a) Before you start, do your predictions!

Outcome	Occurences		
	10 tosses	50 tosses	100 tosses
Head			
Tail			

**Remember!**

Outcome: the face of the coin

Occurences: how many times?

Here the outcome is Tail!

<https://goo.gl/xNYFb2>

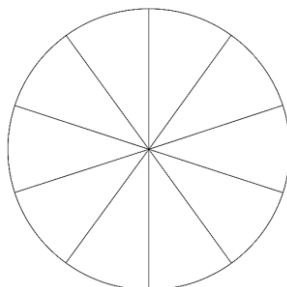


b) Toss the coin 10 times, then 50, then other 100. Record each toss in the table!

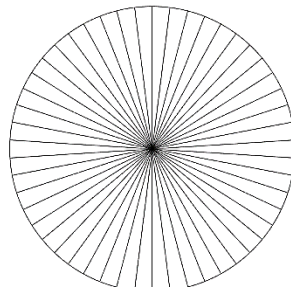
Outcome	Occurences		
	10 tosses	50 tosses	100 tosses
Head			
Tail			



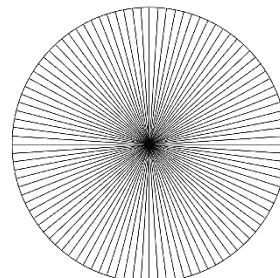
c) Complete the graphical representation of the results.



10 tosses



50 tosses



100 tosses

Head ■  
Tail ■



**CONCLUSION:** is your die a fair die? ☐ yes ☐ no



**EVALUATION:** evaluate your work

Focus	--	-	+	++
I was able to answer all the questions.				
I have understood the difference between theoretical and experimental probability.				