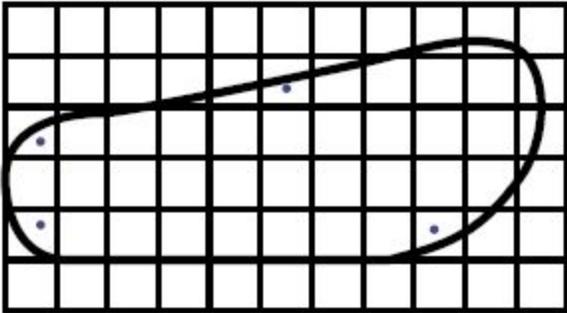


Lesson 79

Course 2 (teacher notes)

Objective: TSW estimate areas using grid systems.

As Tucker balanced one foot on the scale he wondered how many pounds per square inch the scale was supporting. Tucker traced the outline of his shoe on one-inch square grid and counted the squares to estimate the area of his shoe. Here is a reduced image of the inch grid. Can you estimate the area of Tucker's shoe print?



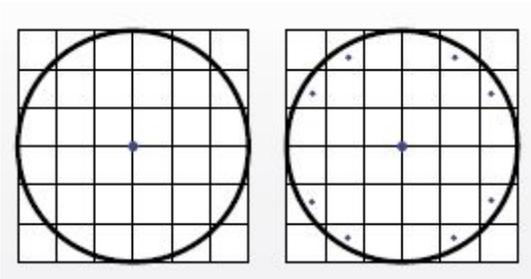
To estimate the area of the shoe print Tucker counted the complete or nearly complete squares within the shoe's outline as whole squares. Then he counted the squares that were about half within the outline as half squares. He counted 30 full or nearly full squares and four "half" squares. Tucker estimated that the area of his shoe print was 32 square inches. Tucker weighs 116 pounds, so he divided his weight by 32 square inches and found that his weight was distributed to about 3.5 pounds per square inch.

$$\frac{116 \text{ lbs}}{32 \text{ in.}^2} \approx 3.52 \text{ lbs per in.}^2$$

Question: Would the number of pounds per square inch on each foot be greater or less than 3.52 if Tucker stood on two feet? It would be less. The same weight would be distributed over a greater area.

Example 1

To prevent a 500 pound piano from damaging the floor, the owner put 6-inch diameter circular castors under the three legs of the piano. Use Tucker's method to estimate the area of each castor. Then find the pounds per square inch the floor supports.



Solution:

We count 24 whole or nearly whole squares. The “half squares” we mark with dots. There are 8 “half squares” that we count as 4 full squares. We estimate the total area of each castor as **28 square inches**.

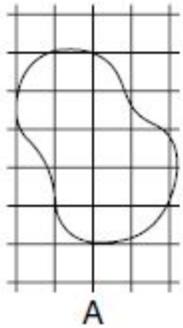
There are three castors so their total area is about **84 in.²**. The weight of the piano is distributed over the area of the three castors, so we divide the 500 lbs weight by 84 in.² to find the pounds per square inch.

$$\frac{500 \text{ lbs}}{84 \text{ in.}^2} \approx 6 \text{ lbs per in.}^2$$

Question: The number of pounds per square inch may not be the same on each castor. Why is this true?? The weight of the piano may not be evenly distributed over each of the three legs.

You Try!!

Figure A shows a map with a square kilometer grid and the outline of lake. Estimate the area of the lake.



Solution:

12 or 13 square km