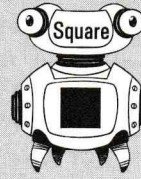


EXAMPLE

How many gumballs will this Squarebot produce?

10
gumballs



100
gumballs

$10 \times 10 = 100$, so the Squarebot produces 100 gumballs.

Squaring a number means multiplying the number by itself.

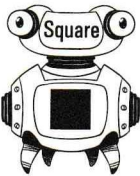
This Squarebot *squares* the number of items we give it.

PRACTICE

How many gumballs will each Squarebot produce?

1.

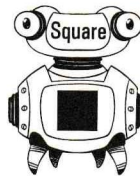
8
gumballs



gumballs

2.

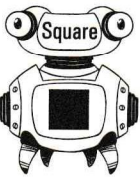
2
gumballs



gumballs

3.

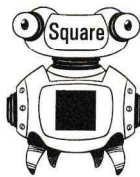
5
gumballs



gumballs

4.

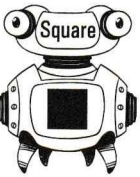
4
gumballs



gumballs

5.

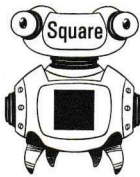
9
gumballs



gumballs

6.

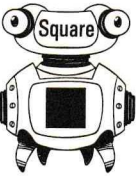
60
gumballs



gumballs

7.

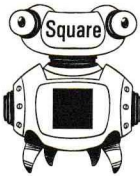
70
gumballs



gumballs

8.

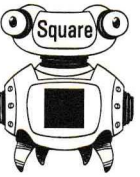
20
gumballs



gumballs

9.

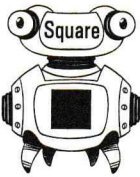
30
gumballs



gumballs

10.

100
gumballs



gumballs



In the following mazes, the tiles with perfect squares are safe. The other tiles are traps.

Starting at 1, escape the maze by moving up, down, sideways, or diagonally onto tiles with perfect squares.

EXAMPLE

Escape the maze below.

We begin at 1.

54	45	16	5
83	4	48	1
8	81	7	3
95	48	25	100

16, 4, 81, 25, and 100 are all perfect squares. The other numbers are not perfect squares. This is our escape path:

54	45	16	5
83	4	48	1
8	81	7	3
95	48	25	100

PRACTICE

Escape the mazes below by following the path of perfect squares. Begin at the tile containing 1.

11.

45	13	85	43	1
34	100	76	46	16
81	45	25	65	9
4	60	7	16	2
66	6	150	8	47

12.

34	36	14	74	10
25	38	9	51	32
100	71	64	47	81
16	101	2	100	34
45	1	37	86	67

13.

8	7	25	16	6
33	49	12	41	4
100	3	6	1	7
8	4	47	5	3
65	45	81	100	75

14.

6	34	4	74	5
48	100	56	9	6
83	81	42	43	1
8	65	4	7	84
49	64	34	2	78

Escape the mazes below by following the path of perfect squares. Begin at the tile containing 1. Watch out for dead ends!

15.

1	3	49	6	45
64	52	23	100	42
16	63	75	40	49
60	4	2	25	10
3	75	9	78	7

16.

5	9	36	25	13
64	7	8	78	7
4	50	57	1	76
16	11	63	4	38
67	81	49	8	7

17.

100	92	38	8	100
50	1	59	81	34
16	37	67	7	9
49	8	3	4	13
63	36	25	5	83

18.

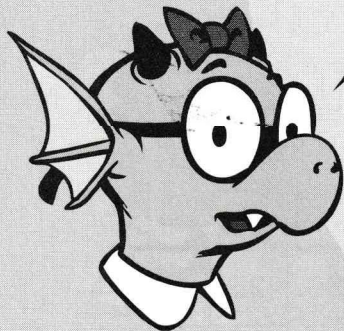
76	83	3	81	7
9	25	4	8	100
65	7	37	83	36
1	9	63	49	13
34	54	16	50	16

19.

7	4	89	25	13
81	43	7	8	9
19	25	20	100	27
64	54	87	16	38
94	36	25	50	1

20.

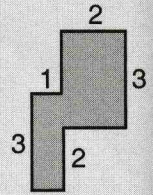
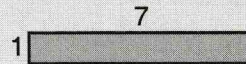
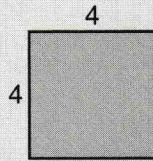
8	81	27	94	8
36	26	21	64	13
25	5	81	7	4
9	8	9	2	100
6	1	3	71	16



For a given perimeter, a square is the rectilinear shape with the largest possible area.

EXAMPLE

Each rectilinear shape below has a perimeter of 16. Which shape has the greatest area?



All three shapes have perimeter 16, so the square has the largest area.

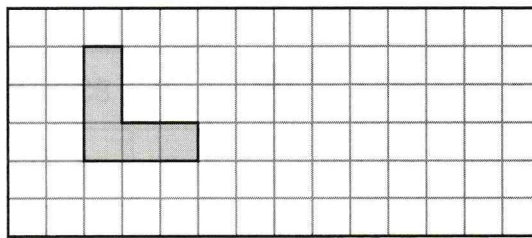
The area of the 4 by 4 square is $4 \times 4 = 16$ squares.
The area of the 1 by 7 rectangle is $1 \times 7 = 7$ squares.
The area of the other rectilinear shape is 9 squares.

The **4 by 4 square** has the largest area.

PRACTICE

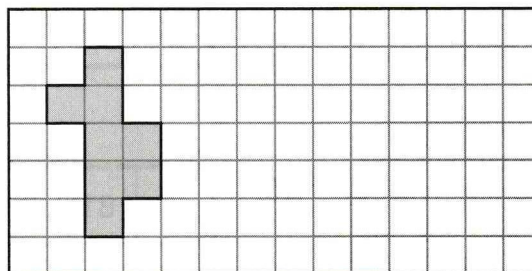
Each small square in the grids below has side length 1.

21. What is the greatest possible area for a rectilinear shape with the same perimeter as the shape traced in the grid below?



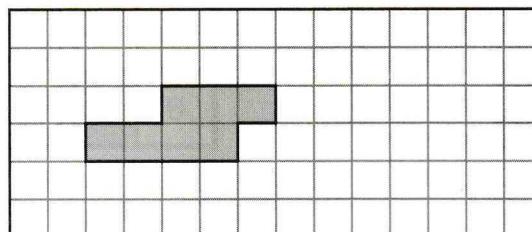
21. _____

22. What is the greatest possible area for a rectilinear shape with the same perimeter as the shape traced in the grid below?



22. _____

23. What is the greatest possible area of a rectilinear shape with whole-number side lengths and the same perimeter as the shape traced in the grid below?



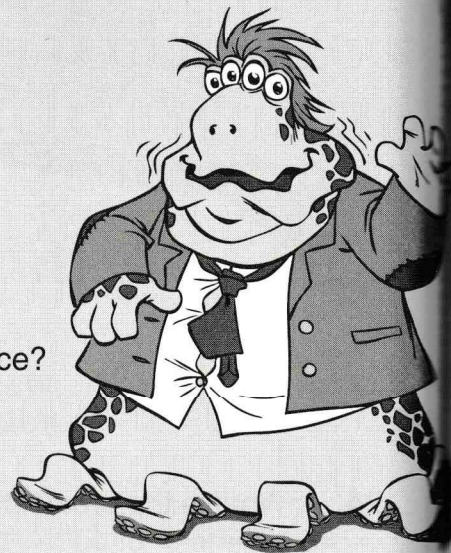
23. _____

24. What is the greatest possible area of a rectilinear shape that has a perimeter of 40? 24. _____
25. What is the greatest possible area of a rectilinear shape that has a perimeter of 24? 25. _____
26. Grogg draws a rectangle with a perimeter of 26 and whole-number side lengths. What is the greatest possible area of Grogg's rectangle? 26. _____
27. Lizzie adds two whole numbers and gets a sum of 12. What is the greatest possible product of Lizzie's two numbers? 27. _____

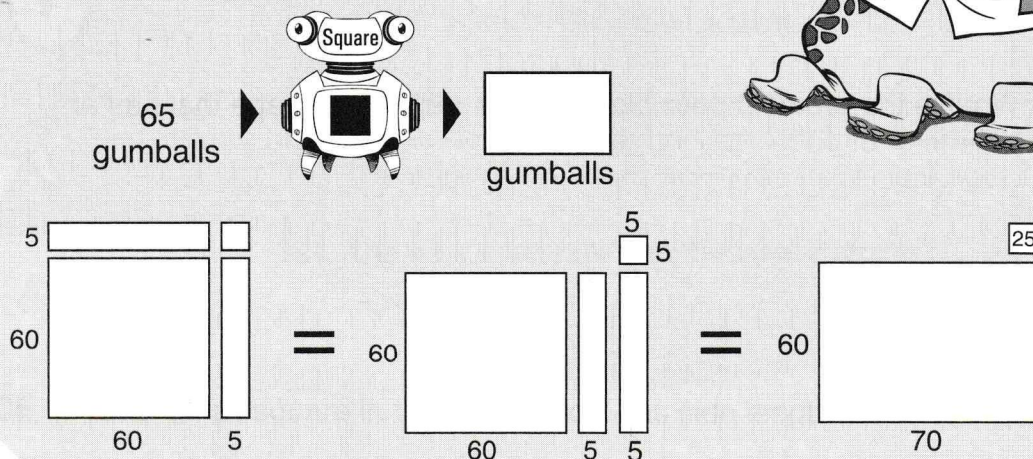


We found a great way to find the square of a number that ends in 5.

You can review the method beginning on page 54 of your Guide.



EXAMPLE How many gumballs will the squarebot below produce?



$65 \times 65 = (60 \times 70) + 25 = 4,200 + 25 = 4,225$.
The Squarebot will produce **4,225** gumballs.

PRACTICE How many gumballs will each Squarebot produce?

28. 35 gumballs → Squarebot → gumballs

29. 15 gumballs → Squarebot → gumballs

30. 45 gumballs → Squarebot → gumballs

31. 95 gumballs → Squarebot → gumballs

32. 85 gumballs → Squarebot → gumballs

33. ★ 1,005 gumballs → Squarebot → gumballs