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1985 Q16

16. The ratio of boys to girls in Mr. Brown's math class is 2:3. If there are 30 students in the class, how many more girls than boys are in the class?

- A) 1 B) 3 C) 5 D) 6 E) 10

16. (D) Since the ratio is 2:3, $\frac{2}{5}$ of the students are boys and $\frac{3}{5}$ of them are girls. Thus there are $\frac{1}{5}$ more girls than boys and $\frac{1}{5} \times 30 = 6$.

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2010 Q16

16. A square and a circle have the same area. What is the ratio of the side length of the square to the radius of the circle?

- (A) $\frac{\sqrt{\pi}}{2}$ (B) $\sqrt{\pi}$ (C) π (D) 2π (E) π^2

16. **Answer (B):** Let the radius of the circle be 1. Then the area of the circle is $\pi(1)^2 = \pi$. The area of the square is π , so its side length $\sqrt{\pi}$. The ratio of the side length of the square to the radius of the circle is $\frac{\sqrt{\pi}}{1} = \sqrt{\pi}$.

Note: The “squaring of a circle” is a classical problem. In the latter part of the 19th century it was proven that a square having an area equal to that of a given circle cannot be constructed with the standard tools of straightedge and compass because it is impossible to construct a transcendental number, e. g. $\sqrt{\pi}$.

17. **Answer (D):** The area below \overline{PQ} is

$$1 + \frac{1}{2} \cdot 5 \cdot (1 + QY) = 5$$

$$\frac{5}{2} \cdot (1 + QY) = 4$$

$$1 + QY = \frac{8}{5}$$

$$QY = \frac{3}{5}$$

Then $XQ = 1 - QY = 1 - \frac{3}{5} = \frac{2}{5}$, so $\frac{XQ}{QY} = \frac{2/5}{3/5} = \frac{2}{3}$.