Polar Bears:
A n ice Game
CMSC104
Spring 2010
Project 3

Polar bears,

Polar bears,
they come in pairs.

Polar bears,
they come in pairs.
They sit around the hole in the ice

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower.

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower.
How many polar bears do you see?

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower.
How many polar bears do you see?
How many fish in the sea?

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower.
How many polar bears do you see?
How many fish in the sea?

What about the plankton?

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower
How many polar bears do you see?
How many fish in the sea?

What about the plankton?
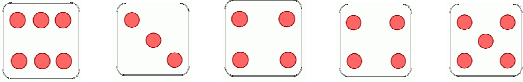
Sample Game 1

How many polar bears do you see?

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower
How many polar bears do you see?
How many fish in the sea?

What about the plankton?

Sample Game 1

How many polar bears do you see?

Answer: There are 6 polar bears

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower
How many polar bears do you see?
How many fish in the sea?
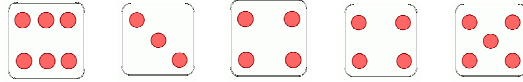
What about the plankton?

Sample Game 1

How many fish in the sea?

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower
How many polar bears do you see?
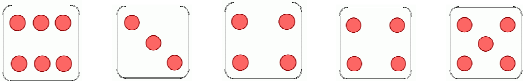How many fish in the sea?

What about the plankton?

Sample Game 1

How many fish in the sea?

Answer: There are 7 fish in the sea

Slide 1

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower
How many polar bears do you see?
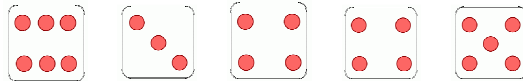How many fish in the sea?

What about the plankton?

Sample Game 1

What about the plankton?

Slide 2

Sample Game 1

What about the plankton?

Answer: There are 28 plankton

Slide 3

Sample Game 2

How many polar bears do you see?

Slide 4

Sample Game 2

How many polar bears do you see?

Answer: There are 0 polar bears

Slide 5

Sample Game 2

How many fish in the sea?

Slide 6

Sample Game 2

How many fish in the sea?

Answer: There are 21 fish in the sea

Slide 1

Polar bears,
they come in pairs.
They sit around the hole in the ice
like petals around a flower
How many polar bears do you see?
How many fish in the sea?

What about the plankton?

Sample Game 2

What about the plankton?

Slide 2

Sample Game 2

What about the plankton?

Answer: There are 0 plankton

Slide 3

"Polar Bears" as a game

Five dice are rolled and based on that role:

- You have to guess the number of polar bears
- If you get that correct, then you have to guess the number of fish in the sea.
- If you get that correct, then you have to state the number of plankton
- If you get that correct, then you win the game!

Slide 4

What's going on?

You get clues from the poem!
Read the poem again, can you discern the clues?

Slide 5

Polar bears,
[polar opposite ends of an axis]
they come in pairs.
[even number of polar bears]
They sit around the hole in the ice
[hole in the dice]
like petals around a flower
[dice hole is in the center]
How many polar bears do you see?
[use the rules above]
How many fish in the sea?

What about the plankton?

Decoding the poem

Hole in dice, one pair sitting on axis = 2 polar bears

No hole in dice, no pairs sitting on axis = 0 polar bears

Hole in dice, two pairs sitting on axis = 4 polar bears

Hole in dice, no pair sitting on axis = 0 polar bears

No hole in dice, no pairs sitting on axis = 0 polar bears

No hole in dice, no pairs sitting on axis = 0 polar bears

Slide 6

Polar bears,
[polar opposite ends of an axis]
they come in pairs.
[even number of polar bears]
They sit around the hole in the ice
[hole in the dice]
like petals around a flower
[dice hole is in the center]
How many polar bears do you see?
[use the rules above]
How many fish in the sea?

What about the plankton?

First rule:

A die role of a 1: generates 0 polar bears

A die role of a 2: generates 0 polar bears

A die role of a 3: generates 2 polar bears

A die role of a 4: generates 0 polar bears

A die role of a 5: generates 4 polar bears

A die role of a 6: generates 0 polar bears

Then add up the number of polar bears on the five dice to get the total number of polar bears. Note than each die is rolled independently, so any one number may appear just once, several times, or not all.

Once you know the rule, the game is simple.

But if do not know the rule, the game can be frustrating and difficult!

Apply the rule:

So now that we know the rule, applying it becomes simple.

Look at the dice rolls for sample games 1 and 2 and count the number of polar bears.

0 + 2 + 0 + 0 + 4 = 6

0 + 0 + 0 + 0 + 0 = 0

Something is fishy!

Hole in dice, one pair sitting on axis = 2 polar bears → 0 fish

No hole in dice, no pairs sitting on axis = 0 polar bears → 3 fish

Hole in dice, no pair sitting on axis = 0 polar bears → 6 fish

Hole in dice, two pairs sitting on axis = 4 polar bears → 0 fish

No hole in dice, no pairs sitting on axis = 0 polar bears → 5 fish

No hole in dice, no pairs sitting on axis = 0 polar bears → 1 fish

---

Second rule:

Fish appear when there are 0 polar bears and the number of fish is the number opposite the number on top of the die.

A die role of a 1: generates 0 polar bears and 6 fish

A die role of a 2: generates 0 polar bears and 5 fish

A die role of a 3: generates 2 polar bears and 0 fish

A die role of a 4: generates 0 polar bears and 3 fish

A die role of a 5: generates 4 polar bears and 0 fish

A die role of a 6: generates 0 polar bears and 1 fish

Polar bear eat the fish, so when they appear (numbers 3 and 5) there will be zero fish.

When there are no polar bears, the fish live, and they are at the bottom of the sea (bottom side of the dice).

Opposite sides of a die always add up to 7.

Apply the rule:

So now that we know the rule, applying it becomes simple.

Look at the dice rolls for sample games 1 and 2 and count the number of fish.

1 + 0 + 3 + 3 + 0 = 7

5 + 1 + 3 + 6 + 6 = 21

Plankton?

Hole in dice, one pair sitting on axis = 2 polar bears → 0 fish → 14 plankton

No hole in dice, no pairs sitting on axis = 0 polar bears → 3 fish → 0 plankton

Hole in dice, two pairs sitting on axis = 4 polar bears → 0 fish → 14 plankton

Hole in dice, no pair sitting on axis = 0 polar bears → 6 fish → 0 plankton

No hole in dice, no pairs sitting on axis = 0 polar bears → 5 fish → 0 plankton

No hole in dice, no pairs sitting on axis = 0 polar bears → 1 fish → 0 plankton

---

Third rule:

Fish appear when there are 0 polar bears and the number of fish is the number opposite the number on top of the die.

A die role of a 1: generates 0 polar bears and 6 fish and 0 plankton

A die role of a 2: generates 0 polar bears and 5 fish and 0 plankton

A die role of a 3: generates 2 polar bears and 0 fish and 14 plankton

A die role of a 4: generates 0 polar bears and 3 fish and 0 plankton

A die role of a 5: generates 4 polar bears and 0 fish and 14 plankton

A die role of a 6: generates 0 polar bears and 1 fish and 0 plankton

Fish eat plankton, so when they appear (numbers 1, 2, 4, and 6) there will be zero plankton.

When there are no fish, the plankton live, and they hang around in the water (the four sides of the dice).

The four sides of a die always add up to 14.

Apply the rule:

So now that we know the rule, applying it becomes simple.

Look at the dice rolls for sample games 1 and 2 and count the number of plankton.

the p

0 + 14 + 0 + 0 + 14 = 28

0 + 0 + 0 + 0 + 0 = 0

Summary of rules

Die	Number	P. Bears	Fish	Plankton
	1	0	6	0
	2	0	5	0
	3	2	0	14
	4	0	3	0
	5	4	0	14
	6	0	1	0

Sample Game 1

How many polar bears do you see?

Sample Game 1

How many polar bears do you see?

8

Sorry that is not correct. Play again?

Sample Game 1

How many polar bears do you see?

6

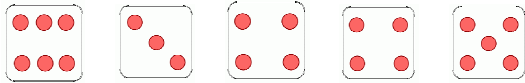That is correct.

Sample Game 1

How many fish in the sea?

8

Sorry that is not correct. Play again?

Slide 1

If the player gets the correct answer, the program should state that and then ask the next question.

In this example, 7 is the correct answer.

Sample Game 1
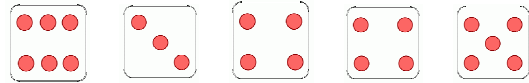

How many fish in the sea?

7

That is correct.

In this case the program advances to the next question, which is shown on the next slide.

Slide 2

Just like the first question, if the player gets the wrong answer, the game should NOT tell the player the correct answer, but simply ask if the player wants to play again.

In this example, 28 is the correct answer.

Sample Game 1
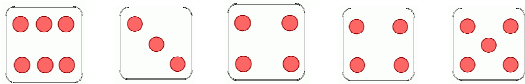

What about the plankton?

8

Sorry that is not correct. Play again?

Slide 3

If the player gets the correct answer, the program should state that and then ask the next question.

In this example, 28 is the correct answer.

Sample Game 1

What about the plankton?

28

That is correct. You win! Play again?

Slide 4

Expectations

- Users (you, the grader, the instructor) will only enter non-negative numbers (0, 1, 2, 3, …) so you should have a loop to prevent the entry of a negative number. Do not worry about other types of input: strings, characters, etc.
- When asked to "Play again?" typing "yes" will continue the game, anything else will end the game
- You do not have to keep track of games played, wins, losses, etc., but you may if you want to.