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 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

20 Determine and state the coordinates of the center and the length of the radius of the circle represented by the equation $x^2 + 16x + y^2 + 12y - 44 = 0$.

21 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.

22 Determine and state the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + y^2 - 6x = 56 - 8y$.

23 Determine and state the coordinates of the center and the length of the radius of the circle whose equation is $x^2 + y^2 + 6x = 6y + 63$.

G.GPE.A.1: Equations of Circles 2
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: 061619aii

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: 4

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

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

REF: 081821geo

20 ANS:

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

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

REF: 012430geo

21 ANS:

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

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

REF: 062429geo

22 ANS:

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

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

REF: 081731geo

23 ANS:

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

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

REF: 062230geo