

Student Interviews: Middle School
The Center for Algebraic Thinking¹

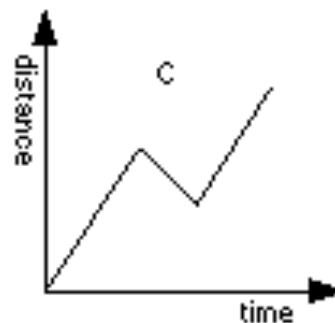
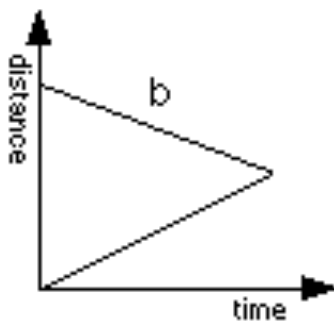
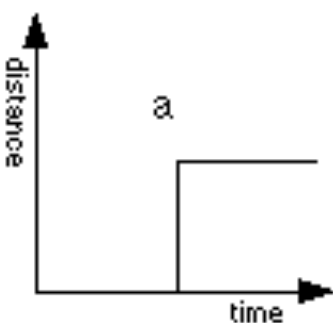
1. Which is larger, $2n$ or $n + 2$? Why?
2. Is this equation always, sometimes, or never true? $a + b = b$ Why?
3. If $e + f = 8$, what does $e + f + g = ?$ How do you know?
4. If you have “ $n + 5$ ”

Can “ n ” stand for “4”? Yes No You can't tell

Can “ n ” stand for “37”? Yes No You can't tell

Can “ n ” stand for “ $3r + 2$ ”? Yes No You can't tell

5. Which of the graphs below represent journeys? Describe what happens in each case. Why do you think that?



6. The table shows some of the distances and times that Frog traveled.

Distance	Time
3.75 cm	1.5 sec
7.5 cm	3 sec
12 cm	4.8 sec
15 cm	6 sec
40 cm	16 sec

Is he going the same speed the whole time, or is he speeding up or slowing down?

How can you tell?

7. a) Write a story problem that can use the equation: $x + 5 = 8$

b) Change the story problem so it can use the new equation: $2x + 5 = 8$

¹ All problems from research studies. See algebraicthinking.org for a list of references.

- c) Change the story problem so it can use the new equation: $2x - 5 = 8$
 d) Change the story problem so it can use the new equation: $2x - 5 < 8$

8. Is this equation always, sometimes, or never true? $h + 2 = h$ Why?

9. What value or values could “ a ” be in the expression? $7 + a + a + a + 10$

10. If $c + d = 10$ and $c < d$, what does “ c ” equal?

11. Can you simplify this expression? If so, how? $3m + 8 + 2m - 5$

12. The Large Foot Pizza Company sells a large pizza that contains 36 pieces. Your class has purchased two of these pizzas for an upcoming class party. Everyone has agreed that each person will receive the same amount of pizza.

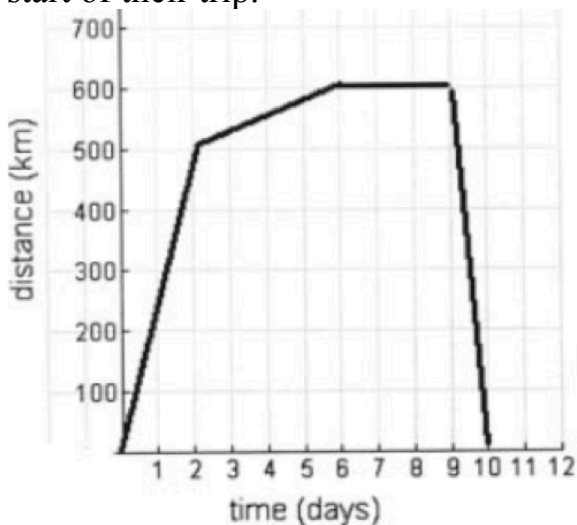
If only 4 students attend the class party, how many pieces of pizza would each student receive? What if 9 students attend the class party?

If 30 students attend the class party, how many pieces of pizza would each student receive?

At the party all students receive one and a half slices of pizza. How many students attended the party?

Write a number sentence or rule that would allow you to find the number of pieces of pizza for any number of students.

13. The Ramirez family’s whole holiday is shown on the graph. The vertical axis shows the distance in kilometers away from home. The horizontal axis shows the time in days since the start of their trip.



a) During which days did the Ramirez family travel fastest?

b) They stayed with friends for a few days. Which days were these?

c) On average, how fast did the Ramirez family travel to get to their destination?

14. Plot the points: (2, 5); (3, 7); (5, 11) on the graph below.

Plot the point (4.6, 9.2)

Plot the point (1 ½, 4)

How many points are there between (2,5) and (3,7)?

15. If $r = s + t$ and $r + s + t = 30$, What can you say about “ r ”?

16. Maria has the following problem:

Find value(s) for x in the expression: $x + x + x = 12$

She gave three answers: a. 2, 5, 5 b. 10, 1, 1 c. 4, 4, 4

Which of her answer(s) is (are) correct? Why do you think that?

17. Without solving either equation, what can you say about the answers to these equations?

$$213x + 476 = 984$$

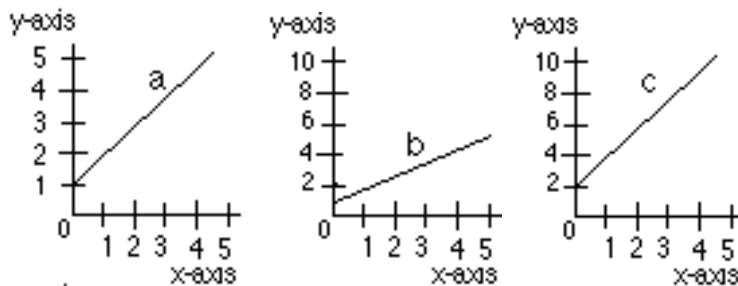
$$213x + 476 + 4 = 984 + 4$$

18. Below is a table that shows the cost for T-shirts.

- What would be the cost for 30 T-shirts?
- Describe in words how you would find the cost if you were told what the number of T-shirts was.
- Write a rule or formula connecting the number of T-shirts and the cost of the T-shirt.

<i>Number of T-Shirts</i>	<i>Cost (in dollars)</i>
3	9
5	15
9	27
21	63

19.



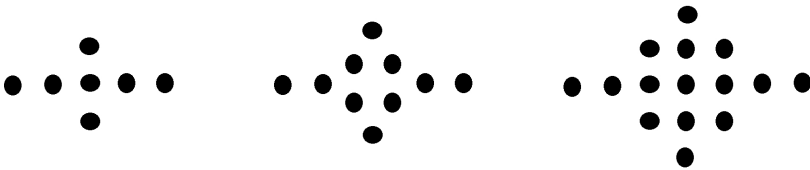
Which two graphs show the same information? How do you know?

20. The Jog Phone Company is currently offering a calling plan that charges 10¢ per minute for the first 5 minutes for any phone call. Any additional minutes cost only 6¢ per minute.

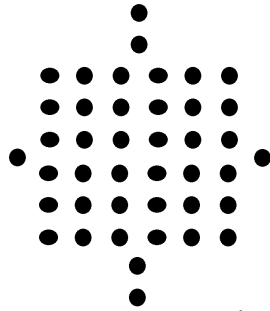
- How much would a 3-minute phone call cost?
- An 8-minute phone call?
- A 15-minute phone call?

- How much would a 123-minute phone call cost? How do you know?
- Suppose that a certain phone call (using the Jog Company plan) costs \$4.64. How many minutes long was the call? Explain
- Explain how you would determine the cost for any number of minutes under this plan. Write a formula or rule to explain how you would determine this cost.

21. a) Draw the fourth diamond in the sequence.



b) Would the diamond in the next picture fit into the pattern? Why or why not?



c) How would you draw the 10th diamond?
How many dots would it have?

d) How many dots would the 25th diamond have? How do you know?

22. Write an equation using the variables S and T to represent the following statement. Use S for the number of students and T for the number of teachers.

"There are six times as many students as teachers at this school."

23. The surface of Clear Lake is 35 feet above the surface of Blue Lake. Clear Lake is twice as deep as Blue Lake. The bottom of Clear Lake is 12 feet above the bottom of Blue Lake. How deep are the two lakes? How do you know?

24. Ling just got a job working as a clerk in a candy store. She already has \$42. She will earn \$7 per hour.

- How many hours will she have to work to have a total of \$126?
- Draw a diagram, chart, table, or graph to represent the problem.
- Write an equation to represent the problem. Solve the problem and show your work.