Thread 2, Quiz 1 – Quadratic Relations

/K 4 /T 4 /C 4 /A 4

Version 3 · 20 minutes

Marks *Show your work for every question. Write your steps clearly. Do not write only a final answer.*

K 2 1. Find the finite differences. Is each relation linear, quadratic, or neither?

a)

x	y	First diff.	Second diff.
0	0		
1	1		
2	8		
3	27		
4	64		

The relation is _____ .

b)

x	y	First diff.	Second diff.
1	2		
2	7		
3	18		
4	35		
5	58		

The relation is _____ .

K 2 2. Compress $y = x^2$ vertically by a factor of $\frac{1}{2}$. Then translate the graph 3 units down. Use the step pattern to sketch the new graph on the grid. Do not make a table of values. Then fill in the blanks.

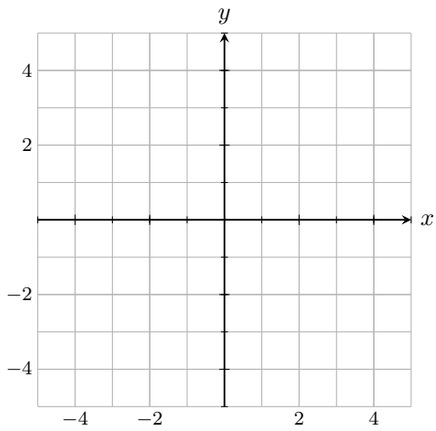
Opens: _____

Vertex: _____

Axis of symmetry: _____

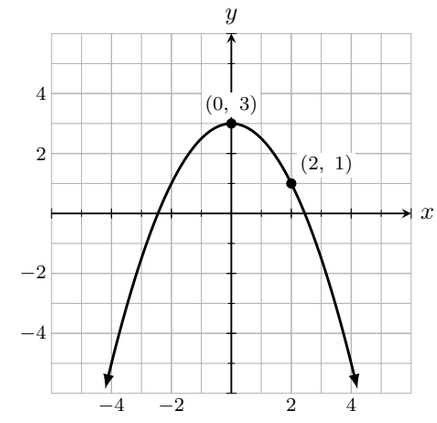
Max. or min. value: _____

y-intercept: _____



T 2 3. The graph shows a parabola. The relation has the form $y = ax^2 + k$. The vertex and one other point are marked.

Write the equation of the parabola.
Explain how you found a.



T 2 4. The table shows some points on a parabola. The relation has the form $y = ax^2$.

x	y	First diff.
0	0	
1	4	
2	16	
3	36	

a) Write the equation of the relation. Explain how you found a.

b) Write the value of y when $x = -3$. Do not calculate. Explain how you know.

Marks

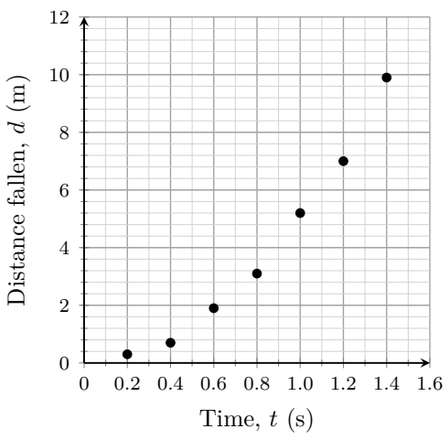
C 2 5. Ana made this table of finite differences. Ana wrote: "The second differences are not constant. So the relation is not quadratic."

What mistake did Ana make? What should Ana do instead?

x	y	First diff.	Second diff.
0	2		
		1	
1	3		2
		3	
2	6		9
		12	
4	18		−3
		9	
5	27		15
		24	
7	51		

C 2 6. Compare the graphs of $y = -2x^2 + 3$ and $y = -2x^2 - 1$. Explain how the two graphs are alike. Explain how the two graphs are different. Use the words *vertex*, *axis of symmetry*, and *maximum* or *minimum* in your answer.

A 4 7. Jordan drops a ball from a balcony and takes a video of the ball. From the video, Jordan reads how far the ball has fallen every 0.2 seconds. The scatter plot shows Jordan's data.



a) Which variable is the independent variable? Use Jordan's situation to explain why.

b) Draw a curve of best fit. Use the curve to estimate the distance fallen at 0.9 s. Is this estimate interpolation or extrapolation?

c) The model $d = 5t^2$ fits the data. Use the model to predict the distance fallen at 2 s. Is this prediction as reliable as your answer to b)? Explain why.

d) Now Jordan measures each distance from the roof. The roof is 4 m above the balcony. Write the new model. Which part of the equation changed?

