

Probability and Area

Table 9 (Iron Chef - Week 3)

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SITUATION: The carnival game of darts is John's favorite. He wants to win the big pink bear for his little sister. He must hit the "X" with the dart to win.

QUESTION:

(A) Determine the shape and size of a game board so that when the given "X" (Figure 1) is placed on the board the probability of hitting the "X" is $\frac{1}{9}$.

(B) Given a 27 by 27 square grid game board (Figure 2), create an "X" so the probability of landing on the "X" is $\frac{1}{9}$.

NOTE: As long as your shape resembles an "X" it can be identified as an "X-shape".

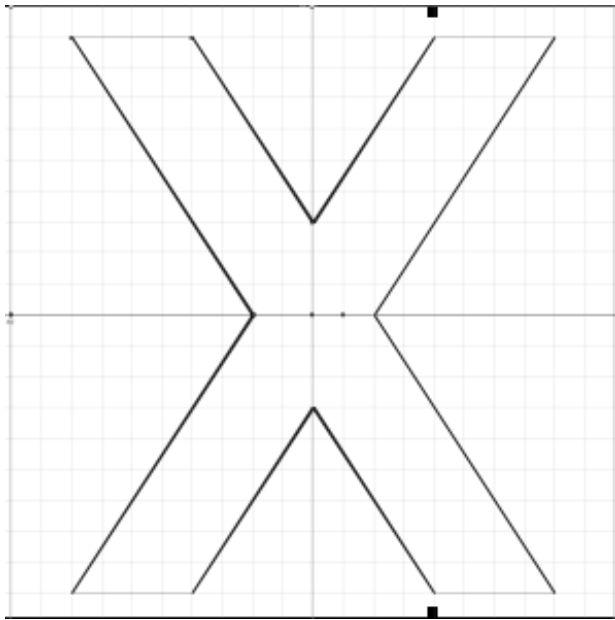


Figure 1

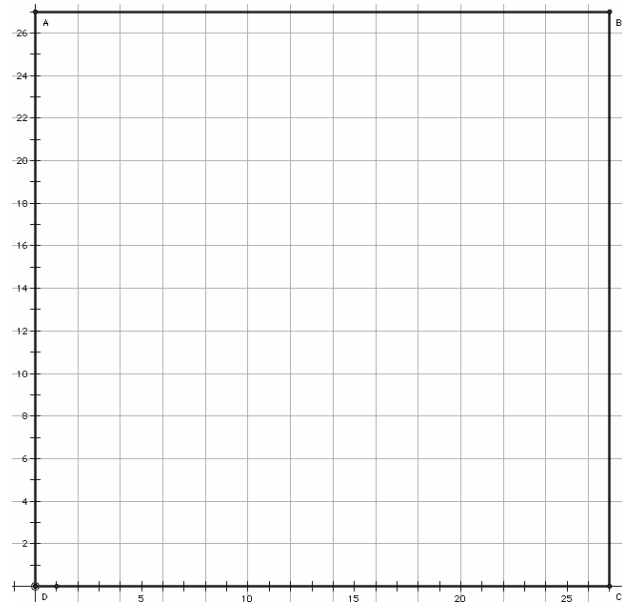
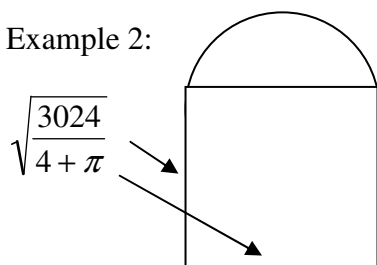


Figure 2

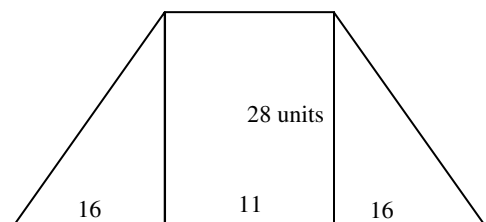
Possible Student Responses for Part (A)

Example 1: An 18 by 42 rectangular game board.

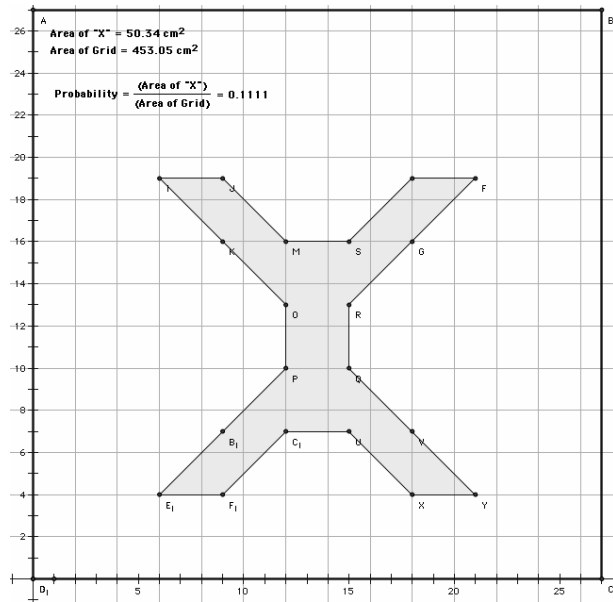
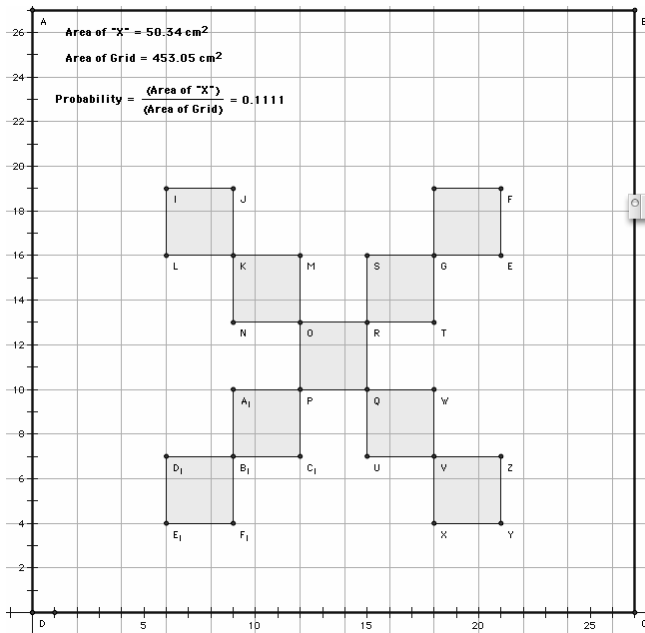
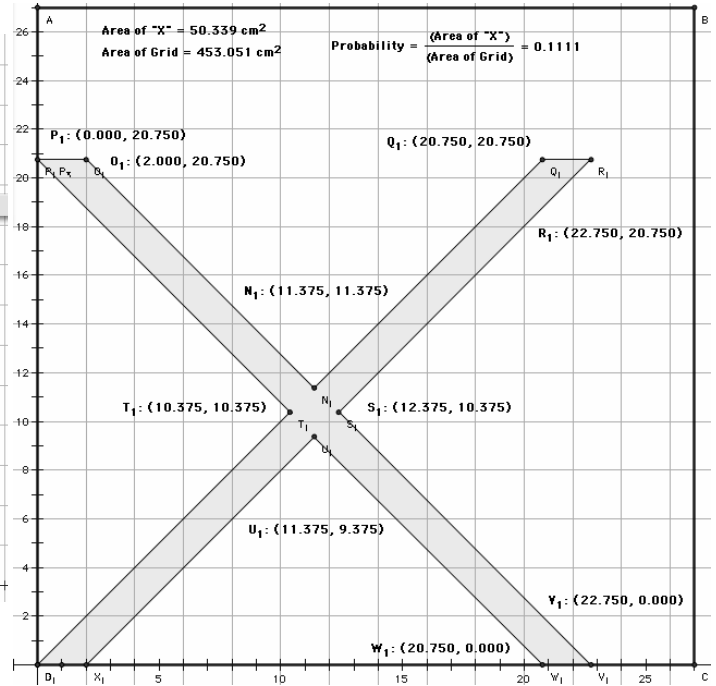
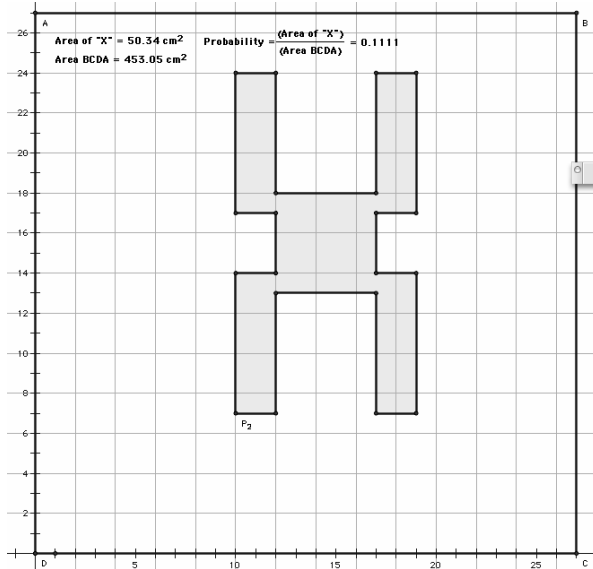
Example 2:



Example 3:



Possible Student Responses for Part (B)



Rich in Valuable Mathematics Content

- 1) Probability and Area
- 2) Distance formula/Pythagorean Theorem
- 3) Creativity in finding complex areas and in creating shapes with given areas

Grade Level

9/10 Geometry or Integrated Math

Questions for Discussions

- 1) What information did you need to know in order to create your game board and “X’ shape?
- 2) Which X’s were easy or difficult to create?
- 3) Is it possible to create an “X” in part (B) similar to the one in part (A)?
- 4) How would changing the game board, the probability, or the size/shape of the “X” lead to further insight?

Purpose of the Activity

- 1) To calculate the area of an “unusual” shape and discuss different solution methods
- 2) To contextualize probability
- 3) To create a complex shape with given area and discuss strategies

Conclusion

- 1) Put all of the 27 by 27 boards on the wall and have students play the carnival game.
- 2) Students should come up with a method for denoting a hit (Maybe put carbon paper behind.)