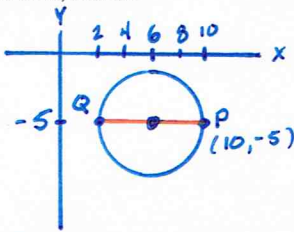


Circle Formula No Calculator

23 **CIRCLE RULES**
 CENTER COORD. $(x-6)^2 + (y+5)^2 = 16 = \sqrt{16} = 4$
 RADIUS!
 A. LABEL & PLOT
 $x=6$ $y=-5$

In the xy -plane, the graph of the equation above is a circle. Point P is on the circle and has coordinates $(10, -5)$. If \overline{PQ} is a diameter of the circle, what are the coordinates of point Q ?

- A) $(2, -5)$
- B) $(6, -1)$
- C) $(6, -5)$
- D) $(6, -9)$



Circle Formula With Calculator

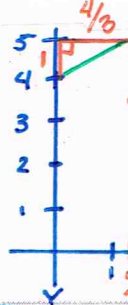
*SLICK!

24 **CIRCLE RULES**

Which of the following is an equation of a circle in the xy -plane with center $(0, 4)$ and a radius with endpoint $(\frac{4}{3}, 5)$?

- A) $x^2 + (y-4)^2 = \frac{25}{9}$
- B) $x^2 + (y+4)^2 = \frac{25}{9}$
- C) $x^2 + (y-4)^2 = \frac{5}{3}$
- D) $x^2 + (y+4)^2 = \frac{3}{5}$

B. LABEL



A. TRANSLATE INFO OF CENTER COORDINATES (x, y) $(0, 4)$

SO $x^2 + (y-4)^2$ NOW P.O.E.
 C. PYTHAG $1^2 + \frac{4}{3}^2 = C^2$
 $= 1 + \frac{16}{9} = C^2$
 $= \frac{9}{9} + \frac{16}{9} = \frac{25}{9} = C^2$

NOTE: RADIUS IS ALWAYS SQUARED IN CIRCLE FORMULA!

24 **CIRCLE RULES**

$x^2 + y^2 + 4x - 2y = -1$

The equation of a circle in the xy -plane is shown above. What is the radius of the circle?

- A) 2 A. REGROUP
- B) 3
- C) 4
- D) 9

B. DIVIDE BY 2 $(x+2)^2 + (y-1)^2 = -1$

C. WHEN FOILED... $x^2 + 4x + 4 + y^2 - 2y + 1 = -1$

D. ADD IT $+4 = \sqrt{4} = 2$ RADIUS!

27 **CIRCLE RULES**

*SLICK BUT SAME AS ABOVE

In the xy -plane, the graph of $2x^2 - 6x + 2y^2 + 2y = 45$ is a circle. What is the radius of the circle?

- A) 5 A. FACTOR OUT 2
- B) 6.5
- C) $\sqrt{40}$
- D) $\sqrt{50}$

B. DIVIDE BY 2 $(x-1.5)^2 + (y+0.5)^2 = 22.5$

C. WHEN FOILED... $x^2 - 3x + 2.25 + y^2 + y + 0.25 = 22.5$

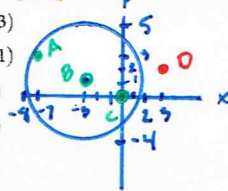
D. ADD IT $+2.5 = \sqrt{25} = 5$ RADIUS!

Circle Formula With Calculator

29 **CIRCLE RULES**

A circle in the xy -plane has equation $(x+3)^2 + (y-1)^2 = 25$. Which of the following points does NOT lie in the interior of the circle?

- A) $(-7, 3)$
- B) $(-3, 1)$
- C) $(0, 0)$
- D) $(3, 2)$



A. LABEL & PLOT
 B. P.O.E. BOTTOM-UP

29 **CIRCLE RULES**

$x^2 + 20x + y^2 + 16y = -20$

The equation above defines a circle in the xy -plane. What are the coordinates of the center of the circle?

- A) $(-20, -16)$
- B) $(-10, -8)$
- C) $(10, 8)$
- D) $(20, 16)$

A. DIVIDE BY 2!!!

$x^2 + \frac{20}{2}x + y^2 + \frac{16}{2}y = \frac{-20}{2}$
 $(x+10)^2 + (y+8)^2 = -20$

B. SET TO = ZERO

$x+10=0$ $y+8=0$
 $x=-10$ $y=-8$

C. SIDE QUESTION: WHAT IS THE RADIUS?
 $(x+10)^2 + (y+8)^2 = -20$

D. WHEN $x^2 + 20x + 100 + y^2 + 16y + 64 = -20$ FOILED...

E. ADD IT $+164 = 144 = \sqrt{144} = 12$ RADIUS

New SAT Additional Math Topics

GEORULES Geometry

RATIO
 $\frac{ED}{5} = \frac{DA}{12} = \frac{AE}{13}$
 $1 \leftarrow BC \rightarrow EC$

1. In the figure above, line l is parallel to line m , segment BD is perpendicular to line m , and segment AC and segment BD intersect at E . What is the length of segment AC ?

Hook!
 $5EC = 13$
 $EC = \frac{13}{5} + \frac{13}{1} = \frac{78}{5} = AC$

BASIC GEO RULES

180×9 TRIANGLES
 1620 TOTAL DEGREES

$360 = 40 \times 9$ INTERIOR ANGLES

40°
 $50, 180 - 40 = 140$
 $140 \div 2 = 70 = x$

2. In the figure above, a regular polygon with 9 sides has been divided into 9 congruent isosceles triangles by line segments drawn from the center of the polygon to its vertices. What is the value of x ?

VOCAB!
 PERFECT POLY

SAY $\widehat{AB} = 60^\circ$
 $\angle ACB = 60^\circ$
 $\angle AYB = 30^\circ$
 $\angle AXB = 30^\circ$

3. In the figure above, $\angle AXB$ and $\angle AYB$ are inscribed in the circle. Which of the following statements is true?

A) The measure of $\angle AXB$ is greater than the measure of $\angle AYB$.
 B) The measure of $\angle AXB$ is less than the measure of $\angle AYB$.
 C) The measure of $\angle AXB$ is equal to the measure of $\angle AYB$.
 D) There is not enough information to determine the relationship between the measure of $\angle AXB$ and the measure of $\angle AYB$.

REMEMBER THIS:

GET FAMILIAR!
 EASY 2-PARTER

$\frac{360}{60} = \frac{36\pi}{x}$
 $360x = 2160\pi$
 $x = 6\pi$

4. In the figure above, O is the center of the circle, segment BC is tangent to the circle at B , and A lies on segment OC . If $OB = AC = 6$, what is the area of the shaded region?

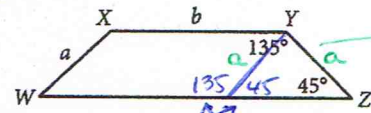
A) $18\sqrt{3} - 3\pi$
 B) $18\sqrt{3} - 6\pi$
 C) $36\sqrt{3} - 3\pi$
 D) $36\sqrt{3} - 6\pi$

VOCAB 90°
 WHICH MEANS $OA = 6$
 SO REMEMBER

$\frac{1}{2}bh = \frac{1}{2}(6)(6\sqrt{3}) = 18\sqrt{3}$

GET FAMILIAR

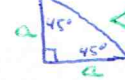
THIS IS A SLICK QUESTION



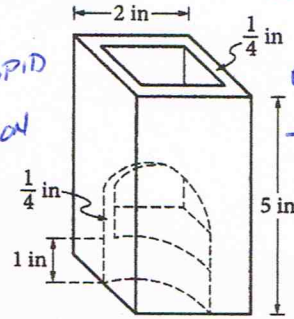
5. Trapezoid $WXYZ$ is shown above. How much greater is the area of this trapezoid than the area of a parallelogram with side lengths a and b and base angles of measure 45° and 135° ?

- A) $\frac{1}{2}a^2$
 B) $\sqrt{2}a^2$
 C) $\frac{1}{2}ab$
 D) $\sqrt{2}ab$

ONCE YOU SEE ABOVE, THE TRAPEZOID WILL BE BIGGER BY THE AREA OF THE RIGHT TRIANGLE



GET FAMILIAR WITH STUPID SET UP IN QUESTION



VOLUME BLOCK = $2 \times 2 \times 5 = 20$
 - VOLUME SPACE = $1 \times 1 \times 4 = 4$
 INSIDE

Note: Figure not drawn to scale.

6. A glass vase is in the shape of a rectangular prism with a square base. The figure above shows the vase with a portion cut out. The external dimensions of the vase are height 5 inches (in), with a square base of side length 2 inches. The vase has a solid base of height 1 inch, and the sides are each $\frac{1}{4}$ inch thick. Which of the following is the volume, in cubic inches, of the glass used in the vase?

- A) 6
 B) 8
 C) 9
 D) 11

ALL OF THIS BALONEY IS REALLY ASKING TO SUBTRACT THE INTERIOR SPACE FROM THE TOTAL VOLUME OF BLOCK.

GET FAMILIAR! Coordinate Geometry

$$x^2 + (y + 1)^2 = 4$$

7. The graph of the equation above in the xy -plane is a circle. If the center of this circle is translated 1 unit up and the radius is increased by 1, which of the following is an equation of the resulting circle?

- A) $x^2 + y^2 = 5$
 B) $x^2 + y^2 = 9$
 C) $x^2 + (y + 2)^2 = 5$
 D) $x^2 + (y + 2)^2 = 9$

FIRST SQUARE ROOT IT!

$$\sqrt{x^2 + (y + 1)^2} = \sqrt{4}$$

$$x + (y + 1) = 2$$

$$x = 0 \quad y = -1$$

SO, UP 1 $y = 0$ R = 3 \leftarrow RADIUS + 1

$$\text{NEW EQUATION } x^2 + y^2 = 9$$

8. The graph of the equation above in the xy -plane is a circle. What is the radius of the circle?

$$x^2 + 8x + y^2 - 6y = 24$$

$$(x + 4)^2 + (y - 3)^2 = 49$$

$$(x^2 + 8x + 16) - 16 + (y^2 - 6y + 9) - 9 = 24$$

$$(x + 4)^2 - 16 + (y - 3)^2 - 9 = 24$$

$$(x + 4)^2 + (y - 3)^2 = 49$$

$$\sqrt{(x + 4)^2 + (y - 3)^2} = \sqrt{49}$$

$$x = -4 \quad y = +3 \quad r = 7$$