

G.GPE.A.1: Equations of Circles 2

- 1 Kevin's work for deriving the equation of a circle is shown below.

$$x^2 + 4x = -(y^2 - 20)$$

STEP 1 $x^2 + 4x = -y^2 + 20$

STEP 2 $x^2 + 4x + 4 = -y^2 + 20 - 4$

STEP 3 $(x + 2)^2 = -y^2 + 20 - 4$

STEP 4 $(x + 2)^2 + y^2 = 16$

In which step did he make an error in his work?

- 1) Step 1
 - 2) Step 2
 - 3) Step 3
 - 4) Step 4
- 2 The equation $x^2 + y^2 - 2x + 6y + 3 = 0$ is equivalent to
- 1) $(x - 1)^2 + (y + 3)^2 = -3$
 - 2) $(x - 1)^2 + (y + 3)^2 = 7$
 - 3) $(x + 1)^2 + (y + 3)^2 = 7$
 - 4) $(x + 1)^2 + (y + 3)^2 = 10$
- 3 The equation $4x^2 - 24x + 4y^2 + 72y = 76$ is equivalent to
- 1) $4(x - 3)^2 + 4(y + 9)^2 = 76$
 - 2) $4(x - 3)^2 + 4(y + 9)^2 = 121$
 - 3) $4(x - 3)^2 + 4(y + 9)^2 = 166$
 - 4) $4(x - 3)^2 + 4(y + 9)^2 = 436$
- 4 What are the coordinates of the center of a circle whose equation is $x^2 + y^2 - 16x + 6y + 53 = 0$?
- 1) $(-8, -3)$
 - 2) $(-8, 3)$
 - 3) $(8, -3)$
 - 4) $(8, 3)$
- 5 The equation of a circle is $x^2 + y^2 + 6y = 7$. What are the coordinates of the center and the length of the radius of the circle?
- 1) center $(0, 3)$ and radius 4
 - 2) center $(0, -3)$ and radius 4
 - 3) center $(0, 3)$ and radius 16
 - 4) center $(0, -3)$ and radius 16
- 6 What are the center and radius of the circle whose equation is $x^2 + y^2 + 4x = 5$?
- 1) $(2, 0)$ and 1
 - 2) $(-2, 0)$ and 1
 - 3) $(2, 0)$ and 3
 - 4) $(-2, 0)$ and 3
- 7 The equation of a circle is $x^2 + y^2 - 12y + 20 = 0$. What are the coordinates of the center and the length of the radius of the circle?
- 1) center $(0, 6)$ and radius 4
 - 2) center $(0, -6)$ and radius 4
 - 3) center $(0, 6)$ and radius 16
 - 4) center $(0, -6)$ and radius 16
- 8 The equation of a circle is $x^2 + y^2 + 12x = -27$. What are the coordinates of the center and the length of the radius of the circle?
- 1) center $(6, 0)$ and radius 3
 - 2) center $(6, 0)$ and radius 9
 - 3) center $(-6, 0)$ and radius 3
 - 4) center $(-6, 0)$ and radius 9
- 9 What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 - 12y - 20.25 = 0$?
- 1) center $(0, 6)$ and radius 7.5
 - 2) center $(0, -6)$ and radius 7.5
 - 3) center $(0, 12)$ and radius 4.5
 - 4) center $(0, -12)$ and radius 4.5
- 10 The equation of a circle is $x^2 + y^2 - 6y + 1 = 0$. What are the coordinates of the center and the length of the radius of this circle?
- 1) center $(0, 3)$ and radius $= 2\sqrt{2}$
 - 2) center $(0, -3)$ and radius $= 2\sqrt{2}$
 - 3) center $(0, 6)$ and radius $= \sqrt{35}$
 - 4) center $(0, -6)$ and radius $= \sqrt{35}$
- 11 The equation of a circle is $x^2 + 8x + y^2 - 12y = 144$. What are the coordinates of the center and the length of the radius of the circle?
- 1) center $(4, -6)$ and radius 12
 - 2) center $(-4, 6)$ and radius 12
 - 3) center $(4, -6)$ and radius 14
 - 4) center $(-4, 6)$ and radius 14

- 12 What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + 6x + y^2 - 4y = 23$?
- 1) $(3, -2)$ and 36
 - 2) $(3, -2)$ and 6
 - 3) $(-3, 2)$ and 36
 - 4) $(-3, 2)$ and 6
- 13 What are the coordinates of the center and the length of the radius of the circle represented by the equation $x^2 + y^2 - 4x + 8y + 11 = 0$?
- 1) center $(2, -4)$ and radius 3
 - 2) center $(-2, 4)$ and radius 3
 - 3) center $(2, -4)$ and radius 9
 - 4) center $(-2, 4)$ and radius 9
- 14 An equation of circle M is $x^2 + y^2 + 6x - 2y + 1 = 0$. What are the coordinates of the center and the length of the radius of circle M ?
- 1) center $(3, -1)$ and radius 9
 - 2) center $(3, -1)$ and radius 3
 - 3) center $(-3, 1)$ and radius 9
 - 4) center $(-3, 1)$ and radius 3
- 15 The equation of a circle is $x^2 + y^2 - 6x + 2y = 6$. What are the coordinates of the center and the length of the radius of the circle?
- 1) center $(-3, 1)$ and radius 4
 - 2) center $(3, -1)$ and radius 4
 - 3) center $(-3, 1)$ and radius 16
 - 4) center $(3, -1)$ and radius 16
- 16 What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + y^2 + 2x - 16y + 49 = 0$?
- 1) center $(1, -8)$ and radius 4
 - 2) center $(-1, 8)$ and radius 4
 - 3) center $(1, -8)$ and radius 16
 - 4) center $(-1, 8)$ and radius 16
- 17 What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 = 8x - 6y + 39$?
- 1) center $(-4, 3)$ and radius 64
 - 2) center $(4, -3)$ and radius 64
 - 3) center $(-4, 3)$ and radius 8
 - 4) center $(4, -3)$ and radius 8
- 18 If $x^2 + 4x + y^2 - 6y - 12 = 0$ is the equation of a circle, the length of the radius is
- 1) 25
 - 2) 16
 - 3) 5
 - 4) 4
- 19 What is the length of the radius of the circle whose equation is $x^2 + y^2 - 2x + 4y - 5 = 0$?
- 1) $\sqrt{5}$
 - 2) $\sqrt{10}$
 - 3) 5
 - 4) 10
- 20 An equation of circle O is $x^2 + y^2 + 4x - 8y = -16$. The statement that best describes circle O is the
- 1) center is $(2, -4)$ and is tangent to the x -axis
 - 2) center is $(2, -4)$ and is tangent to the y -axis
 - 3) center is $(-2, 4)$ and is tangent to the x -axis
 - 4) center is $(-2, 4)$ and is tangent to the y -axis
- 21 Determine and state the coordinates of the center and the length of the radius of the circle represented by the equation $x^2 + 16x + y^2 + 12y - 44 = 0$.
- 22 The equation of a circle is $x^2 + y^2 + 8x - 6y + 7 = 0$. Determine and state the coordinates of the center and the length of the radius of the circle.
- 23 Determine and state the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + y^2 - 6x = 56 - 8y$.
- 24 Determine and state the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 + 6x = 6y + 63$.

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Answer Section

1 ANS: 2 REF: 061603geo

2 ANS: 2

$$x^2 - 2x + y^2 + 6y = -3$$

$$x^2 - 2x + 1 + y^2 + 6y + 9 = -3 + 1 + 9$$

$$(x - 1)^2 + (y + 3)^2 = 7$$

REF: 061016a2

3 ANS: 4

$$4(x^2 - 6x + 9) + 4(y^2 + 18y + 81) = 76 + 36 + 324$$

$$4(x - 3)^2 + 4(y + 9)^2 = 436$$

REF: 061619aai

4 ANS: 3

$$x^2 + y^2 - 16x + 6y + 53 = 0$$

$$x^2 - 16x + 64 + y^2 + 6y + 9 = -53 + 64 + 9$$

$$(x - 8)^2 + (y + 3)^2 = 20$$

REF: 011415a2

5 ANS: 2

$$x^2 + y^2 + 6y + 9 = 7 + 9$$

$$x^2 + (y + 3)^2 = 16$$

REF: 061514geo

6 ANS: 4

$$x^2 + y^2 + 4x = 5$$

$$x^2 + 4x + 4 + y^2 = 5 + 4$$

$$(x + 2)^2 + y^2 = 9$$

REF: 081626a2

7 ANS: 1

$$x^2 + y^2 - 12y + 36 = -20 + 36$$

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

REF: 061712geo

8 ANS: 3

$$x^2 + 12x + 36 + y^2 = -27 + 36$$

$$(x + 6)^2 + y^2 = 9$$

REF: 082313geo

9 ANS: 1

$$x^2 + y^2 - 12y + 36 = 20.25 + 36 \quad \sqrt{56.25} = 7.5$$

$$x^2 + (y - 6)^2 = 56.25$$

REF: 082219geo

10 ANS: 1

$$x^2 + y^2 - 6y + 9 = -1 + 9$$

$$x^2 + (y - 3)^2 = 8$$

REF: 011718geo

11 ANS: 4

$$x^2 + 8x + 16 + y^2 - 12y + 36 = 144 + 16 + 36$$

$$(x + 4)^2 + (y - 6)^2 = 196$$

REF: 061920geo

12 ANS: 4

$$x^2 + 6x + 9 + y^2 - 4y + 4 = 23 + 9 + 4$$

$$(x + 3)^2 + (y - 2)^2 = 36$$

REF: 011617geo

13 ANS: 1

$$x^2 - 4x + 4 + y^2 + 8y + 16 = -11 + 4 + 16$$

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

REF: 081616geo

14 ANS: 4

$$x^2 + 6x + y^2 - 2y = -1$$

$$x^2 + 6x + 9 + y^2 - 2y + 1 = -1 + 9 + 1$$

$$(x + 3)^2 + (y - 1)^2 = 9$$

REF: 062309geo

15 ANS: 2

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

$$x^2 - 6x + 9 + y^2 + 2y + 1 = 6 + 9 + 1$$

$$(x - 3)^2 + (y + 1)^2 = 16$$

REF: 011812geo

16 ANS: 2

$$x^2 + 2x + 1 + y^2 - 16y + 64 = -49 + 1 + 64$$

$$(x + 1)^2 + (y - 8)^2 = 16$$

REF: 012314geo

17 ANS: 4

$$x^2 - 8x + y^2 + 6y = 39$$

$$x^2 - 8x + 16 + y^2 + 6y + 9 = 39 + 16 + 9$$

$$(x - 4)^2 + (y + 3)^2 = 64$$

REF: 081906geo

18 ANS: 3

$$x^2 + 4x + 4 + y^2 - 6y + 9 = 12 + 4 + 9$$

$$(x + 2)^2 + (y - 3)^2 = 25$$

REF: 081509geo

19 ANS: 2

$$x^2 + y^2 - 2x + 4y - 5 = 0$$

$$x^2 - 2x + 1 + y^2 + 4y + 4 = 5 + 1 + 4$$

$$(x - 1)^2 + (y + 2)^2 = 10$$

REF: 082416geo

20 ANS: 4

$$x^2 + 4x + 4 + y^2 - 8y + 16 = -16 + 4 + 16$$

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

REF: 081821geo

21 ANS:

$$x^2 + 16x + 64 + y^2 + 12y + 36 = 44 + 64 + 36 \quad (-8, -6); r = 12$$

$$(x + 8)^2 + (y + 6)^2 = 144$$

REF: 012430geo

22 ANS:

$$x^2 + 8x + 16 + y^2 - 6y + 9 = -7 + 16 + 9 \quad (-4, 3) \quad \sqrt{18}$$

$$(x + 4)^2 + (y - 3)^2 = 18$$

REF: 062429geo

23 ANS:

$$x^2 - 6x + 9 + y^2 + 8y + 16 = 56 + 9 + 16 \quad (3, -4); r = 9$$

$$(x - 3)^2 + (y + 4)^2 = 81$$

REF: 081731geo

24 ANS:

$$x^2 + 6x + 9 + y^2 - 6y + 9 = 63 + 9 + 9 \quad (-3, 3); r = 9$$

$$(x + 3)^2 + (y - 3)^2 = 81$$

REF: 062230geo