

# Question ID ffc88014

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: ffc88014

The measure of angle  $Z$  is  $60^\circ$ . What is the measure, in radians, of angle  $Z$ ?

- A.  $\frac{1}{6}\pi$
- B.  $\frac{1}{3}\pi$
- C.  $\frac{2}{3}\pi$
- D.  $1\pi$

ID: ffc88014 Answer

Correct Answer: B

Rationale

Choice B is correct. The measure of an angle, in radians, can be found by multiplying its measure, in degrees, by  $\frac{\pi}{180}$ . It's given that the measure of angle  $Z$  is  $60^\circ$ . It follows that the measure, in radians, of angle  $Z$  is  $60\frac{\pi}{180}$ , or  $\frac{1}{3}\pi$ .

Choice A is incorrect. This is the measure, in radians, of an angle whose measure is  $30^\circ$ , not  $60^\circ$ .

Choice C is incorrect. This is the measure, in radians, of an angle whose measure is  $120^\circ$ , not  $60^\circ$ .

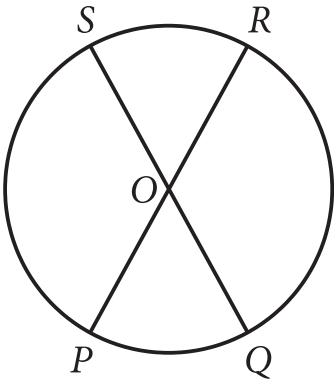
Choice D is incorrect. This is the measure, in radians, of an angle whose measure is  $180^\circ$ , not  $60^\circ$ .

Question Difficulty: Medium

Question ID 4ff588cd

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: 4ff588cd



Note: Figure not drawn to scale.

The circle shown has center  $O$ , circumference  $144\pi$ , and diameters  $\overline{PR}$  and  $\overline{QS}$ . The length of arc  $PS$  is twice the length of arc  $PQ$ . What is the length of arc  $QR$ ?

- A.  $24\pi$
- B.  $48\pi$
- C.  $72\pi$
- D.  $96\pi$

ID: 4ff588cd Answer

Correct Answer: B

Rationale

Choice B is correct. Since  $\overline{PR}$  and  $\overline{QS}$  are diameters of the circle shown,  $\overline{OS}$ ,  $\overline{OR}$ ,  $\overline{OP}$ , and  $\overline{OQ}$  are radii of the circle and are therefore congruent. Since  $\angle SOP$  and  $\angle ROQ$  are vertical angles, they are congruent. Therefore, arc  $PS$  and arc  $QR$  are formed by congruent radii and have the same angle measure, so they are congruent arcs. Similarly,  $\angle SOR$  and  $\angle POQ$  are vertical angles, so they are congruent. Therefore, arc  $SR$  and arc  $PQ$  are formed by congruent radii and have the same angle measure, so they are congruent arcs. Let  $x$  represent the length of arc  $SR$ . Since arc  $SR$  and arc  $PQ$  are congruent arcs, the length of arc  $PQ$  can also be represented by  $x$ . It's given that the length of arc  $PS$  is twice the length of arc  $PQ$ . Therefore, the length of arc  $PS$  can be represented by the expression  $2x$ . Since arc  $PS$  and arc  $QR$  are congruent arcs, the length of arc  $QR$  can also be represented by  $2x$ . This gives the expression  $x + x + 2x + 2x$ . Since it's given that the circumference is  $144\pi$ , the expression  $x + x + 2x + 2x$  is equal to  $144\pi$ . Thus  $x + x + 2x + 2x = 144\pi$ , or  $6x = 144\pi$ . Dividing both sides of this equation by 6 yields  $x = 24\pi$ . Therefore, the length of arc  $QR$  is  $2(24\pi)$ , or  $48\pi$ .

Choice A is incorrect. This is the length of arc  $PQ$ , not arc  $QR$ .

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

# Question ID f009297f

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: f009297f

In the  $xy$ -plane, the graph of the equation  $(x - 3)^2 + (y - 5)^2 = 9$  is a circle. The point  $(6, c)$ , where  $c$  is a constant, lies on this circle. What is the value of  $c$ ?

ID: f009297f Answer

Correct Answer: 5

Rationale

The correct answer is 5. It's given that in the  $xy$ -plane, the graph of the equation  $(x - 3)^2 + (y - 5)^2 = 9$  is a circle. It's also given that the point  $(6, c)$ , where  $c$  is a constant, lies on this circle. It follows that the ordered pair  $(6, c)$  makes the equation  $(x - 3)^2 + (y - 5)^2 = 9$  true. Substituting 6 for  $x$  and  $c$  for  $y$  in this equation yields  $(6 - 3)^2 + (c - 5)^2 = 9$ , or  $9 + (c - 5)^2 = 9$ . Subtracting 9 from each side of this equation yields  $(c - 5)^2 = 0$ . It follows that the value of  $c$  is 5.

Question Difficulty: Medium

# Question ID 8e79ef1c

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: 8e79ef1c

An angle has a measure of  $\frac{9\pi}{20}$  radians. What is the measure of the angle in degrees?

ID: 8e79ef1c Answer

Correct Answer: 81

Rationale

The correct answer is 81. The measure of an angle, in degrees, can be found by multiplying its measure, in radians, by  $\frac{180 \text{ degrees}}{\pi \text{ radians}}$ . Multiplying the given angle measure,  $\frac{9\pi}{20}$  radians, by  $\frac{180 \text{ degrees}}{\pi \text{ radians}}$  yields  $\frac{9\pi}{20} \text{ radians} \frac{180 \text{ degrees}}{\pi \text{ radians}}$ , which is equivalent to 81 degrees.

Question Difficulty: Medium

Question ID 0ce06a95

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: 0ce06a95

A circle in the  $xy$ -plane has the equation  $(x - 13)^2 + (y - k)^2 = 64$ . Which of the following gives the center of the circle and its radius?

- A. The center is at  $(13, k)$  and the radius is 8.
- B. The center is at  $(k, 13)$  and the radius is 8.
- C. The center is at  $(k, 13)$  and the radius is 64.
- D. The center is at  $(13, k)$  and the radius is 64.

ID: 0ce06a95 Answer

Correct Answer: A

Rationale

Choice A is correct. For a circle in the  $xy$ -plane that has the equation  $x - h^2 + y - k^2 = r^2$ , where  $h, k$ , and  $r$  are constants,  $h, k$  is the center of the circle and the positive value of  $r$  is the radius of the circle. In the given equation,  $h = 13$  and  $r^2 = 64$ . Taking the square root of each side of  $r^2 = 64$  yields  $r = \pm 8$ . Therefore, the center of the circle is at  $13, k$  and the radius is 8.

Choice B is incorrect. This gives the center and radius of a circle with equation  $x - k^2 + y - 13^2 = 64$ , not  $x - 13^2 + y - k^2 = 64$ .

Choice C is incorrect. This gives the center and radius of a circle with equation  $x - k^2 + y - 13^2 = 4,096$ , not  $x - 13^2 + y - k^2 = 64$ .

Choice D is incorrect. This gives the center and radius of a circle with equation  $x - 13^2 + y - k^2 = 4,096$ , not  $x - 13^2 + y - k^2 = 64$ .

Question Difficulty: Medium

Question ID 98d85e86

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: 98d85e86

What is the center of the circle in the  $xy$ -plane defined by the equation  $(x - 1)^2 + (y + 7)^2 = 1$ ?

- A.  $(-1, -7)$
- B.  $(-1, 7)$
- C.  $(1, -7)$
- D.  $(1, 7)$

ID: 98d85e86 Answer

Correct Answer: C

Rationale

Choice C is correct. The equation of a circle in the  $xy$ -plane can be written as  $(x - h)^2 + (y - k)^2 = r^2$ , where the center of the circle is  $(h, k)$  and the radius of the circle is  $r$ . It's given that the circle in the  $xy$ -plane is defined by the equation  $(x - 1)^2 + (y + 7)^2 = 1$ . This equation can be written as  $(x - 1)^2 + (y - (-7))^2 = 1$ . For this equation, it follows that  $h = 1$  and  $k = -7$ . Therefore, the center of the circle in the  $xy$ -plane defined by the given equation is  $(1, -7)$ .

Choice A is incorrect. This is the center of the circle in the  $xy$ -plane that is defined by the equation  $(x + 1)^2 + (y + 7)^2 = 1$ , not  $(x - 1)^2 + (y + 7)^2 = 1$ .

Choice B is incorrect. This is the center of the circle in the  $xy$ -plane that is defined by the equation  $(x + 1)^2 + (y - 7)^2 = 1$ , not  $(x - 1)^2 + (y + 7)^2 = 1$ .

Choice D is incorrect. This is the center of the circle in the  $xy$ -plane that is defined by the equation  $(x - 1)^2 + (y - 7)^2 = 1$ , not  $(x - 1)^2 + (y + 7)^2 = 1$ .

Question Difficulty: Medium

Question ID 88041348

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: 88041348

A circle in the  $xy$ -plane has its center at  $(-4, 5)$  and the point  $(-8, 8)$  lies on the circle. Which equation represents this circle?

- A.  $(x - 4)^2 + (y + 5)^2 = 5$
- B.  $(x + 4)^2 + (y - 5)^2 = 5$
- C.  $(x - 4)^2 + (y + 5)^2 = 25$
- D.  $(x + 4)^2 + (y - 5)^2 = 25$

ID: 88041348 Answer

Correct Answer: D

Rationale

Choice D is correct. A circle in the  $xy$ -plane can be represented by an equation of the form  $x - h^2 + y - k^2 = r^2$ , where  $h, k$  is the center of the circle and  $r$  is the length of a radius of the circle. It's given that the circle has its center at  $-4, 5$ . Therefore,  $h = -4$  and  $k = 5$ . Substituting  $-4$  for  $h$  and  $5$  for  $k$  in the equation  $x - h^2 + y - k^2 = r^2$  yields  $x - 4^2 + y - 5^2 = r^2$ , or  $x + 4^2 + y - 5^2 = r^2$ . It's also given that the point  $-8, 8$  lies on the circle. Substituting  $-8$  for  $x$  and  $8$  for  $y$  in the equation  $x + 4^2 + y - 5^2 = r^2$  yields  $-8 + 4^2 + 8 - 5^2 = r^2$ , or  $-4^2 + 3^2 = r^2$ , which is equivalent to  $16 + 9 = r^2$ , or  $25 = r^2$ . Substituting  $25$  for  $r^2$  in the equation  $x + 4^2 + y - 5^2 = r^2$  yields  $x + 4^2 + y - 5^2 = 25$ . Thus, the equation  $x + 4^2 + y - 5^2 = 25$  represents the circle.

Choice A is incorrect. The circle represented by this equation has its center at  $4, -5$ , not  $-4, 5$ , and the point  $-8, 8$  doesn't lie on the circle.

Choice B is incorrect. The point  $-8, 8$  doesn't lie on the circle represented by this equation.

Choice C is incorrect. The circle represented by this equation has its center at  $4, -5$ , not  $-4, 5$ , and the point  $-8, 8$  doesn't lie on the circle.

Question Difficulty: Medium

Question ID 43e876eb

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: 43e876eb

$$x^2 + 58x + y^2 = 0$$

In the  $xy$ -plane, the graph of the given equation is a circle. What are the coordinates  $(x, y)$  of the center of the circle?

- A.  $(0, 29)$
- B.  $(0, -29)$
- C.  $(29, 0)$
- D.  $(-29, 0)$

ID: 43e876eb Answer

Correct Answer: D

Rationale

Choice D is correct. It’s given that in the  $xy$ -plane, the graph of  $x^2 + 58x + y^2 = 0$  is a circle. The equation of a circle in the  $xy$ -plane can be written as  $(x - h)^2 + (y - k)^2 = r^2$ , where the coordinates of the center of the circle are  $(h, k)$  and the radius of the circle is  $r$ . By completing the square, the equation  $x^2 + 58x + y^2 = 0$  can be rewritten as  $x^2 + 58x + \frac{58^2}{2} + y^2 = 0 + \frac{58^2}{2}$ , or  $x^2 + 58x + 841 + y^2 = 841$ . This equation is equivalent to  $(x + 29)^2 + y^2 = 841$ , or  $x - (-29)^2 + (y - 0)^2 = 841$ . Therefore,  $h$  is  $-29$  and  $k$  is  $0$ , and the coordinates  $(x, y)$  of the center of the circle are  $(-29, 0)$ .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

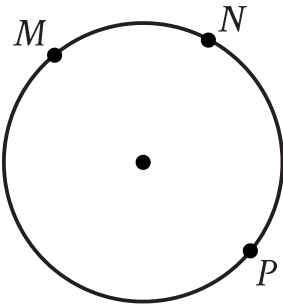
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID 1f96ea4b

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: 1f96ea4b



Points  $M$ ,  $N$ , and  $P$  lie on the circle shown. On this circle, minor arc  $MN$  has a length of **39** centimeters and major arc  $MPN$  has a length of **195** centimeters. What is the circumference, in centimeters, of the circle shown?

- A. **39**
- B. **156**
- C. **195**
- D. **234**

ID: 1f96ea4b Answer

Correct Answer: D

Rationale

Choice D is correct. Since the endpoints of minor arc  $MN$  and major arc  $MPN$  are the same, and the arcs together form a full circle, the sum of the lengths of these two arcs is equal to the circumference of the circle. It's given that the length of minor arc  $MN$  is 39 centimeters and the length of major arc  $MPN$  is 195 centimeters. Therefore, the circumference of the circle, in centimeters, is  $39 + 195$ , or 234.

Choice A is incorrect. This is the length, in centimeters, of minor arc  $MN$ , not the circumference, in centimeters, of the circle.

Choice B is incorrect. This is the difference of the lengths of major arc  $MPN$  and minor arc  $MN$ , in centimeters.

Choice C is incorrect. This is the length, in centimeters, of major arc  $MPN$ , not the circumference, in centimeters, of the circle.

Question Difficulty: Medium

# Question ID 7ea88342

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: 7ea88342

An angle has a measure of  $\frac{16\pi}{15}$  radians. What is the measure of the angle, in degrees?

ID: 7ea88342 Answer

Correct Answer: 192

Rationale

The correct answer is 192. The measure of an angle, in degrees, can be found by multiplying its measure, in radians, by  $\frac{180 \text{ degrees}}{\pi \text{ radians}}$ . Multiplying the given angle measure,  $\frac{16\pi}{15}$  radians, by  $\frac{180 \text{ degrees}}{\pi \text{ radians}}$  yields  $\frac{16\pi}{15}$  radians  $\frac{180 \text{ degrees}}{\pi \text{ radians}}$ , which simplifies to 192 degrees.

Question Difficulty: Medium

Question ID b2eb22ba

| Assessment | Test | Domain                    | Skill   | Difficulty |
|------------|------|---------------------------|---------|------------|
| SAT        | Math | Geometry and Trigonometry | Circles | Medium     |

ID: b2eb22ba

The measure of angle  $R$  is  $\frac{2\pi}{3}$  radians. The measure of angle  $T$  is  $\frac{5\pi}{12}$  radians greater than the measure of angle  $R$ . What is the measure of angle  $T$ , in degrees?

- A. 75
- B. 120
- C. 195
- D. 390

ID: b2eb22ba Answer

Correct Answer: C

Rationale

Choice C is correct. It’s given that the measure of angle  $R$  is  $\frac{2\pi}{3}$  radians, and the measure of angle  $T$  is  $\frac{5\pi}{12}$  radians greater than the measure of angle  $R$ . Therefore, the measure of angle  $T$  is equal to  $\frac{2\pi}{3} + \frac{5\pi}{12}$  radians. Multiplying  $\frac{2\pi}{3}$  by  $\frac{4}{4}$  to get a common denominator with  $\frac{5\pi}{12}$  yields  $\frac{8\pi}{12}$ . Therefore,  $\frac{2\pi}{3} + \frac{5\pi}{12}$  is equivalent to  $\frac{8\pi}{12} + \frac{5\pi}{12}$ , or  $\frac{13\pi}{12}$ . Therefore, the measure of angle  $T$  is  $\frac{13\pi}{12}$  radians. The measure of angle  $T$ , in degrees, can be found by multiplying its measure, in radians, by  $\frac{180}{\pi}$ . This yields  $\frac{13\pi}{12} \times \frac{180}{\pi}$ , which is equivalent to 195 degrees. Therefore, the measure of angle  $T$  is 195 degrees.

Choice A is incorrect. This is the number of degrees that the measure of angle  $T$  is greater than the measure of angle  $R$ .

Choice B is incorrect. This is the measure of angle  $R$ , in degrees.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium