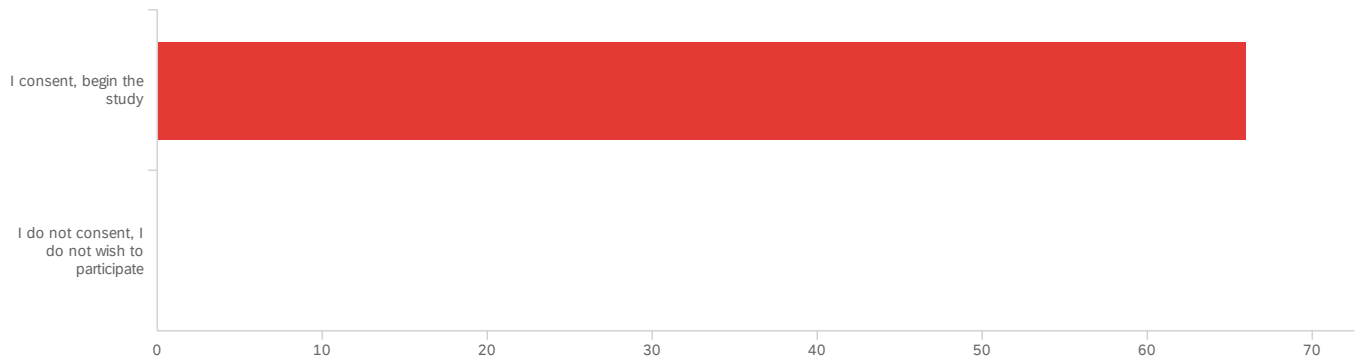


Survey Report 2

Ordinals

June 20, 2022 5:50 PM CEST

Q1 - Welcome to the research study! We are interested in understanding the role of visualization of mathematics within mathematical practice. You will be presented with information relevant to ordinal numbers, a branch of the mathematical field of set theory, and be asked to answer some questions about it. Please be assured that your responses will be kept completely confidential. The study should take you approximately 15 minutes to complete, and you will have a chance to win €15 for your participation. Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. If you would like to contact the Principal Investigator in the study to discuss this research, please e-mail Yuval Goren (Yuvali.goren@gmail.com) By clicking the button below, you acknowledge that your participation in the study is voluntary, you are 18 years of age, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason. Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.



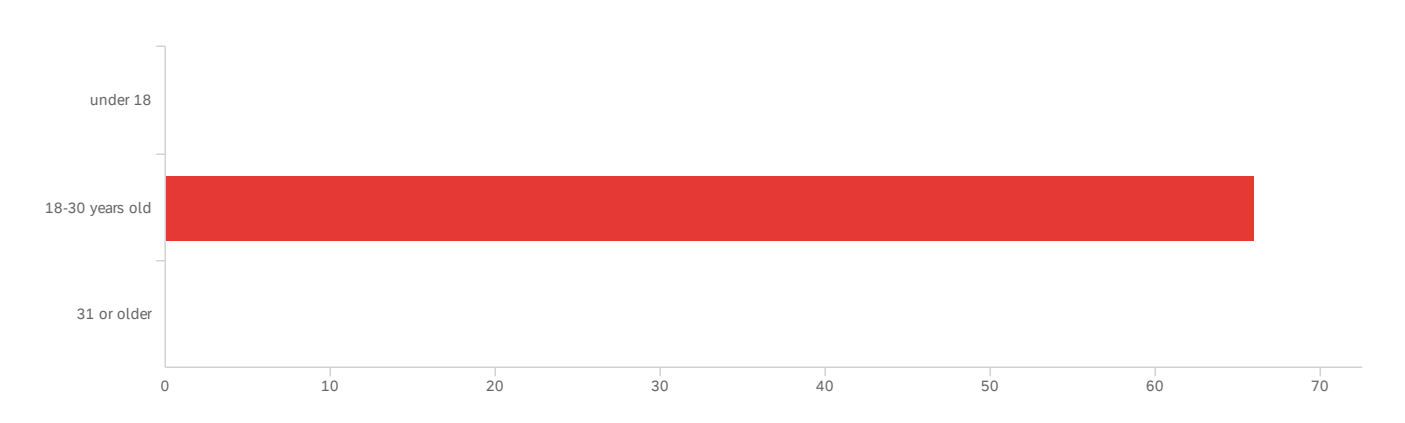
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	<p>Welcome to the research study! We are interested in understanding the role of visualization of mathematics within mathematical practice. You will be presented with information relevant to ordinal numbers, a branch of the mathematical field of set theory, and be asked to answer some questions about it. Please be assured that your responses will be kept completely confidential. The study should take you approximately 15 minutes to complete, and you will have a chance to win €15 for your participation. Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. If you would like to contact the Principal Investigator in the study to discuss this research, please e-mail Yuval Goren (Yuval.goren@gmail.com) By clicking the button below, you acknowledge that your participation in the study is voluntary, you are 18 years of age, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason. Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.</p>	1.00	1.00	1.00	0.00	0.00	66

#	Field	Choice Count
1	I consent, begin the study	100.00% 66
2	I do not consent, I do not wish to participate	0.00% 0

66

Showing rows 1 - 3 of 3

Q1 - How old are you?

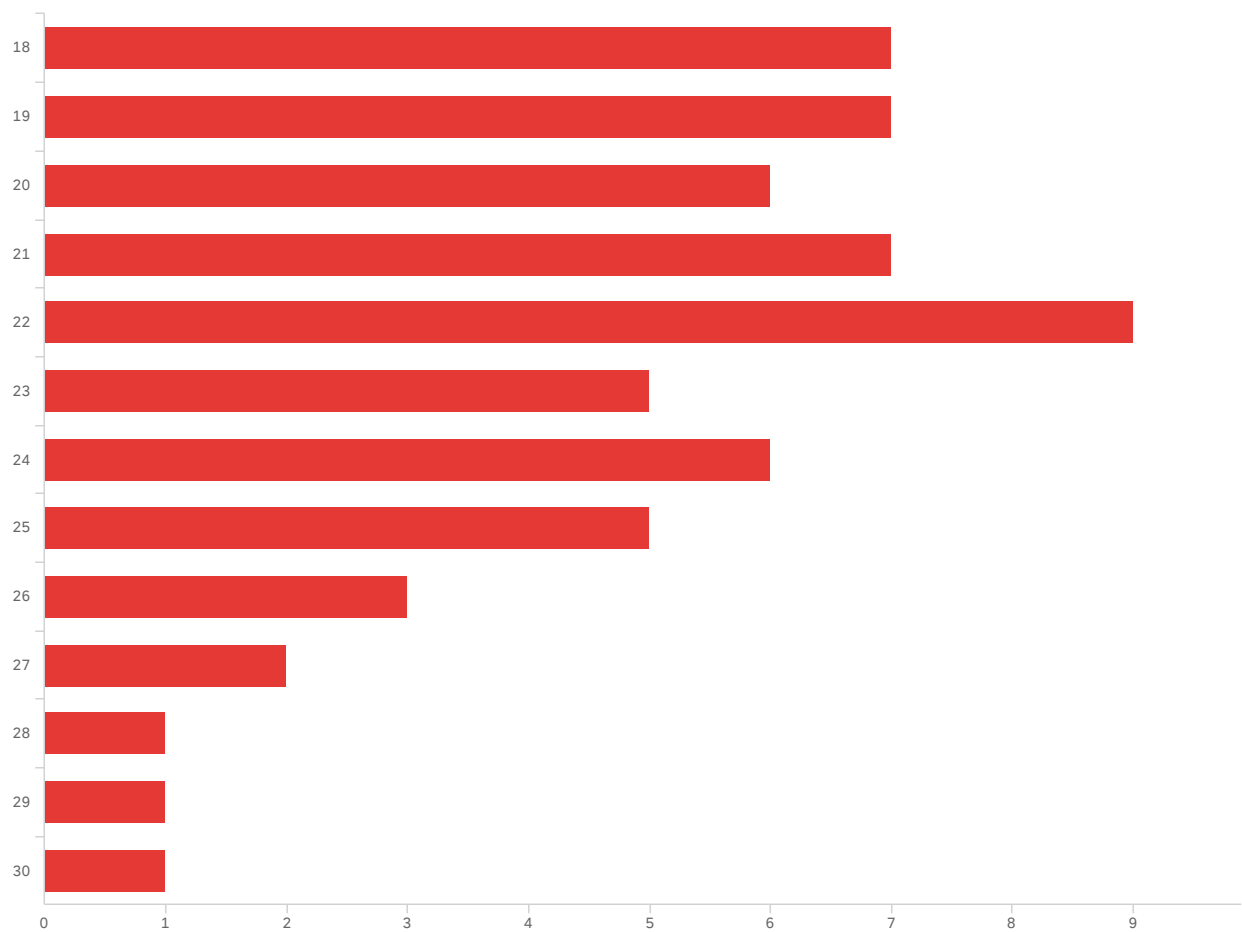


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How old are you?	2.00	2.00	2.00	0.00	0.00	66

#	Field	Choice Count
1	under 18	0.00% 0
2	18-30 years old	100.00% 66
3	31 or older	0.00% 0
		66

Showing rows 1 - 4 of 4

Q2 - If you answered '18-30 years old' in the previous question, Please specify your age



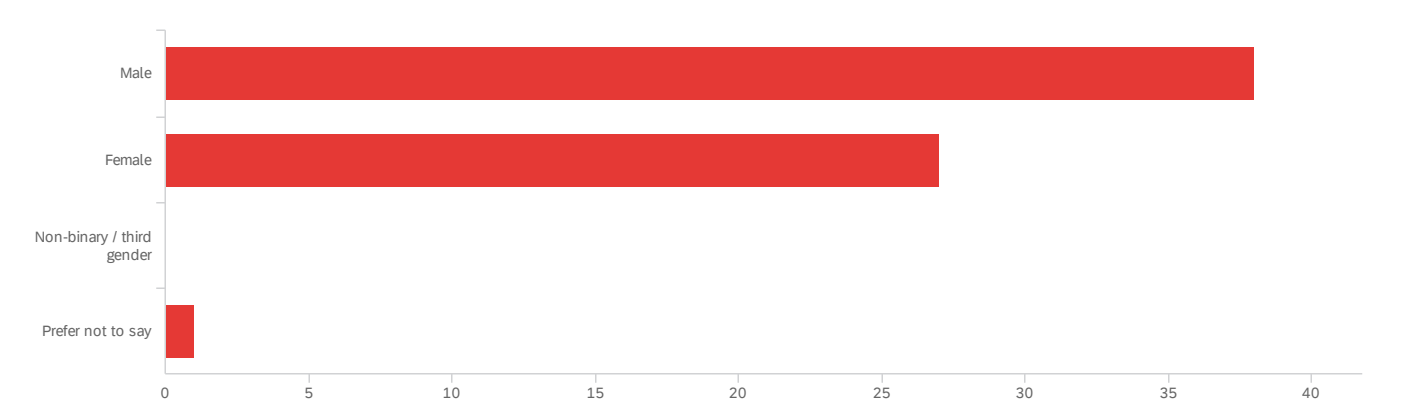
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	If you answered '18-30 years old' in the previous question, Please specify your age	1.00	13.00	5.12	2.96	8.77	60

#	Field	Choice Count
1	18	11.67% 7
2	19	11.67% 7
3	20	10.00% 6
4	21	11.67% 7
5	22	15.00% 9
6	23	8.33% 5

#	Field	Choice Count
7	24	10.00% 6
8	25	8.33% 5
9	26	5.00% 3
10	27	3.33% 2
11	28	1.67% 1
12	29	1.67% 1
13	30	1.67% 1
		60

Showing rows 1 - 14 of 14

Q3 Gender - What gender do you identify as?



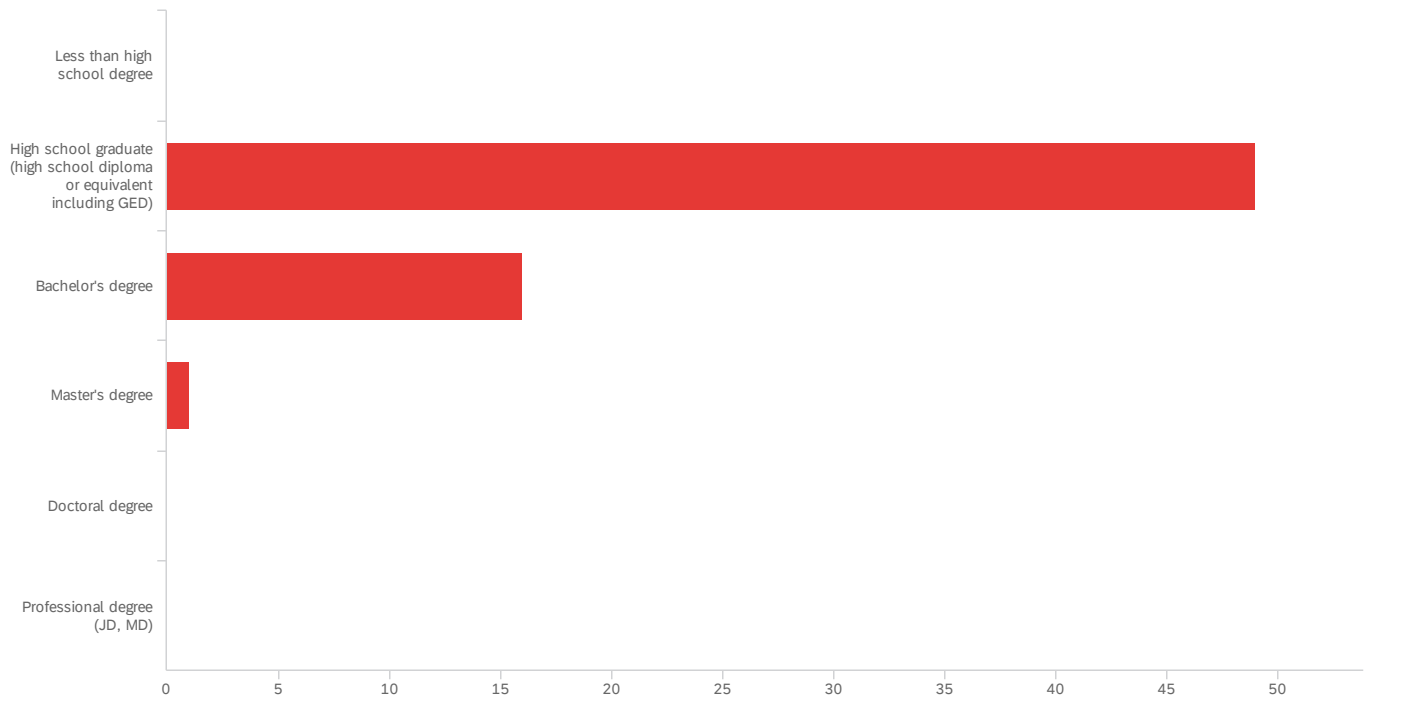
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What gender do you identify as?	1.00	4.00	1.45	0.58	0.34	66

#	Field	Choice Count
1	Male	57.58% 38
2	Female	40.91% 27
3	Non-binary / third gender	0.00% 0
4	Prefer not to say	1.52% 1

66

Showing rows 1 - 5 of 5

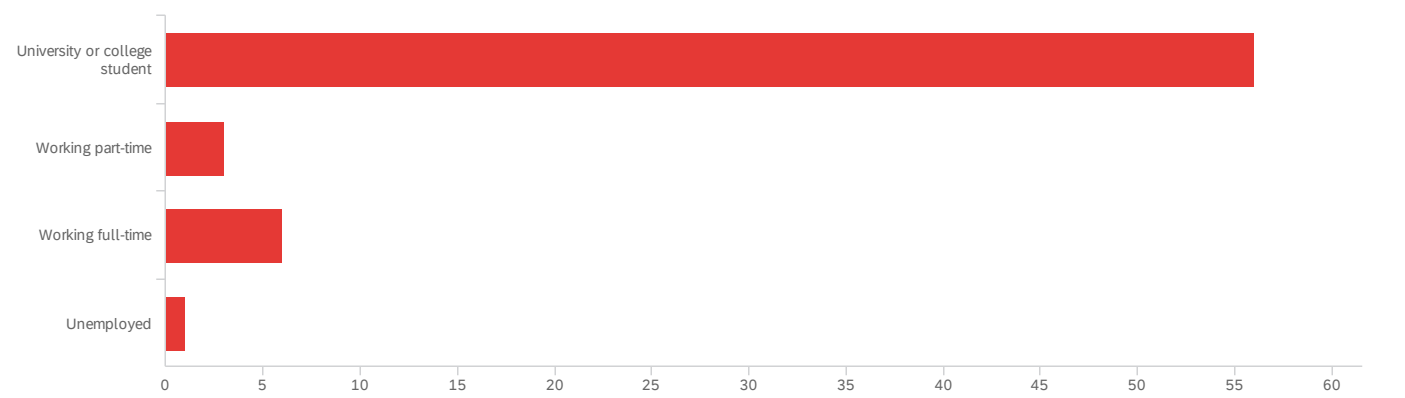
Q4 - What is the highest level of school you have completed or the highest degree you have received?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is the highest level of school you have completed or the highest degree you have received?	2.00	4.00	2.27	0.48	0.23	66

#	Field	Choice Count
1	Less than high school degree	0.00% 0
2	High school graduate (high school diploma or equivalent including GED)	74.24% 49
3	Bachelor's degree	24.24% 16
4	Master's degree	1.52% 1
5	Doctoral degree	0.00% 0
6	Professional degree (JD, MD)	0.00% 0

Q6 - What is your current occupation?



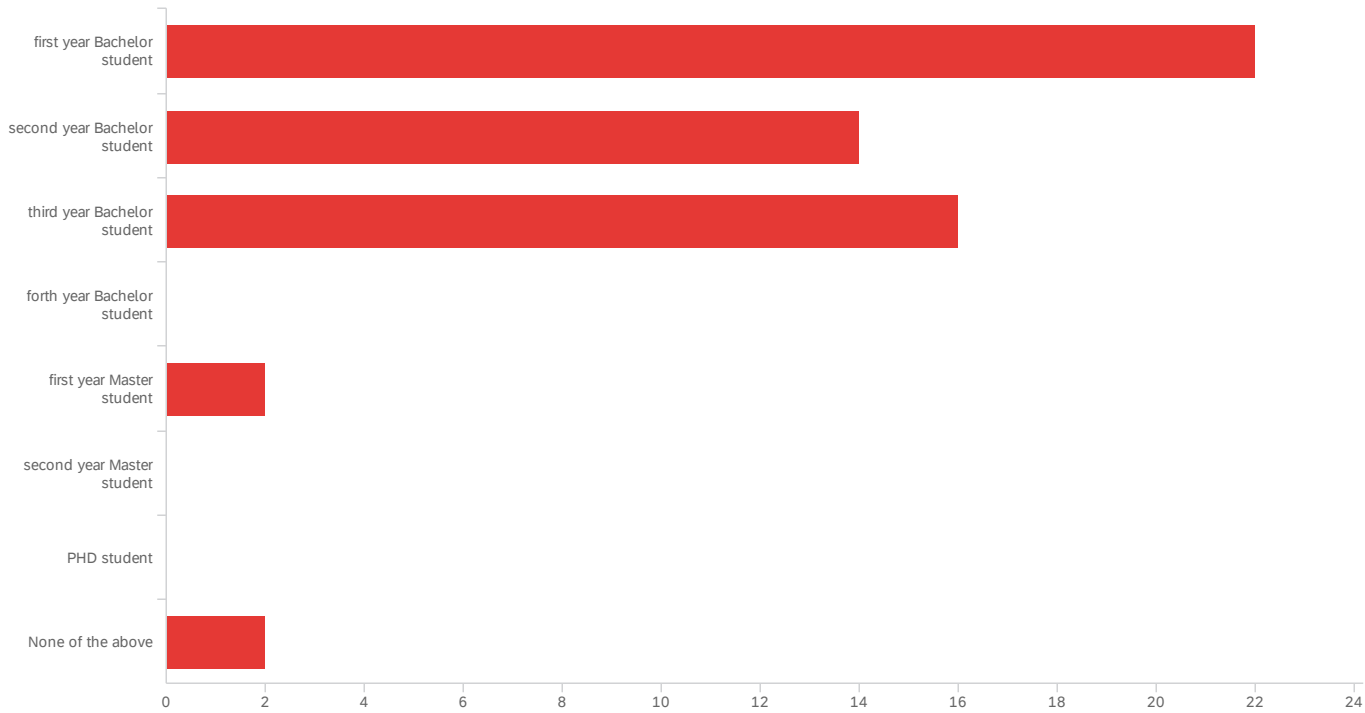
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is your current occupation?	1.00	4.00	1.27	0.69	0.47	66

#	Field	Choice Count
1	University or college student	84.85% 56
2	Working part-time	4.55% 3
3	Working full-time	9.09% 6
4	Unemployed	1.52% 1

66

Showing rows 1 - 5 of 5

Q7 - If you answered 'University or college student' in the previous question, please specify your current academic year



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	If you answered 'University or college student' in the previous question, please specify your current academic year - Selected Choice	1.00	8.00	2.21	1.50	2.24	56

#	Field	Choice Count
1	first year Bachelor student	39.29% 22
2	second year Bachelor student	25.00% 14
3	third year Bachelor student	28.57% 16
4	forth year Bachelor student	0.00% 0
5	first year Master student	3.57% 2
6	second year Master student	0.00% 0
7	PHD student	0.00% 0

#	Field	Choice Count
8	None of the above	3.57% 2

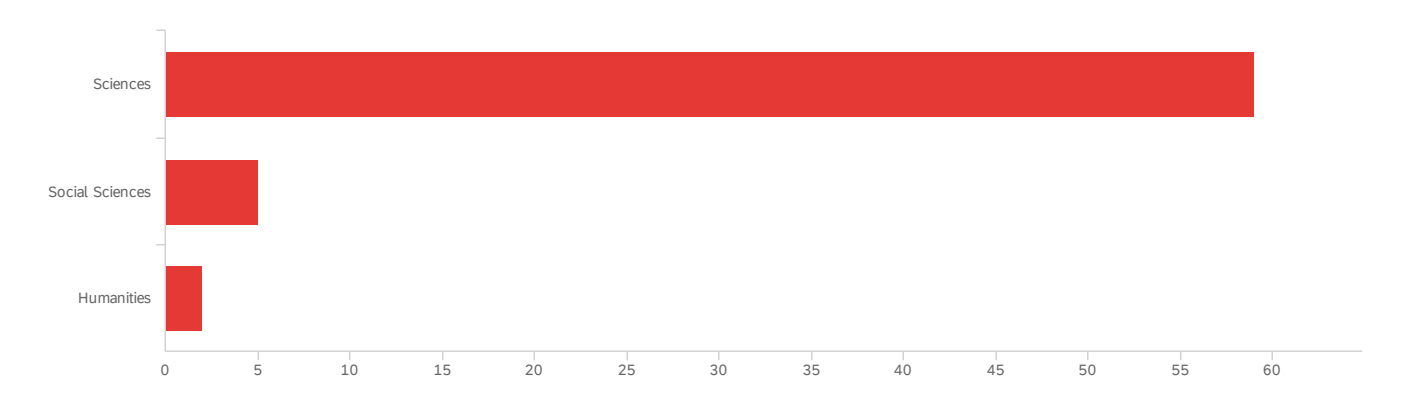
56

Showing rows 1 - 9 of 9

Q7_8_TEXT - None of the above

None of the above
Diploma

Q8 - What is your area of study/profession?

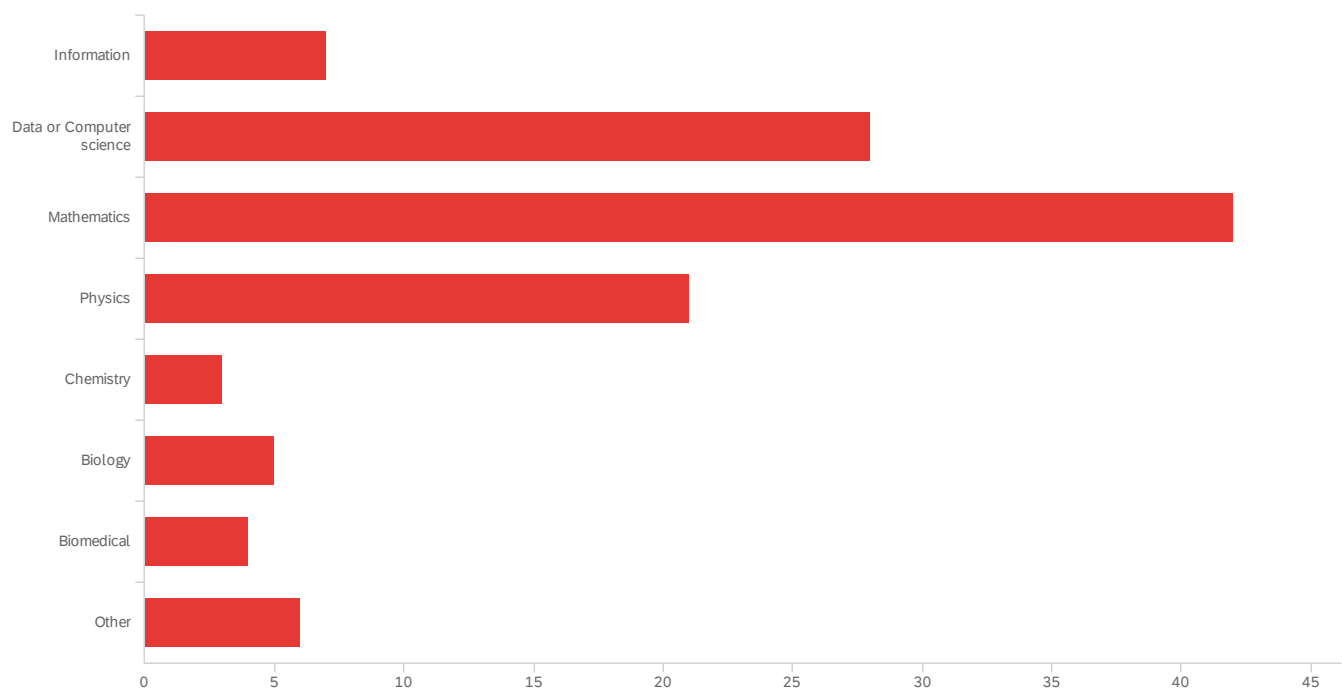


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is your area of study/profession?	1.00	3.00	1.14	0.42	0.18	66

#	Field	Choice Count
1	Sciences	89.39% 59
2	Social Sciences	7.58% 5
3	Humanities	3.03% 2
		66

Showing rows 1 - 4 of 4

Q9 - If you chose 'Sciences' in the previous question, please specify (more than one answer is allowed)

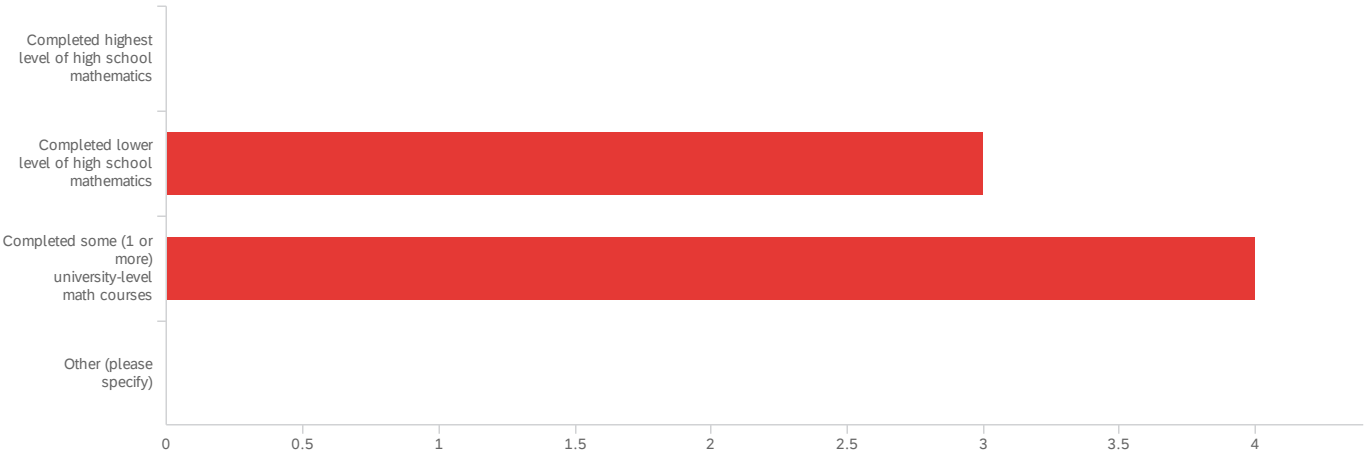


#	Field	Choice Count
1	Information	6.03% 7
2	Data or Computer science	24.14% 28
3	Mathematics	36.21% 42
4	Physics	18.10% 21
5	Chemistry	2.59% 3
6	Biology	4.31% 5
7	Biomedical	3.45% 4
8	Other	5.17% 6

116

Showing rows 1 - 9 of 9

Q10 - If you chose social sciences or humanities in the previous question, please describe your mathematical background



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	If you chose social sciences or humanities in the previous question, please describe your mathematical background - Selected Choice	2.00	3.00	2.57	0.49	0.24	7

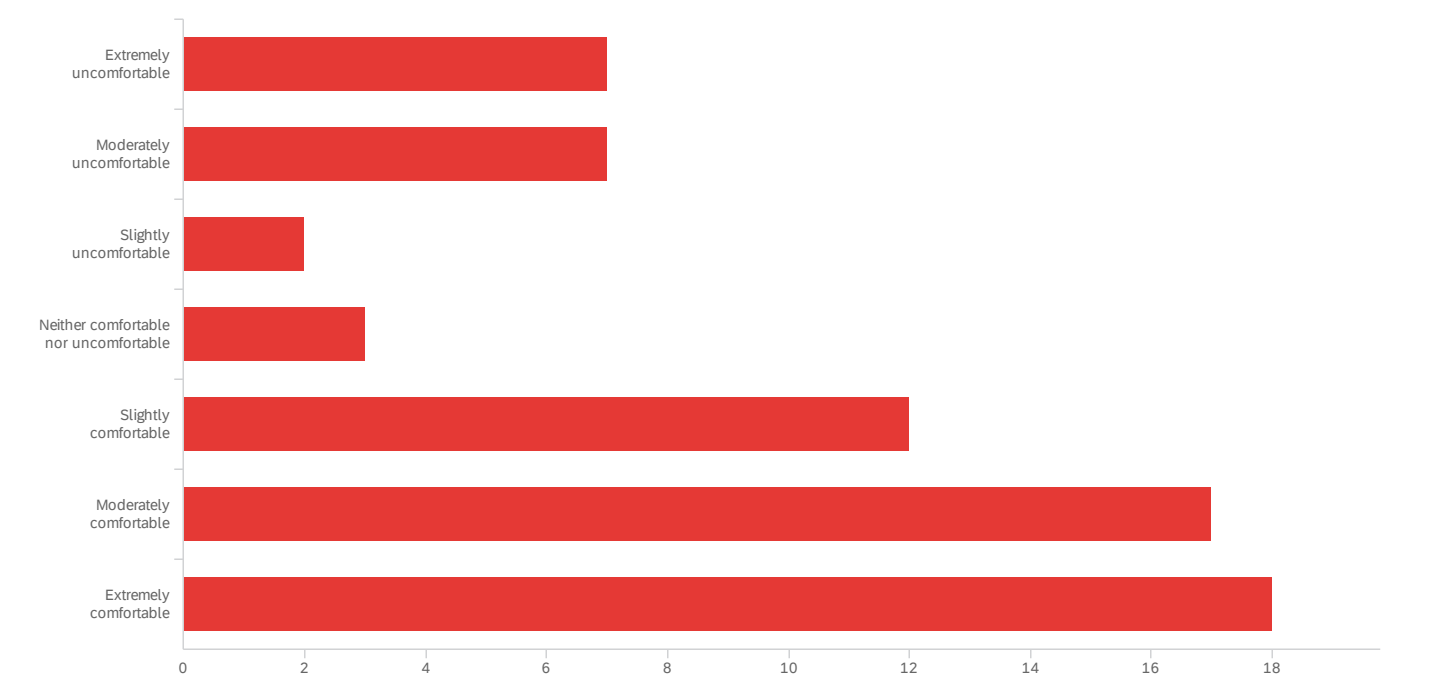
#	Field	Choice Count
1	Completed highest level of high school mathematics	0.00% 0
2	Completed lower level of high school mathematics	42.86% 3
3	Completed some (1 or more) university-level math courses	57.14% 4
4	Other (please specify)	0.00% 0
		7

Showing rows 1 - 5 of 5

Q10_4_TEXT - Other (please specify)

Other (please specify)

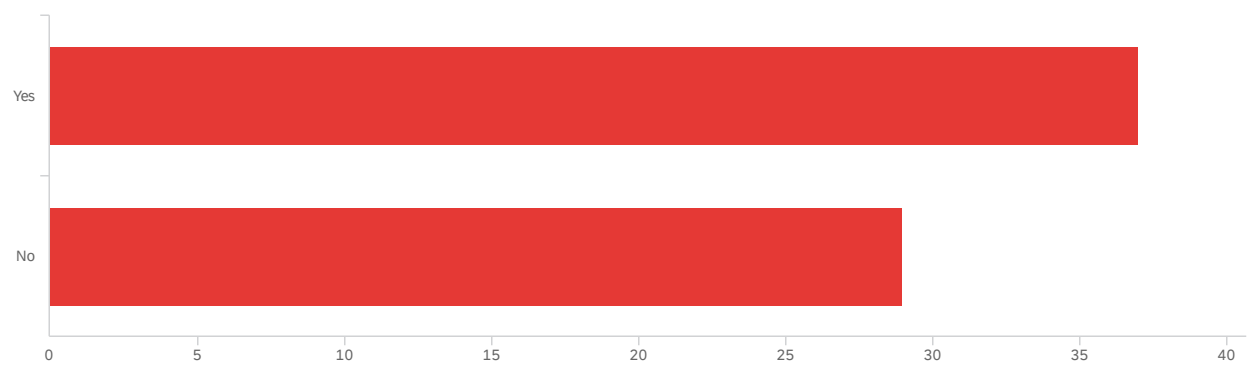
Q11 - On a scale from "Extremely uncomfortable" to "Extremely comfortable", How comfortable are you with mathematics?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	On a scale from "Extremely uncomfortable" to "Extremely comfortable", How comfortable are you with mathematics?	1.00	7.00	4.95	2.04	4.16	66

#	Field	Choice Count
1	Extremely uncomfortable	10.61% 7
2	Moderately uncomfortable	10.61% 7
3	Slightly uncomfortable	3.03% 2
4	Neither comfortable nor uncomfortable	4.55% 3
5	Slightly comfortable	18.18% 12
6	Moderately comfortable	25.76% 17
7	Extremely comfortable	27.27% 18
		66

Q48 - Are you familiar with ordinal numbers?



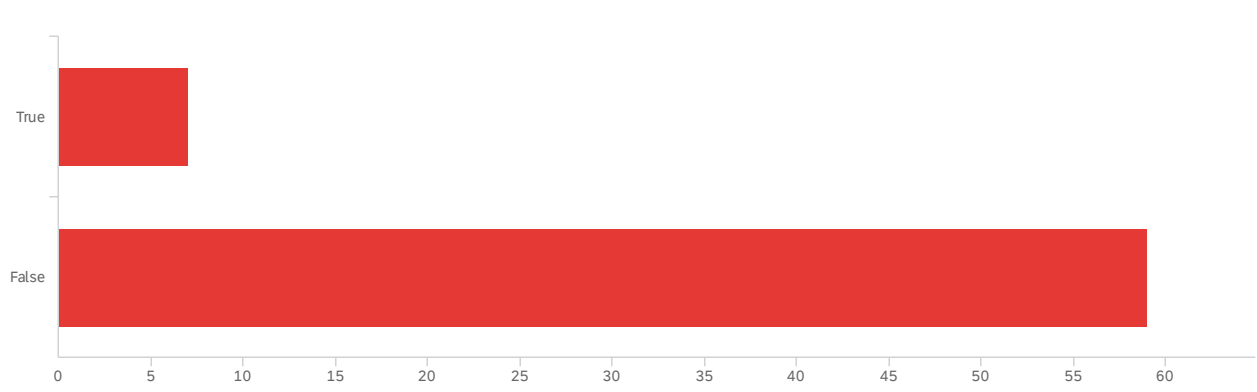
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Are you familiar with ordinal numbers?	1.00	2.00	1.44	0.50	0.25	66

#	Field	Choice Count
1	Yes	56.06% 37
2	No	43.94% 29

66

Showing rows 1 - 3 of 3

Q20 - True or false: $\omega + 1 = \omega + 2$



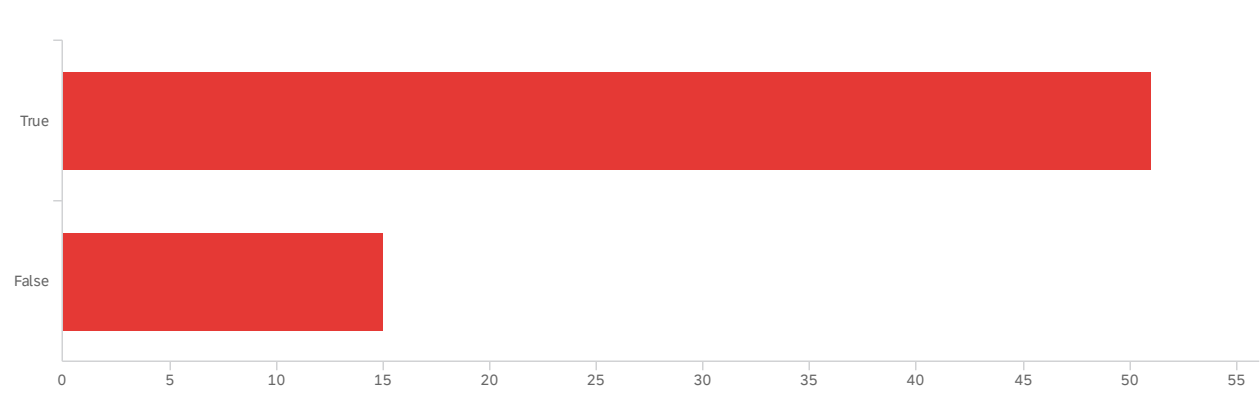
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	True or false: $\omega + 1 = \omega + 2$	1.00	2.00	1.89	0.31	0.09	66

#	Field	Choice	Count
1	True	10.61%	7
2	False	89.39%	59

66

Showing rows 1 - 3 of 3

Q24 - True or false: $412 + \omega = \omega$



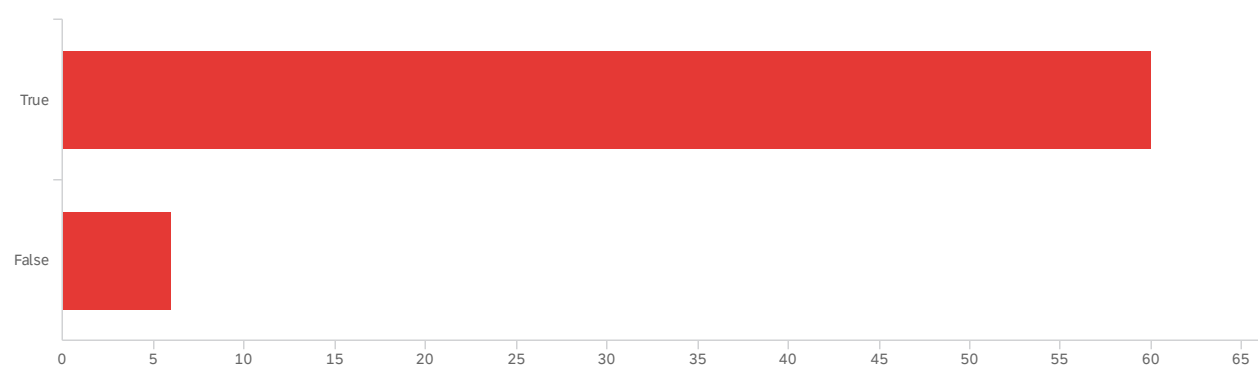
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	True or false: $412 + \omega = \omega$	1.00	2.00	1.23	0.42	0.18	66

#	Field	Choice Count
1	True	77.27% 51
2	False	22.73% 15

66

Showing rows 1 - 3 of 3

Q25 - True or false: For an ordinal number $\alpha < \omega$ (i.e., a finite ordinal), $5 * \alpha = \alpha * 5$



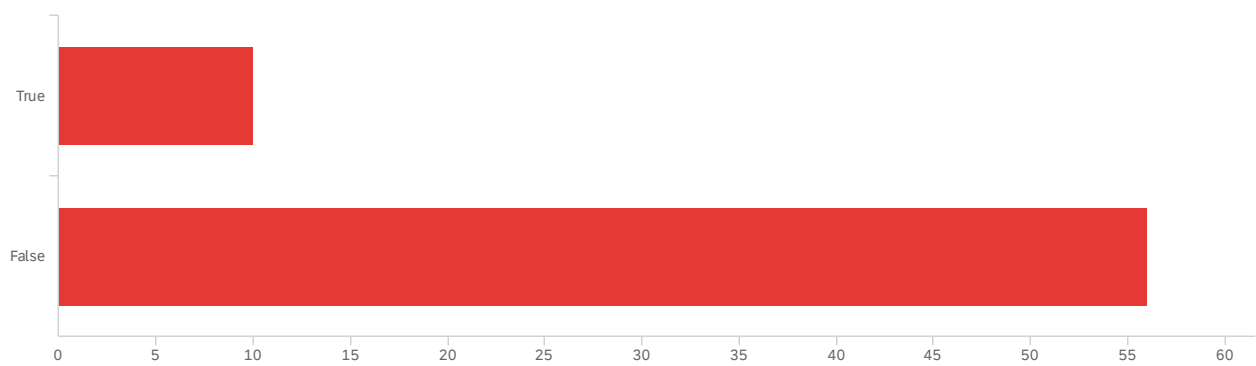
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	True or false: For an ordinal number $\alpha < \omega$ (i.e., a finite ordinal), $5 * \alpha = \alpha * 5$	1.00	2.00	1.09	0.29	0.08	66

#	Field	Choice Count
1	True	90.91% 60
2	False	9.09% 6

66

Showing rows 1 - 3 of 3

Q27 - True or false: $5 * \omega = \omega * 5$



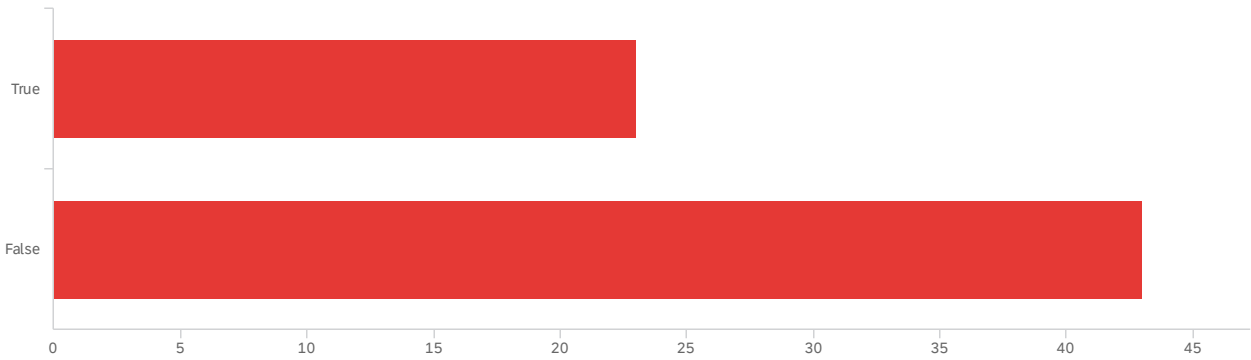
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	True or false: 5 * ω = ω * 5	1.00	2.00	1.85	0.36	0.13	66

#	Field	Choice	Count
1	True	15.15%	10
2	False	84.85%	56

66

Showing rows 1 - 3 of 3

Q31 - True or false: $4 * \omega = (1 + 1 + 1 + 1) * \omega = 1 * \omega + 1 * \omega + 1 * \omega + 1 * \omega = \omega + \omega + \omega + \omega$



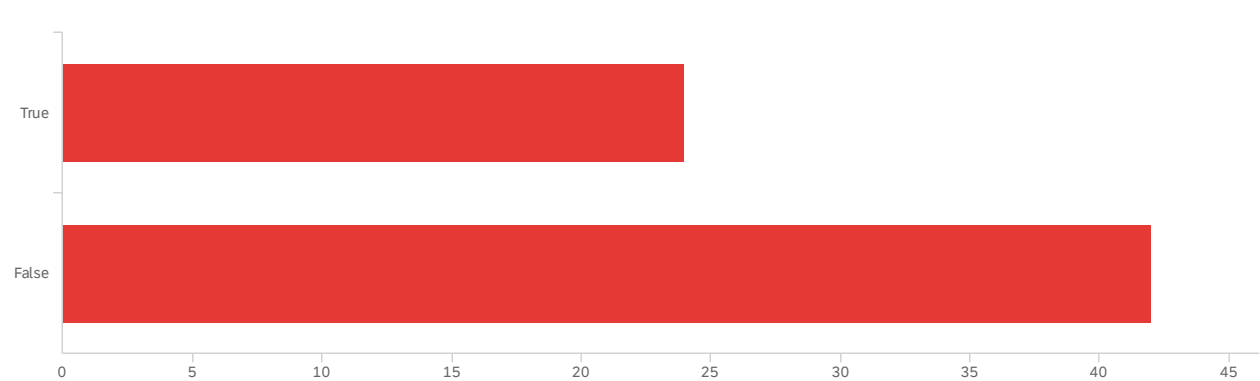
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	True or false: 4 * ω = (1 + 1 + 1 + 1) * ω = 1 * ω + 1 * ω + 1 * ω + 1 * ω = ω + ω + ω + ω	1.00	2.00	1.65	0.48	0.23	66

#	Field	Choice Count
1	True	34.85% 23
2	False	65.15% 43

66

Showing rows 1 - 3 of 3

Q49 - True or false: Every ordinal number has a predecessor



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	True or false: Every ordinal number has a predecessor	17.00	18.00	17.64	0.48	0.23	66

#	Field	Choice Count
17	True	36.36% 24
18	False	63.64% 42

66

Showing rows 1 - 3 of 3

Q51 - If you answered 'No' in the previous question, please provide an example of such ordinal

If you answered 'No' in the previous question, please provide an example of...

If $\forall \{0,1,2,\dots\}$ Then 0 have no predecessor

I'm a bit unsure of this one as you defined ordinals to be natural numbers. Hence 0 would not be an ordinal as it is not a natural number. Meaning that the ordinal 1 would not have a predecessor. However, all sets were defined to have a 0th place just like in computer science. If 0 is in fact an ordinal, which to my understanding it shouldn't, it's just a place name within a set, then it can be said that it is an ordinal without a predecessor as -1 is definitely not possible.

?

0

0

0 if without negatives

-

0

1

0

0

1

0

0

0

0

0

ω

0

0

If you answered 'No' in the previous question, please provide an example of...

Omega

the first one - 0 (matching to the empty set. or in some definitions, 1)

W

0

0

ω

0

0

Omega. There exists no ordinal number k such that $k+1 = \text{omega}$

ω

0

0

0, assuming zero is an ordinal and negative integers are not

0

0 hasnt have a predecessor

1

omega

0

w

Omega

Omega

0

Q32 - Please type your answer in the box below: Express the number 5 in terms of successors of 0 [Hint: $8 = S(S(6))$]

Please type your answer in the box below: Express the number 5 in terms of...

6

$S(S(S(S(0))))$

$5=S(S(S(S(0$

$S(S(S(S(0))))$

$S(s(s(s(0))))$

7

$8=s$

$S(S(S(S(0))))$

?

$S(S(S(S(0))))$

$S(S(S(S(0))))$

$S(S(S(S(0))))$

$S(S(S(S(0))))$

$S(S(S(S(0))))$

$S(S(-2))$

$S(S(S(S(0))))$

$S(S(S(S(0))))$

$S(s(s(s(0))))$

$S(s(s(s(0))))$

$5=S(S(S(S(0))))$

$S(S(S(S(0))))$

Please type your answer in the box below: Express the number 5 in terms of...

$S(S(S(S(0))))$

$s(s(s(s(0))))$

$5=S(S(S(S(0))))$

$5=S(S(S(0)))$

$5 = S(S(S(S(S(0)))))$

$s(s(s(s(0))))$

$5 = S(S(S(S(0))))$

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$S(S(S(S(0))))$

$S(S(S(S(0))))$

$S(S(S(S(0))))$

$S(S(S(S(0))))$

$5= S(S(S(S(0))))$

0

$5 = S(S(S(S(0))))$

$S(S(S(S(0))))$

$5 = S(S(S(S(S(0)))))$

Please type your answer in the box below: Express the number 5 in terms of...

$S(S(S(S(S(0))))))$

$S(S(S(S(S(0))))))$

$5=S(S(S(S(S(0))))))$

$0\ 1\ 2\ 3\ 4$

$S(S(S(S(S(0))))))$

$S(S(S(S(1))))$

$S(S(S(S(S(S(S(0)))))))$

$5=S(S(S(S(S(0))))))$

$S(S(S(S(S(0))))))$

$5=S(S(S(S(S(0))))))$

$5 = S(S(S(S(S(0))))))$

$S(S(S(S(S(0))))))$

$S(s(s(s(s(0)))))$

$S(S(S(S(S(0))))))$

$S(S(S(S(S(0)))))$

$S(S(S(S(S(0))))))$

$S(S(S(S(S(0))))))$

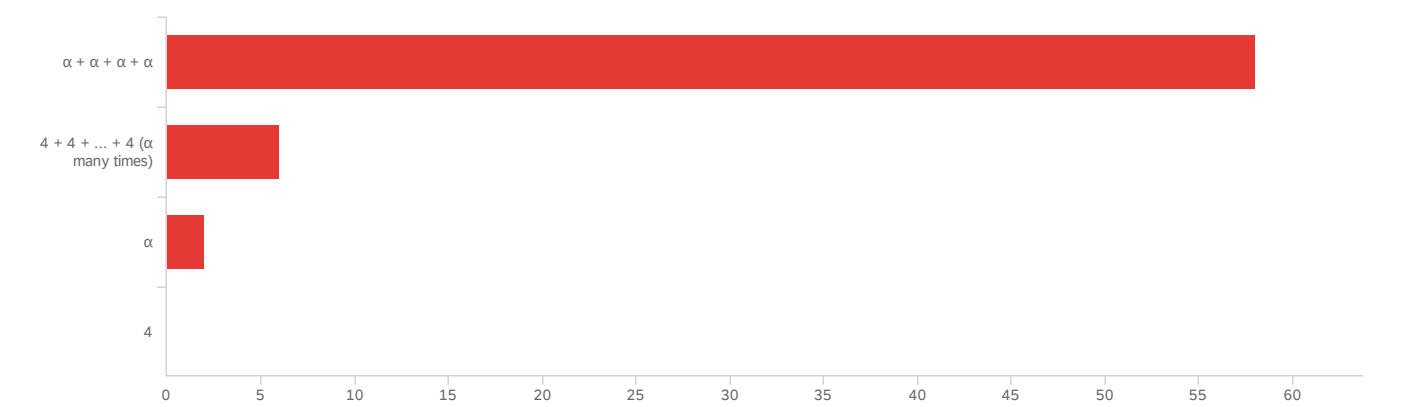
$S(s(s(s(s(s(0))))))$

$S(S(S(S(S(0))))))$

$S(S(S(S(S(0))))))$

$s(s(3))$

Q29 - Multiple choice: For an arbitrary ordinal number α , which of the following is a representation of $\alpha * 4$?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Multiple choice: For an arbitrary ordinal number α , which of the following is a representation of $\alpha * 4$?	1.00	3.00	1.15	0.43	0.19	66

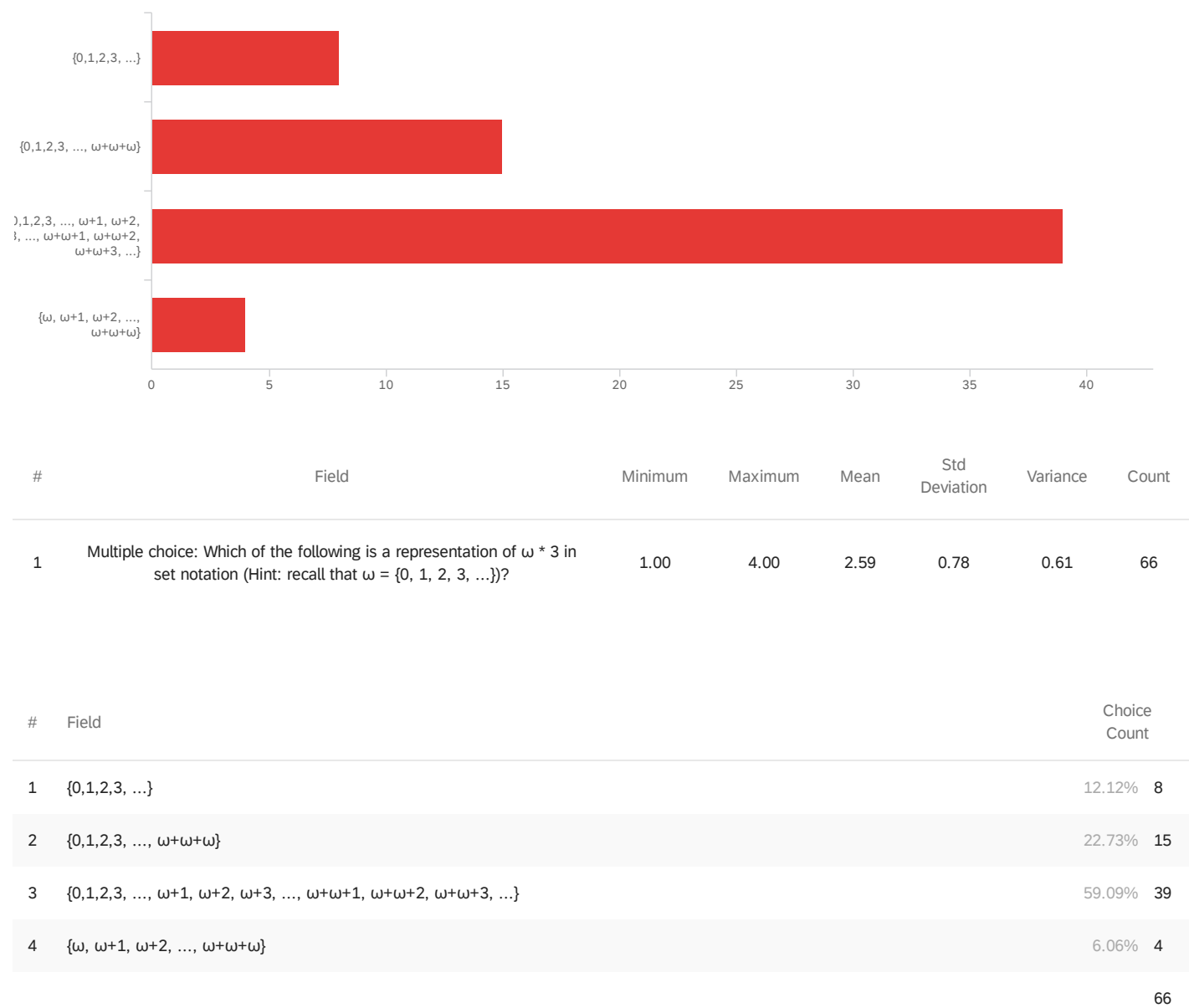
#	Field	Choice Count
1	$\alpha + \alpha + \alpha + \alpha$	87.88% 58
2	$4 + 4 + \dots + 4$ (α many times)	9.09% 6
3	α	3.03% 2
4	4	0.00% 0

66

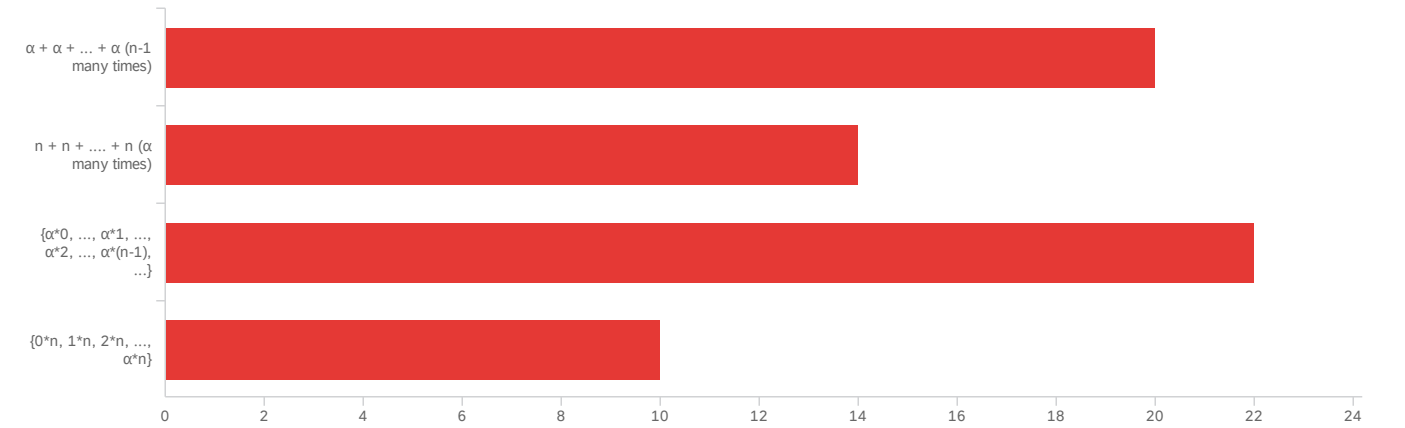
Showing rows 1 - 5 of 5

Q28 - Multiple choice: Which of the following is a representation of $\omega * 3$ in set notation

(Hint: recall that $\omega = \{0, 1, 2, 3, \dots\}$)?



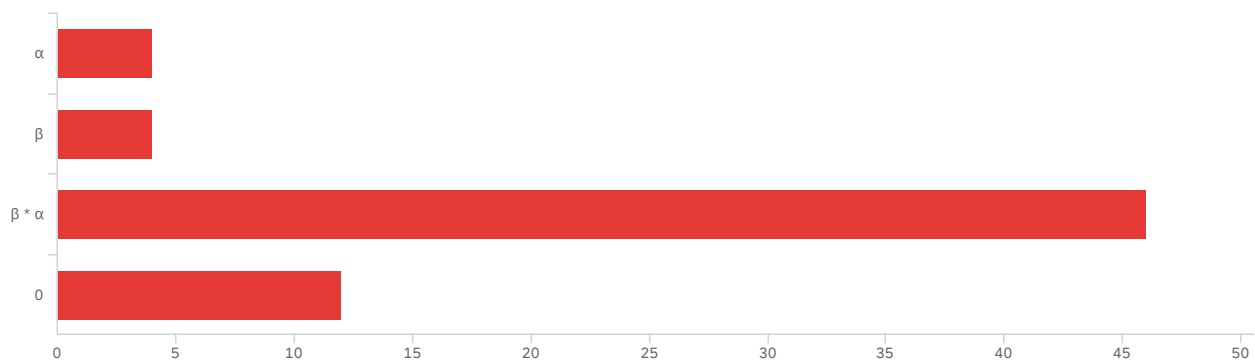
Q30 - Multiple choice: For an arbitrary ordinal number α and a natural number $n \in \mathbb{N}$, which of the following best represents the ordinal number $\alpha * n$?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Multiple choice: For an arbitrary ordinal number α and a natural number $n \in \mathbb{N}$, which of the following best represents the ordinal number $\alpha * n$?	1.00	4.00	2.33	1.06	1.13	66

#	Field	Choice Count
1	$\alpha + \alpha + \dots + \alpha$ ($n-1$ many times)	30.30% 20
2	$n + n + \dots + n$ (α many times)	21.21% 14
3	$\{\alpha^*0, \dots, \alpha^*1, \dots, \alpha^*2, \dots, \alpha^*(n-1), \dots\}$	33.33% 22
4	$\{0^*n, 1^*n, 2^*n, \dots, \alpha^*n\}$	15.15% 10

Q52 - Multiple choice: For any pair of ordinal numbers α , β , which of the following could never be an element in the set representation of the ordinal number $\beta * \alpha$?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
---	-------	---------	---------	------	---------------	----------	-------

1	Multiple choice: For any pair of ordinal numbers α , β , which of the following could never be an element in the set representation of the ordinal number $\beta * \alpha$?	1.00	4.00	3.00	0.70	0.48	66
---	---	------	------	------	------	------	----

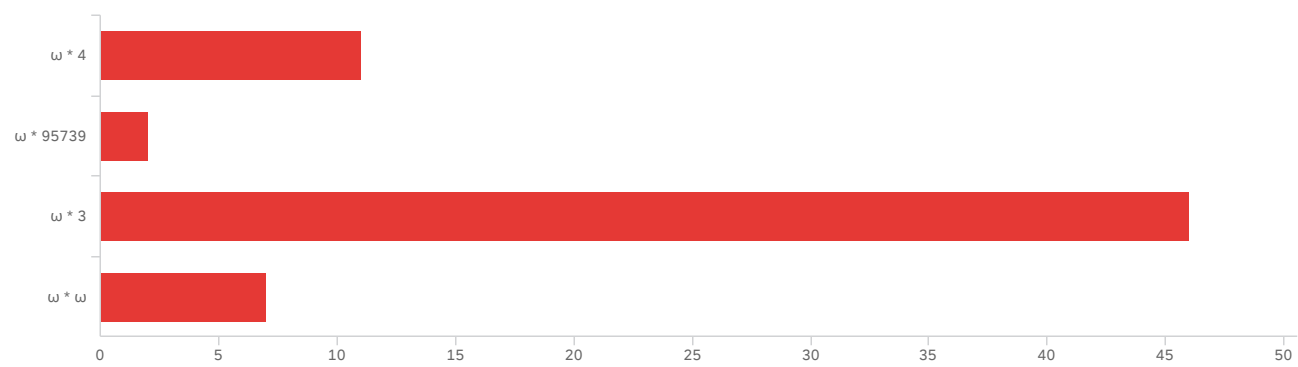
#	Field	Choice Count
---	-------	--------------

1	α	6.06% 4
2	β	6.06% 4
3	$\beta * \alpha$	69.70% 46
4	0	18.18% 12

66

Showing rows 1 - 5 of 5

Q53 - Multiple choice: Which of the following is an element in the set representation of the ordinal number $\omega * 4$?



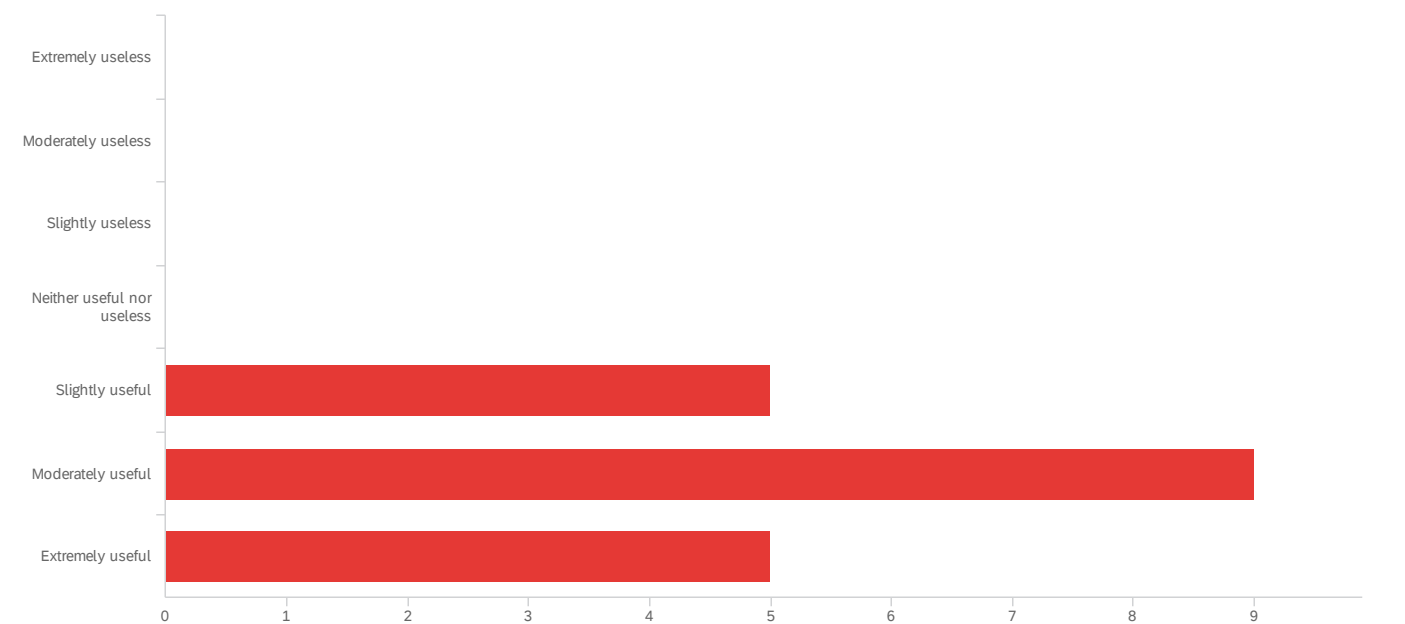
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Multiple choice: Which of the following is an element in the set representation of the ordinal number $\omega * 4$?	1.00	4.00	2.74	0.86	0.74	66

#	Field	Choice Count
1	$\omega * 4$	16.67% 11
2	$\omega * 95739$	3.03% 2
3	$\omega * 3$	69.70% 46
4	$\omega * \omega$	10.61% 7

66

Showing rows 1 - 5 of 5

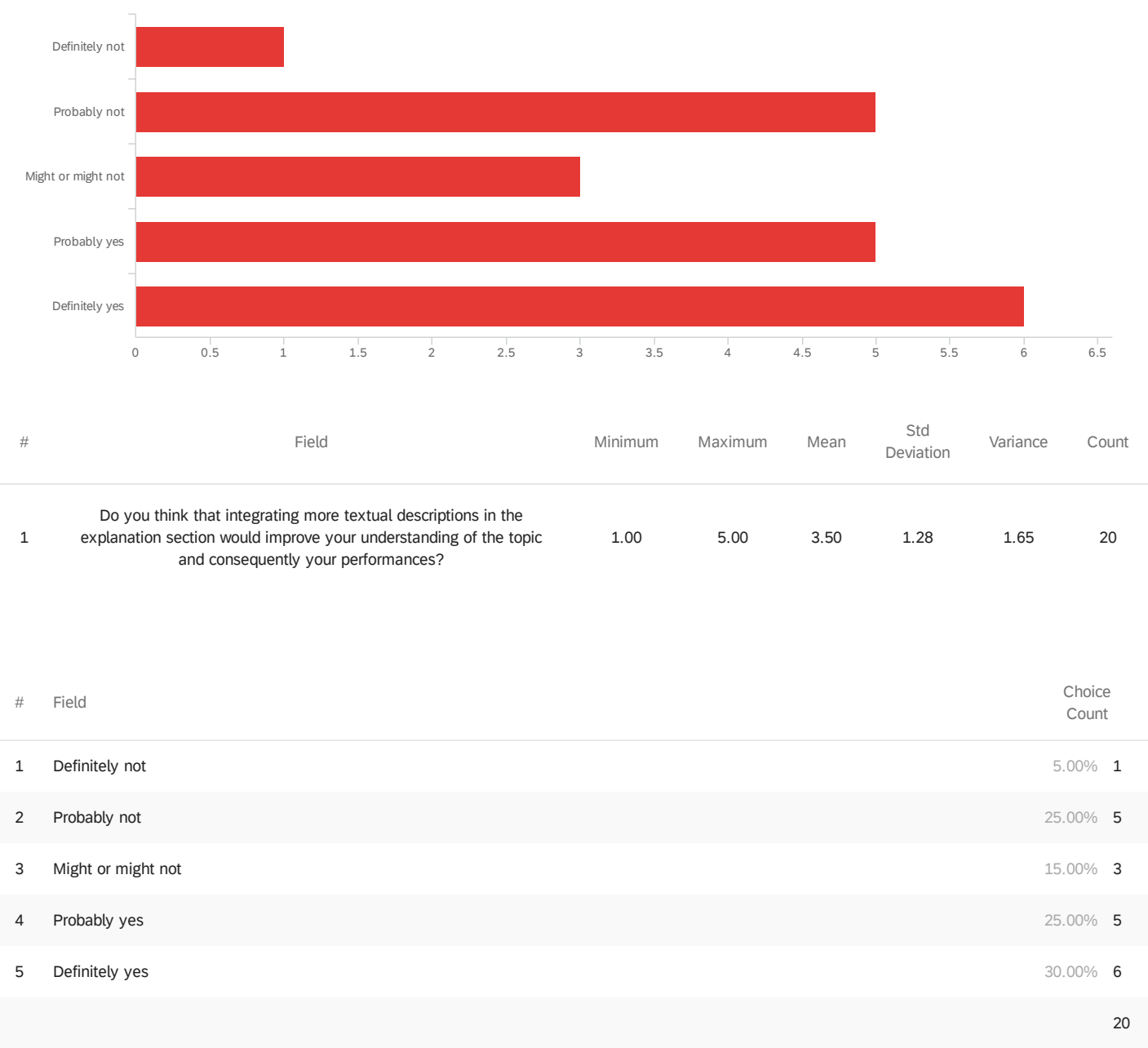
Q44 - To what extend did you find the visuals (i.e., the images and diagrams) helpful?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	To what extend did you find the visuals (i.e., the images and diagrams) helpful?	5.00	7.00	6.00	0.73	0.53	19

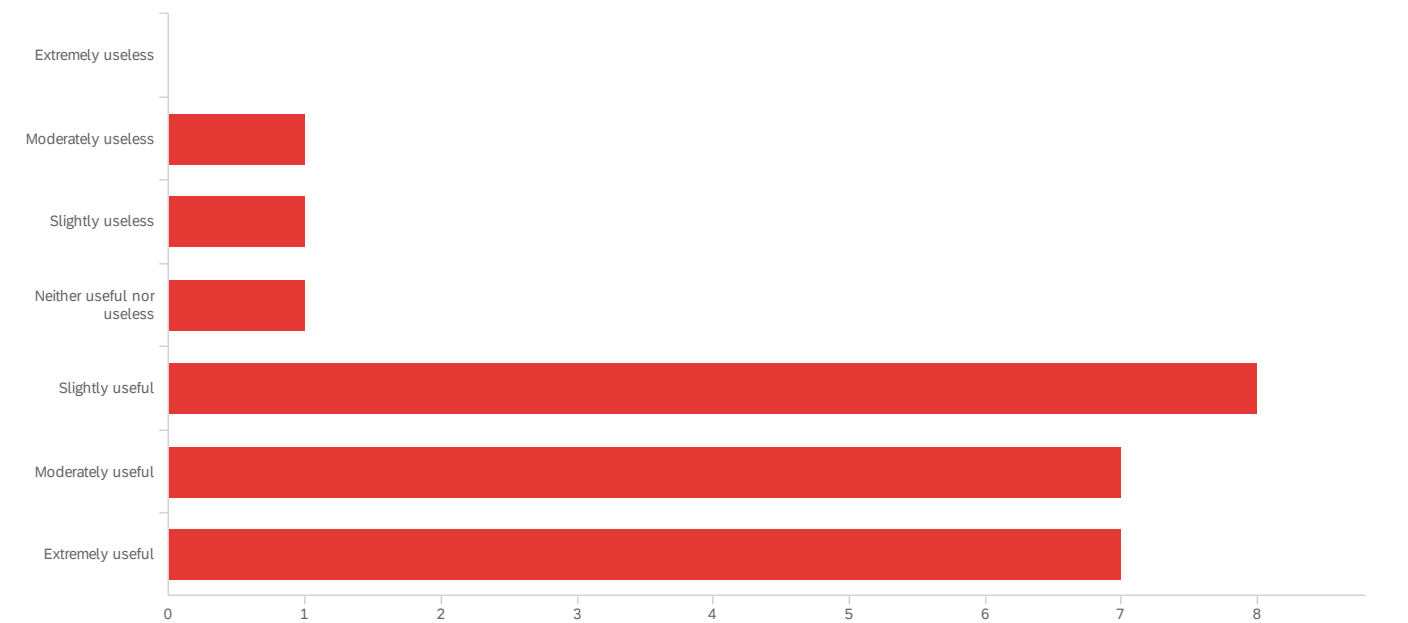
#	Field	Choice Count
1	Extremely useless	0.00% 0
2	Moderately useless	0.00% 0
3	Slightly useless	0.00% 0
4	Neither useful nor useless	0.00% 0
5	Slightly useful	26.32% 5
6	Moderately useful	47.37% 9
7	Extremely useful	26.32% 5
		19

Q56 - Do you think that integrating more textual descriptions in the explanation section would improve your understanding of the topic and consequently your performances?



Showing rows 1 - 6 of 6

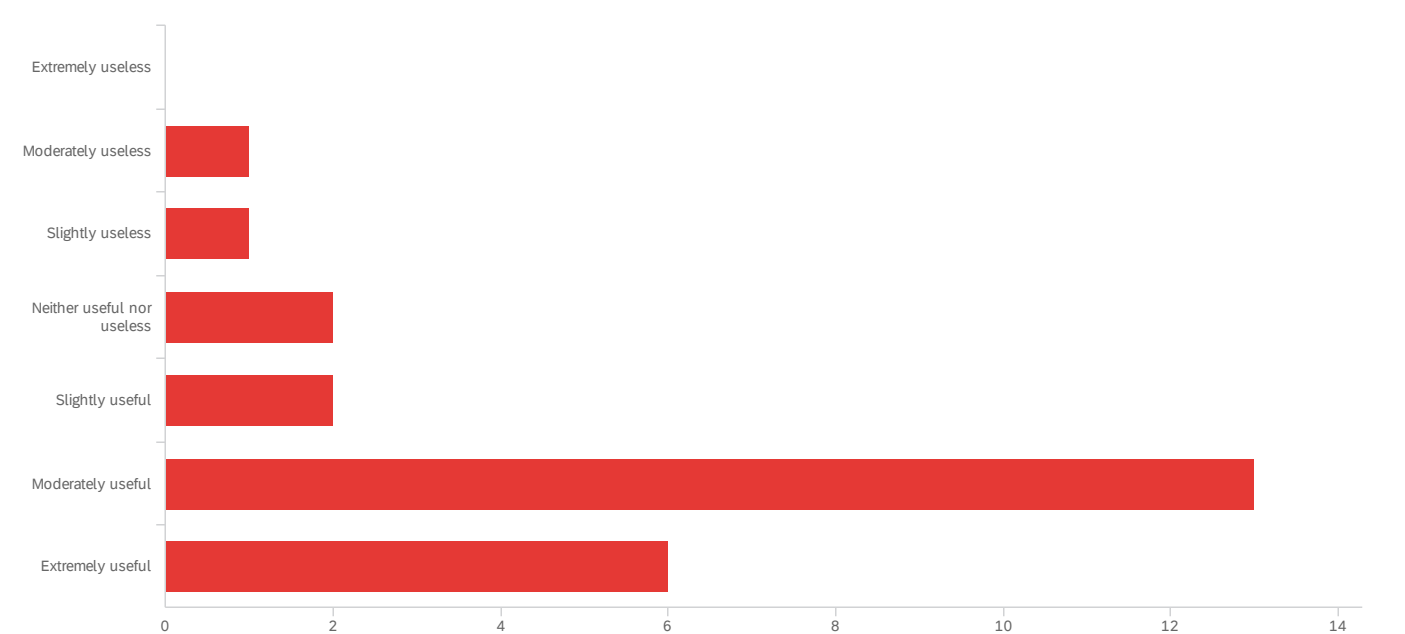
Q39 - To what extend did you find the visual parts (i.e., the images and diagrams) of the explanation helpful?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	To what extend did you find the visual parts (i.e., the images and diagrams) of the explanation helpful?	2.00	7.00	5.60	1.26	1.60	25

#	Field	Choice Count
1	Extremely useless	0.00% 0
2	Moderately useless	4.00% 1
3	Slightly useless	4.00% 1
4	Neither useful nor useless	4.00% 1
5	Slightly useful	32.00% 8
6	Moderately useful	28.00% 7
7	Extremely useful	28.00% 7
		25

Q41 - To what extend did you find the verbal parts of the explanation helpful?

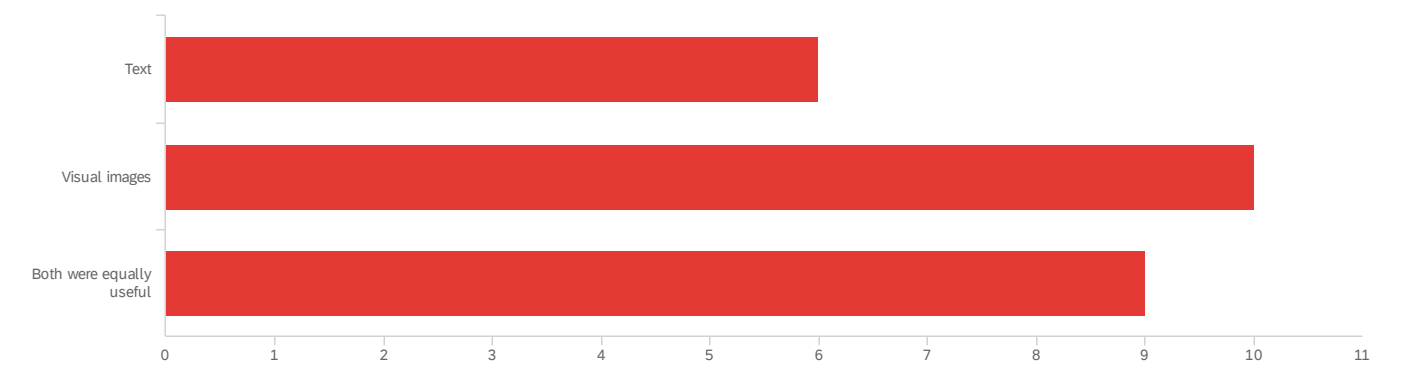


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	To what extend did you find the verbal parts of the explanation helpful?	2.00	7.00	5.72	1.25	1.56	25

#	Field	Choice Count
1	Extremely useless	0.00% 0
2	Moderately useless	4.00% 1
3	Slightly useless	4.00% 1
4	Neither useful nor useless	8.00% 2
5	Slightly useful	8.00% 2
6	Moderately useful	52.00% 13
7	Extremely useful	24.00% 6
		25

Showing rows 1 - 8 of 8

Q40 - Which part did you find to be more useful?

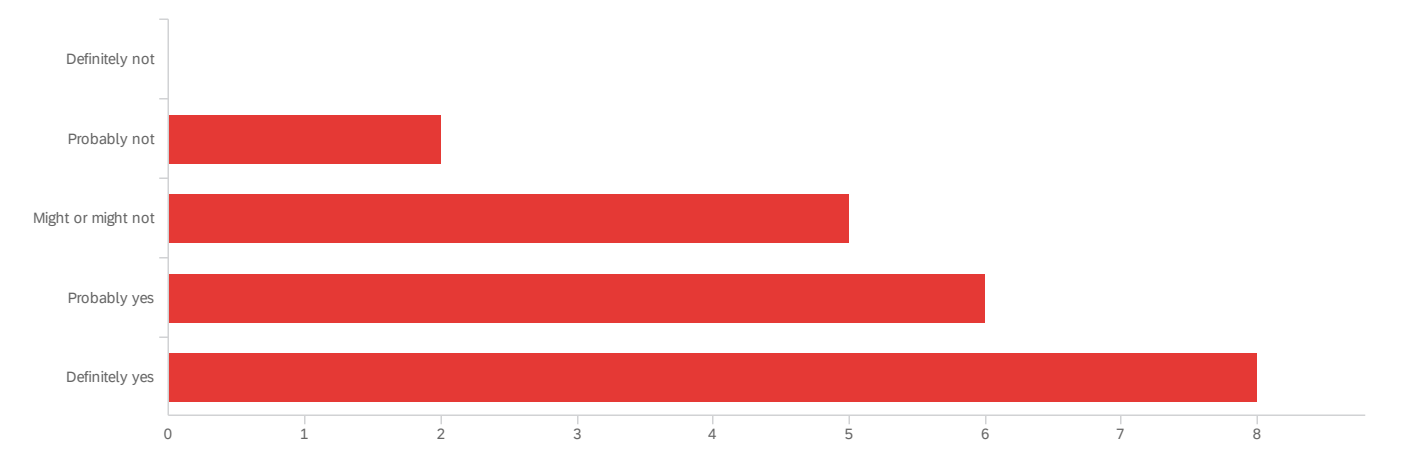


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Which part did you find to be more useful?	1.00	3.00	2.12	0.77	0.59	25

#	Field	Choice Count
1	Text	24.00% 6
2	Visual images	40.00% 10
3	Both were equally useful	36.00% 9
		25

Showing rows 1 - 4 of 4

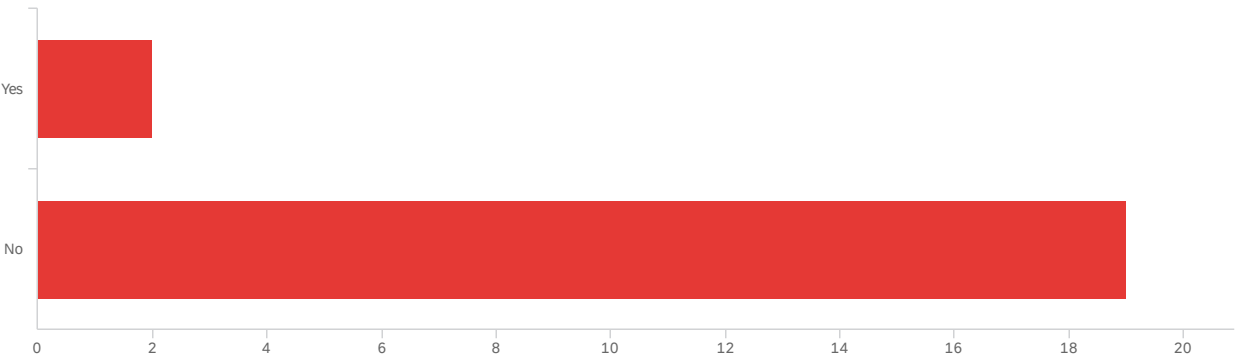
Q36 - Do you think that integrating visuals in the explanation section would improve your understanding of the topic and consequently your performances?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Do you think that integrating visuals in the explanation section would improve your understanding of the topic and consequently your performances?	2.00	5.00	3.95	1.00	1.00	21

#	Field	Choice Count
1	Definitely not	0.00% 0
2	Probably not	9.52% 2
3	Might or might not	23.81% 5
4	Probably yes	28.57% 6
5	Definitely yes	38.10% 8
		21

Q37 - Have you tried to visualize some of the definitions/questions, by sketching a diagram for example?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Have you tried to visualize some of the definitions/questions, by sketching a diagram for example?	1.00	2.00	1.90	0.29	0.09	21

#	Field	Choice Count
1	Yes	9.52% 2
2	No	90.48% 19

21

Showing rows 1 - 3 of 3

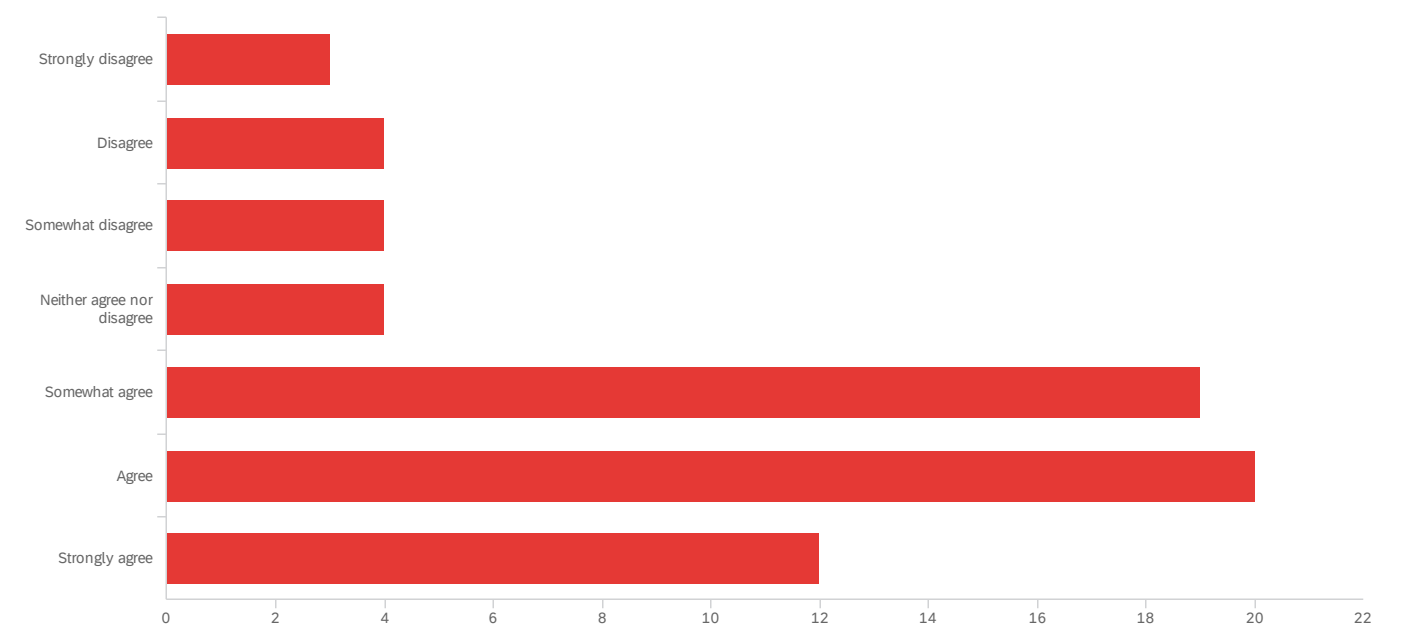
Q38 - If you answered 'Yes' in the previous questions, please elaborate below:

If you answered "Yes" in the previous questions, please elaborate below:

Addition and multiplication were described as a visual process (in addition to the formal definitions), so I could picture doing them in my head

Not only here, but, in general, whenever I have a difficulty conceptualizing the question, I try to put into a diagram, so that I can understand the essence of what it is asking.

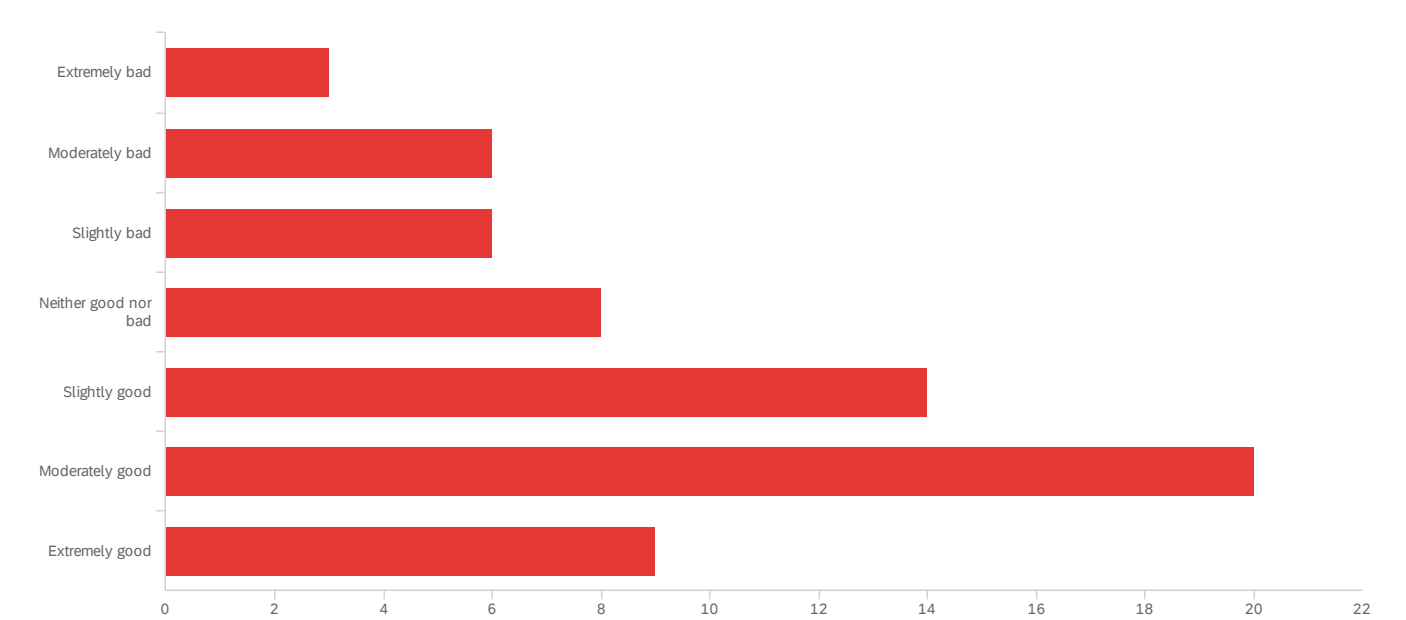
Q33 - To what extent do you agree with the following statement: I feel like I understood the topic and was able to answer the questions properly



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	To what extent do you agree with the following statement: I feel like I understood the topic and was able to answer the questions properly	1.00	7.00	5.12	1.61	2.59	66

#	Field	Choice Count
1	Strongly disagree	4.55% 3
2	Disagree	6.06% 4
3	Somewhat disagree	6.06% 4
4	Neither agree nor disagree	6.06% 4
5	Somewhat agree	28.79% 19
6	Agree	30.30% 20
7	Strongly agree	18.18% 12
		66

Q34 - How well do you think you performed?

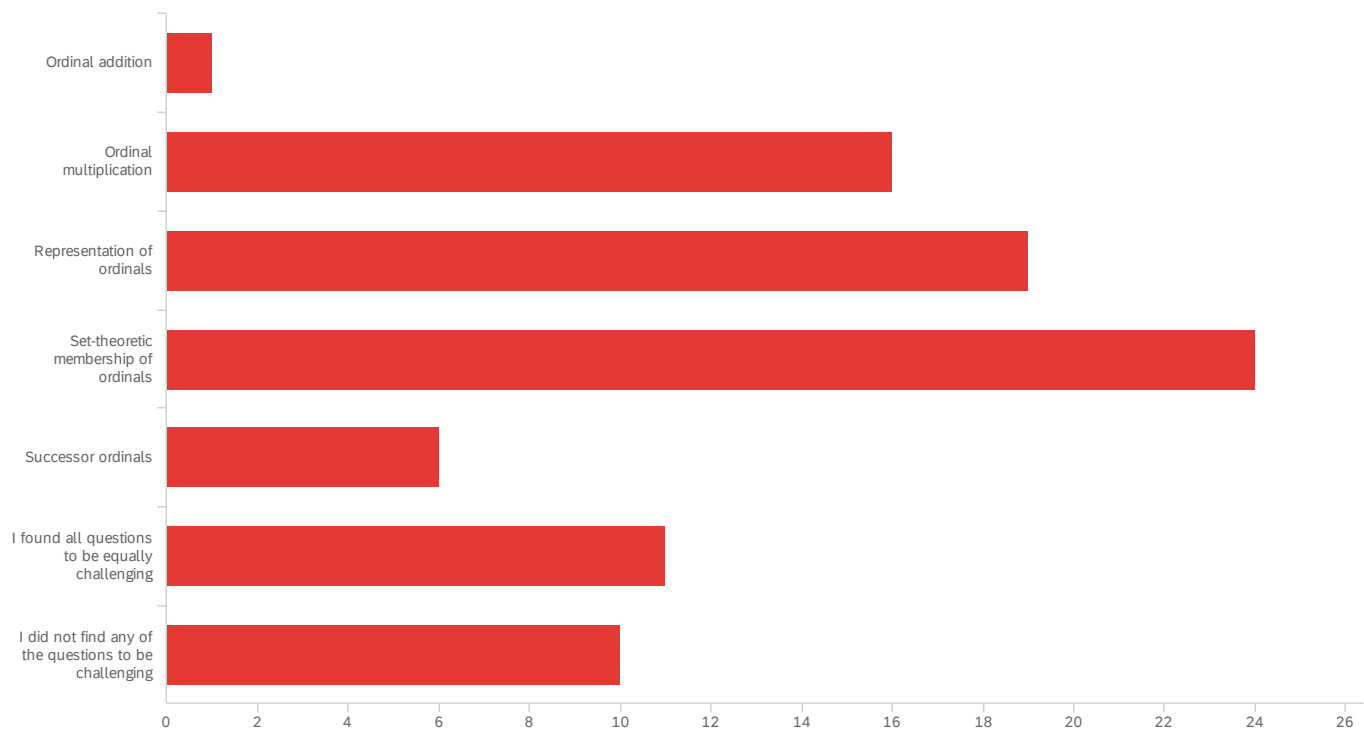


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How well do you think you performed?	1.00	7.00	4.82	1.69	2.85	66

#	Field	Choice Count
1	Extremely bad	4.55% 3
2	Moderately bad	9.09% 6
3	Slightly bad	9.09% 6
4	Neither good nor bad	12.12% 8
5	Slightly good	21.21% 14
6	Moderately good	30.30% 20
7	Extremely good	13.64% 9
		66

Showing rows 1 - 8 of 8

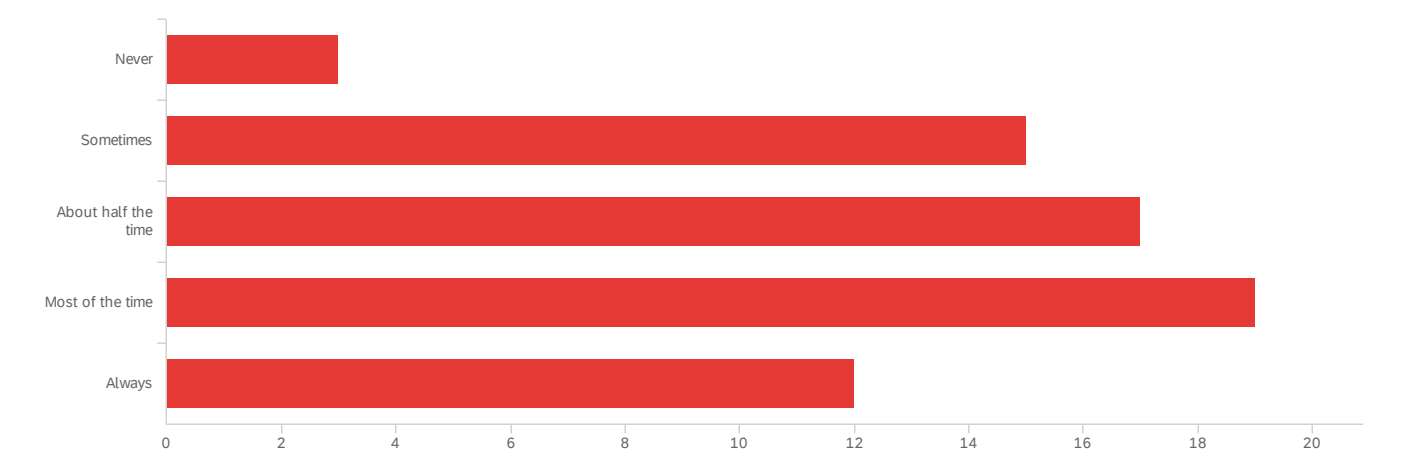
Q55 - Which question type did you find to be most challenging? You can select more than one option



#	Field	Choice Count
1	Ordinal addition	1.15% 1
2	Ordinal multiplication	18.39% 16
3	Representation of ordinals	21.84% 19
4	Set-theoretic membership of ordinals	27.59% 24
5	Successor ordinals	6.90% 6
6	I found all questions to be equally challenging	12.64% 11
7	I did not find any of the questions to be challenging	11.49% 10
		87

Showing rows 1 - 8 of 8

Q45 - Do you often use visualization to clarify, explain and understand learning material in your studies or work, especially with regard to mathematical material?

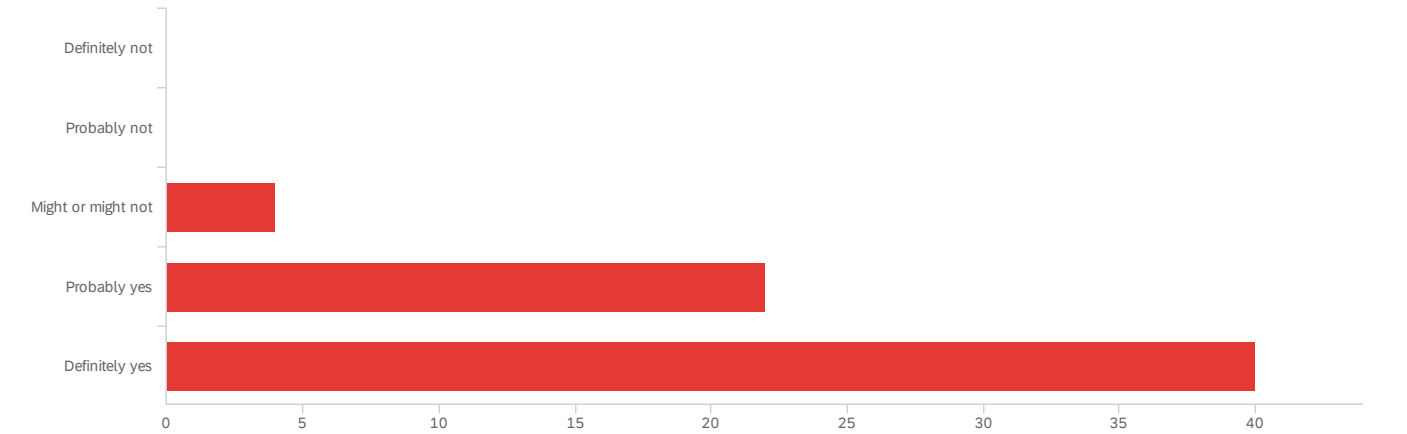


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Do you often use visualization to clarify, explain and understand learning material in your studies or work, especially with regard to mathematical material?	1.00	5.00	3.33	1.15	1.31	66

#	Field	Choice Count
1	Never	4.55% 3
2	Sometimes	22.73% 15
3	About half the time	25.76% 17
4	Most of the time	28.79% 19
5	Always	18.18% 12
		66

Showing rows 1 - 6 of 6

Q46 - Do you think visual representation can (and should) play a role in learning mathematics?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Do you think visual representation can (and should) play a role in learning mathematics?	3.00	5.00	4.55	0.61	0.37	66

#	Field	Choice Count
1	Definitely not	0.00% 0
2	Probably not	0.00% 0
3	Might or might not	6.06% 4
4	Probably yes	33.33% 22
5	Definitely yes	60.61% 40
		66

Showing rows 1 - 6 of 6

Q47 - Please elaborate your previous answer: How do you see the role of visualization in mathematics?

Please elaborate your previous answer: How do you see the role of visualiza...

to aid in the understanding of the concept

Helping to me to visualize a functions by running numbers in my head and see how the function respond to it then I can tell how the graph will look like. If I have $f(x)$ then I visualize x as an infinite set of numbers instead of a variable

Some people that are good in mathematics can imagine the visualisations but for people who find it difficult, it is important to give a familiar tool (other than confusing symbols and numbers) and to organize all the information in a clear and easy to remember way.

Visualisation requires understanding. If you can create an accurate visual stimulus in your mind, the understanding must fall into place quickly.

It helps with understanding depth of mathematics (I.e vector spaces) or with simple calculation and "lined" explanations (I.e $3+m$ not equal to $m+3$)

It can help us understand theoreticall ideas and proves of rules

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It makes understanding theoretical knowledge in a more down to earth way

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visualizations often help understand a complex subject in a simpler way that our brain can process more easily. If we'll use more visual aids in teaching and learning mathematics we can help people study it faster, more efficiently, and even to attract more people into the ,athe,atics and various sciences fields.

Very importanat!

Helps to understand abstract concepts such as numbers beyond infinity

Good

Short explanatory videos

Provides the ability to prove informally and understand theorems without getting stuck technical issues

As a complimentary explanation

For me I always need it to understand more logistical mathematical notions

Visualisation can be a good way to develop early intuition of a new subject, Wich can help students feel more comfortable, less threatened by the new subject and develop a mathematical sense

Please elaborate your previous answer: How do you see the role of visualiza...

It should be included in the school system

I think that (at the very least) every new term or definition taught should be explained with a visual example.

A visualisation is useful for a specific example - such as the visualisation added of a specific ordinal number or the graph of a function - as opposed to a visualisation trying to capture the entire definition of a subject\term (which is often impossible).

I think its an important role cause by "live example" people can understand better how to solve this kind of questions

I think it creates some connection between abstract concepts to something I can grasp, and in addition, help me remember definitions, how to calculate things and more.

Many mathematical concepts are highly complex and involve use of either graphs or geometric figures, these are thus much easier to represent visually than in text.

I think it would help reach another level of understanding, beyond just learning what is requested and knowing formulas by heart for example. i would help have a mental representation of what different mathematical manipulations represent 'in real life's.

I think it depends. Some people are more visual, others auditive...

Help to see the problem then solve it, but even more important in physics

Makes the learning of math more ingaging and fun

As an enhancer to the actual rigorous proofs

its not nessecery but very useful. it depends on what subject in math you are talking about. (calculus-sure , set theory-not really..)

Crunching numbers is always easier when writing it down than not

I do think visualisation is one of the basic process we need to pass by before proving something: we first need to know how stuff work before using it

To solve almost any question I visualize it in my head. Even with very abstract math I can use small examples which are easy to visualize. Learning with visualizations (such as in YouTube videos) helps me the most. It fails only when it comes to math that requires more than 3 dimensions.

in many cases, there is a clear geometric "meaning" to something. however, in the more advanced and general math - this gets less and less so, and trying to understand things in "visual" terms is shoving a metaphor into a box that does not quite fix: the edges are cut out. (tl;dr basic math for non-math can greatly be helped by visualisations. advanced math trying to be other the the math itself ends up shooting itself in the foot by doing so)

I see the role of visualization in mathematics as an integral part of the learning process. However, I think it is extremely important for the student to come up with his own, original visual representation of the material.

Demonstrate difficult theoretical new concepts

Showing the importance of the learned material, applications

mathematics has many visualizations

Please elaborate your previous answer: How do you see the role of visualiza...

I think at every level, the role of visualization might fall on the "teachers". They should be careful not to visualize everything and leave some room for "imagination practice."

Visualization is extremely helpful when being introduced with new abstract mathematical concepts, and usually leads to quicker attainment and understanding of the theory.

I see math not only for numbers, and I believe that the geometry of math is something that i can find almost in any math questions, so thinking about numbers and questions as something that i can see makes it a lot easier. And i think it's beautiful, to "see math" or "see numbers".

It is very important

A bit helper material, a bit intuition. Not more

Very important but I don't use it enough.

I see it as a way to help explain proofs, as long as they are generalized and don't provide only examples

Visualisation I believe gives more permanent understanding. A function behaves in a certain way geometrically, vectors span a space, etc., and visualizations represent their actions. Otherwise math learning is just computation.

Some concepts (especially completely new one) are hard to understand, some are because they are hard to visualize (like Flux), but some confuses us because they redefine things we previously learned (such as ordinal numbers, or set-theory in general). In the latter, visual aid helps clarify the new definitions and the innate contradiction we have.

Its can help understanding

It's easier to understand what the aim of each equation.

Helping students gain a visual intuition on abstract concepts

When I think about mathematics, especially in topics that I know well, I will have developed some semi-graphical representation of the mathematical steps I'm doing. Like doing in-head animations for swapping sides in equations etc. So for me learning to visualize math in my head is a necessary part of the learning process if that makes sense.

It can aid in concretizing some key concepts, but is not always necessary

It allows to get a more intuitive understanding of the concepts

Of an extreme importance as it gives the intuition behind the concept.

That's what physics should be about. Professors helping you visualize the content of their mathematics notebook instead of copying it on a board

It helps give intuition to learners, as most of the time concepts may be tough to grasp in an abstract setting..

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Mathematical ideas are abstract, but also oftentimes non-verbal. A visualization speaks more than a sea of symbols, although non-rigorously.

I think its important to ground the subject and make it more real, math has a tendency to become too abstract very fast

Please elaborate your previous answer: How do you see the role of visualiza...

One can understand a mathematical idea only after one has visualized it

Useful to explain concepts and work out what problems mean, and how to solve them

Actually im not sure about visualization in set theory, but it might be because I've never seen one. I can say that I believe that in infinitesimal calculus it has segnificant role, also in geomtry and topology. In algebra or set thoery I think it has a a bit less meaning, but of course it helps to model problems (Although I think we ahound notice that we don't stick only to visualise specific problems).

I think to add intuation after having a formal understanding is the way to go

I have found that when the mathematical concept is visualized in class, I do not need to read a lot more about it after. If we have just mentioned a concept and then explained it solely theoretically, I would need a lot more time to truly understand it.

I belive that visual learning is so underrepresented in our learning of mathematics even though it would make it so much easier to understand for the majority of learners. Inability to do mathematics easily is one of the biggest reasons why students give up on science and I think that if we would just change the way we taught mathematics and let students actually understand how these theorems work visually, I feel like the mental jump to understand the concept wouldn't be so difficult..

End of Report