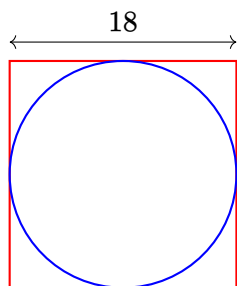


(ID:733) 1. Ava draws a circle inscribed in a square with side length 18. What is the area of the circle in terms of π ?

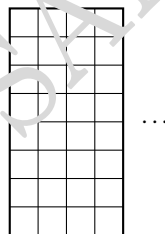


(ID:1253) 3. What is the perimeter of an equilateral triangle with side length 23?

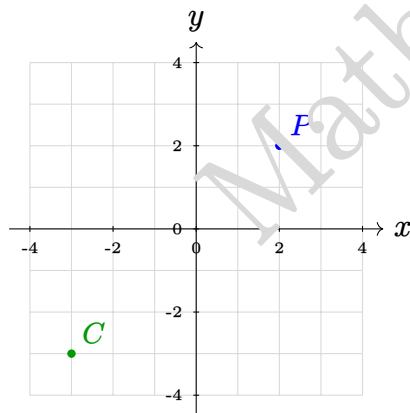
(ID:76) 2. On a 8x5 grid, how many different paths can you take from the top left corner to the bottom right corner if you can only move right or down?

(ID:709) 4. A window is divided into a 19×4 grid of rectangular panes. How many individual panes are there?

19 rows $\times$ 4 cols

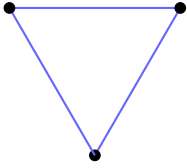


(ID:1066) 5. Point $P(2, 2)$ is dilated about center $(-3, -3)$ with scale factor 2. Find the coordinates of P' .

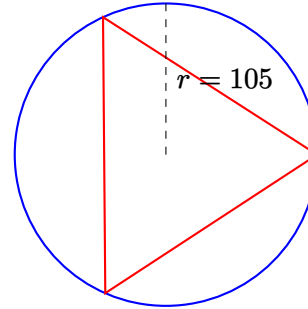


(ID:76) 6. On a 7x3 grid, how many different paths can you take from the top left corner to the bottom right corner if you can only move right or down?

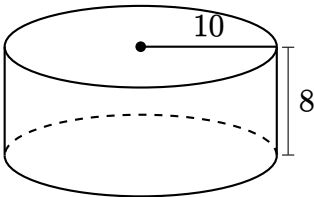
- (ID:126) 7. Find the measure of each interior angle in a regular polygon with 3 sides.



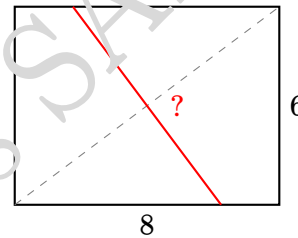
- (ID:737) 8. Jaxson asks: what is the maximum area of a triangle that can be inscribed in a circle with radius 105?



- (ID:603) 9. What is the volume of a cylinder with radius 10 and height 8?



- (ID:729) 10. Angela folds an 8×6 rectangle so that one corner touches the diagonally opposite corner. What is the length of the fold crease?



Answer Key

1. 81π

2. 1287

3. 69

4. 76

5. (7, 7)

6. 120

7. 60

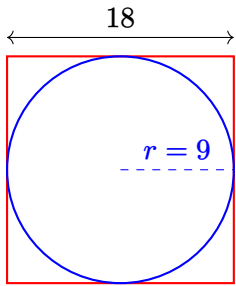
8. $33075\sqrt{3}/4$

9. 800π

10. $15/2$

Math Genius SAMPLE

Solution to Problem 1



Step 1: Find radius

$$\text{Radius} = \text{side} / 2 = 9$$

Step 2: Calculate area

$$A = \pi r^2 = 81\pi$$

Step 3: Final Answer

Area:

$$\boxed{81\pi}$$

Solution to Problem 2

To find how many different paths exist on a 8x5 grid from the top left to the bottom right, moving only right or down:

Step 1: Understand the path formula

Total moves: 8 down and 5 right. Choose positions for right moves: $C(8 + 5, 5)$.

Step 2: Substitute values

Compute:

$$C(13, 5) = \frac{(8 + 5)!}{5!(13 - 5)!}$$

Step 3: Final Answer

The number of paths is

1287

Solution to Problem 3

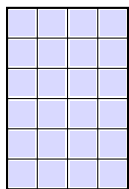
Step 1: Apply the Perimeter Formula

A regular polygon with n sides each of length s has perimeter $P = n \times s$.

$$P = 3 \times 23 = \boxed{69}$$

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Solution to Problem 4



Step 1: Count panes

The window has 19 rows and 4 columns of panes.

Total panes = rows $\times$ columns:

$$19 \times 4 = 76$$

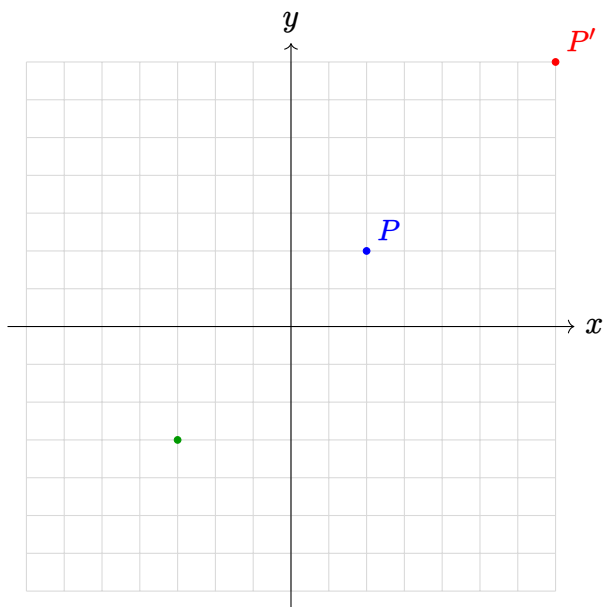
Step 2: Final Answer

There are

76

panes.

Solution to Problem 5



Step 1: Apply the Dilation Rule About a Center

A dilation about center $(-3, -3)$ with scale factor k maps (x, y) to $(-3 + k(x - (-3)), -3 + k(y - (-3)))$.

Step 2: Substitute the Values

$$\begin{aligned} P' &= (-3 + 2(2 - (-3)), -3 + 2(2 - (-3))) \\ &= (-3 + 2 \cdot 5, -3 + 2 \cdot 5) = (7, 7) \end{aligned}$$

Step 3: Final Answer

$$\boxed{(7, 7)}$$

Solution to Problem 6

To find how many different paths exist on a 7x3 grid from the top left to the bottom right, moving only right or down:

Step 1: Understand the path formula

Total moves: 7 down and 3 right. Choose positions for right moves: $C(7 + 3, 3)$.

Step 2: Substitute values

Compute:

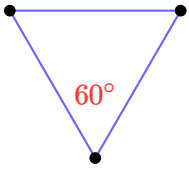
$$C(10, 3) = \frac{(7 + 3)!}{3!(10 - 3)!}$$

Step 3: Final Answer

The number of paths is

120

Solution to Problem 7



Step 1: Apply the Interior Angle Formula

For any regular n -gon, each interior angle equals:

$$\text{Interior angle} = \frac{180(n - 2)}{n}$$

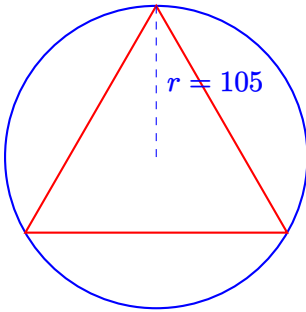
Step 2: Substitute $n = 3$

$$\frac{180(3 - 2)}{3} = \frac{180}{3} = 60^\circ$$

Step 3: Final Answer

$$\boxed{60^\circ}$$

Solution to Problem 8



Step 1: Maximum area is equilateral triangle

Among all triangles inscribed in a circle, the equilateral triangle has maximum area.

Step 2: Derive side length

For an equilateral triangle inscribed in a circle of radius r , the circumradius formula gives $s = r\sqrt{3}$.

Side $s = 105\sqrt{3}$

Step 3: Calculate area

$$s^2 = (105\sqrt{3})^2 = 11025 \cdot 3 = 33075$$

$$\text{Area} = \frac{s^2\sqrt{3}}{4} = \frac{33075\sqrt{3}}{4} = \frac{33075\sqrt{3}}{4}$$

Step 4: Final Answer

Max area:

$\frac{33075\sqrt{3}}{4}$

Solution to Problem 9

Step 1: Recall the formula

The volume of a cylinder is given by:

$$V = \pi r^2 h$$

where r is the radius and h is the height.

Step 2: Substitute values

Given: radius $r = 10$ and height $h = 8$

$$V = \pi \cdot 10^2 \cdot 8$$

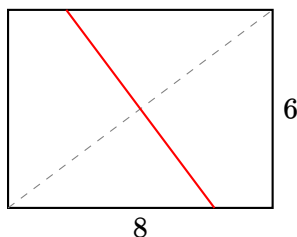
$$V = \pi \cdot 100 \cdot 8 = 800\pi$$

Step 3: Final Answer

The volume is

$$\boxed{800\pi}$$

Solution to Problem 10



Step 1: Set up coordinates

Place the rectangle with corners at $(0,0)$, $(8,0)$, $(8,6)$, and $(0,6)$.

Fold corner $(0,0)$ onto opposite corner $(8,6)$. Every point on the crease is equidistant from these two corners, so the crease lies on the perpendicular bisector of the diagonal from $(0,0)$ to $(8,6)$.

Step 2: Find crease endpoints

The diagonal has:

$$\text{Midpoint} = (4, 3), \quad \text{Slope} = \frac{3}{4}$$

The perpendicular bisector through the midpoint has slope $-4/3$, giving the equation:

$$y - \frac{6}{2} = -\frac{4}{3} \left(x - \frac{8}{2} \right)$$

Solving for x in terms of y :

$$x = \frac{L^2 + W^2}{2L} - \frac{W}{L} y$$

Setting $y = 0$:

$$x = \frac{L^2 + W^2}{2L} = \frac{100}{16} = \frac{25}{4}$$

Setting $y = 6$:

$$x = \frac{L^2 + W^2}{2L} - \frac{W^2}{L} = \frac{L^2 - W^2}{2L} = \frac{28}{16} = \frac{7}{4}$$

Step 3: Compute crease length

The endpoint distances:

$$\Delta x = \frac{W^2}{L} = \frac{9}{2}, \quad \Delta y = 6$$

$$\text{crease} = \sqrt{\left(\frac{W^2}{L}\right)^2 + W^2} = \frac{W}{L} \sqrt{L^2 + W^2} = \frac{6}{8} \sqrt{100} = \frac{15}{2}$$

Step 4: Final Answer

Crease length:

$\frac{15}{2}$

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