Daniel, age 7, Practitioner

A 4 day old worm will need 10 triangles
a 10 day old worm will need 22 triangles
a 63 day old worm will need 128 triangles

Extra: A worm made of 60 triangles will be 29 days old.

SuperExtra: If the number of days old = x, then the number of triangles needed will be 2x+2.

I noticed that the number of triangles needed for each worm followed an arithmetic sequence with a difference of +2.

I also noticed that if you removed the 2 end triangles, the number of triangles needed was twice the number of days which gave me the formula 2x+2 when x was the number of days old.

Therefore a 4 day old worm was 2(4)+2 = 10

a 10day old worm was 2(10)+2 = 22
a 63 day old worm was 2(63)+2 = 128

Extra: To find how old a worm was that was made of 60 triangles, I started with the formula 2x+2=60. I need to get x by itself so I used inverse operations. First I subtracted 2 from both sides so I had 2x=58. Then I divided both sides by 2 which gave me 29=x.

Daniel's thinking and his communication skills are excellent. He justifies his formula with details from the diagram. He clearly understands inverse operations I would ask him to explain how his inverse procedure relates to the physical model. Why does it make sense in terms of the diagram to subtract 2 before dividing?

Emily, age 10, Expert

The answer is a 4 day old worm has 10 triangles, a 10 day old worm has 22 triangles, and a 63 day old worm has 128 triangles. The answer to the extra is a worm that has 60 triangles is 29 days old.

I know that the pattern adds two triangles each day. So I will multiply the day by two, then add two because of the triangles on the outside of the worm. Also, all of my answers will be even because the first worm started out even and adds even numbers each day.

1) 4x2=8+2=10 2) 10x2=20+2=22 3) 63x2=126+2=128

So the answer is the 4 day old worm is 10 triangles, the 10 day old worm is 22 triangles and the 63 day old worm is 128 triangles.

I checked my work by subtracting 2 then dividing it in 2.

1) 10-2=8 8/2 =4 2) 22-2=20 20/2=10 3) 128-2=126 126/2=63

EXTRA: Using the first method in reverse, I did 60-2=58. Then I did 58/2. So my answer is the worm is 29 days old. I checked my work by doing 29x2=58+2=60.

*Emily explained her rule and how it related to the diagram. She included her calculations for the main problem and the Extra. She provided exceptional insight in the problem by explaining why the numbers of triangles need to be even. Her Extra explanation could be improved by connecting it to the diagram. I would model for her a more accurate way to notate her calculations, e.g., 4 * 2 + 2 = 10*

Scoring Rubric

A **problem-specific rubric** can be found linked from the problem to help in assessing student solutions. We consider each category separately when evaluating the students' work, thereby providing more focused information regarding the strengths and weaknesses in the work.

We hope these packets are useful in helping you make the most of the Math Fundamentals Problems of the Week. Please let me know if you have ideas for making them more useful.

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