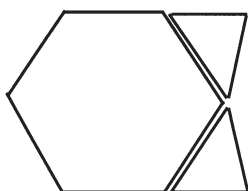


# Pattern Block Fish

Pat and Sam were having fun building fish with pattern blocks.

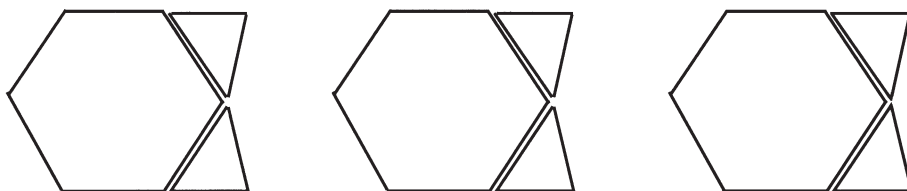
1 fish had 2 fins.



2 fish had 4 fins.



3 fish had 6 fins.



If this pattern continued...

How many fins did 7 fish have?

How many fins did 10 fish have?

How many fins did 20 fish have?

## Pattern Block Fish

### Suggested Grade Span

Grades 3-5

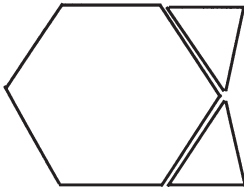
### Grade(s) in Which Task Was Piloted

Grade 3

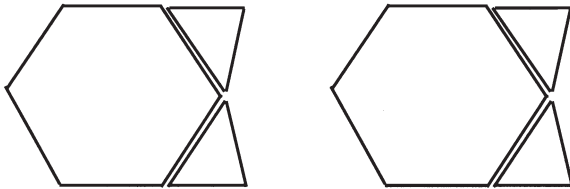
### Task

Pat and Sam were having fun building fish with pattern blocks.

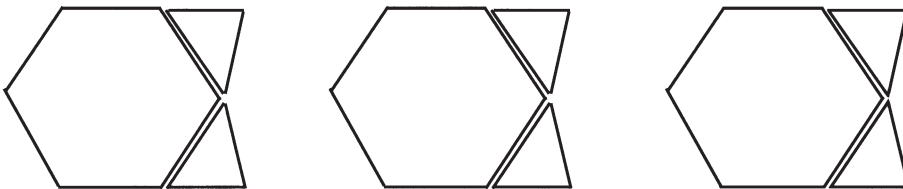
1 fish had 2 fins.



2 fish had 4 fins.



3 fish had 6 fins.



If this pattern continued...

How many fins did 7 fish have?

How many fins did 10 fish have?

How many fins did 20 fish have?

## Alternative Versions of Task

**More Accessible Version:** (Use the same fish pattern as above.)  
Pat and Sam were having fun building fish with pattern blocks.

1 fish had 2 fins.

2 fish had 4 fins.

3 fish had 6 fins.

If this pattern continued...

How many fins did 4 fish have?

How many fins did 5 fish have?

How many fins did 6 fish have?

**More Challenging Version:** (Use the same fish pattern as above.)  
Pat and Sam were having fun building fish with pattern blocks.

1 fish had 2 fins.

2 fish had 4 fins.

3 fish had 6 fins.

If this pattern continued...

How many fins did 10 fish have?

How many fins did 100 fish have?

How many fins did N fish have?

## NCTM Content Standards and Evidence

### Algebra Standard for Grades 3–5

Instructional programs from Pre–Kindergarten through grade 12 should enable students to...

- Understand patterns, relations, and functions.
  - **NCTM Evidence:** Describe, extend, and make generalizations about geometric and numeric patterns.
  - **Exemplars Task Specific Evidence:** This task requires students to identify and extend a geometric pattern.

## Time/Context/Qualifiers/Tip(s) From Piloting Teacher

This is a short length task.

## Links

This task could link to units on fish, water, or oceans.

*Pattern Block Walls*, also featured in this issue of **Exemplars**, requires the same strategy, and could be given to students along with this task as part of a choice menu.

## Common Strategies Used to Solve This Task

Most students create a chart to record data given in the task, and then extend the chart to achieve a solution.

## Possible Solutions

*Original Version:*

Fish	Fins
1	2
2	4
3	6
7	14
10	20
15	30

*More Accessible Version:*

Fish	Fins
1	2
2	4
3	6
4	8
5	10
6	12

*More Challenging Version:*

Fish	Fins
1	2
2	4
3	6
10	20
100	200
N	2N

## Task Specific Assessment Notes

**General Notes:** Most students will create a representation to organize the information presented in the task. Look for all 3 parts to be correct in a practitioner's solution.

**Novice:** No strategy will be present. The student will merely interact with the drawings of the fish, adding eyes and mouths.

**Apprentice:** The apprentice is able to organize the information presented in the task in a representation, but either proceeds incorrectly or is unable to proceed at all.

**Practitioner:** The practitioner will achieve a correct answer with supporting work. The student will also note patterns seen in solving the task.

**Expert:** Not only will the expert identify and extend the pattern, but the expert will also be able to generalize his/her solution so that the total number of fins for any number of fish can be found.

## Author

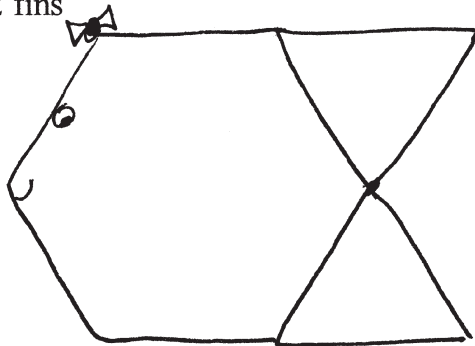
This task was written by **Deb Armitage**, K–8 Mathematics Assessment Consultant at the Vermont Department of Education. The task was piloted by teachers and students in Vermont.

Novice

Pattern Block Fish!

Pat and Sam were having fun building fish with pattern blocks.

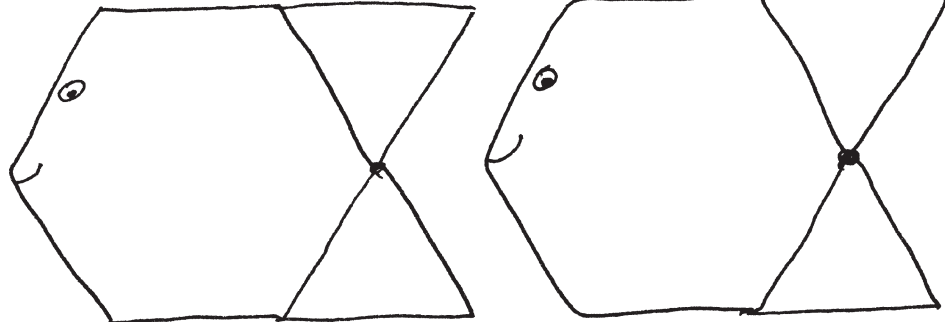
1 fish had 2 fins



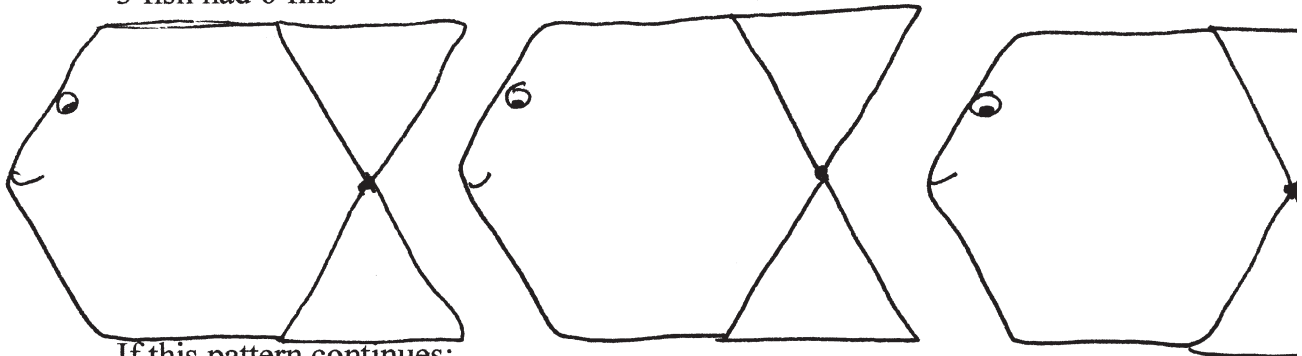
No strategy is present and there is no evidence of engagement with the task.

No math language is used.

2 fish had 4 fins



3 fish had 6 fins



If this pattern continues:  
How many fins did 7 fish have?  
How many fins did 10 fish have?  
How many fins did 20 fish have?

There is no awareness of audience.

Apprentice

Fish and fins

Key  
f = fin  
F = Fish

Fish | fins

The use of a key shows some awareness of audience.

1	2
2	4
3	6
4	8
5	10

The student has a strategy for reaching a partial solution.

The student creates a chart drawing on some previous knowledge.

The chart is a representation used to communicate problem solving.

Practitioner

I need to find out how many fins 7, 10, and 20 fish have.

I will make a T-chart

fish fins

# of fish  $\times$  2 = fins

# of fish	total fins
1	2
2	4
3	6
4	8
5	10
6	12
7	14 *
8	16
9	18
10	20 *
11	22
12	24
13	26
14	28
15	30
16	32
17	34
18	36
19	38

50190 \*

The student clarifies the task in a restatement.

The student notes the pattern that fish  $\times$  2 = fins.

The student organizes a coherent response.

A deductive chain of reasoning is evident.

A correct strategy of making a chart is used to solve the problem.

Correct answers are achieved.

## Expert

I need to find out how many fins 7, 10, 20 fish have. I will make a T-chart.

how many fish	fins	total blocks
1	2	3
2	4	6
3	6	9
4	8	12
5	10	15
6	12	18
7	14	21
8	16	24
9	18	27
10	20	30
11	22	33
12	24	36
13	26	39
14	28	
15		
16		
17		
18		
19		
20		

I See a  
rule.  
 $7+7=14$   
 $10+10=20$   
and 12 of 20 = 40  
 $f+f=2f$

A sense of audience and purpose is evident.

A correct strategy is chosen.

A correct answer is achieved.

The student analyzes the situation in mathematical terms.

The student notes regularities and uses evidence to support statements.

The student uses a deductive argument.

The student generalizes the solution in stating  $f + f = 2f$ .

The math representation is used to analyze relationships.

Precise math language and notations are used.