

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

- 1 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) $(x + 1)^2 + (y + 3)^2 = 10$

- 2 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?

- 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 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?

- 5 What are the center and radius of the circle whose equation is $x^2 + y^2 + 4x = 5$?

- 6 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?

- 7 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?

- 8 What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + 6x + y^2 - 4y = 23$?

- 9 What are the coordinates of the center and the length of the radius of the circle represented by the equation $x^2 + y^2 - 4x + 8y + 11 = 0$?

- 10 What are the coordinates of the center of a circle whose equation is $x^2 + y^2 - 16x + 6y + 53 = 0$?

- 11 If $x^2 + 4x + y^2 - 6y - 12 = 0$ is the equation of a circle, the length of the radius is

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

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Answer Section

1 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

2 ANS:

Step 2

REF: 061603geo

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:

center $(0, -3)$ and radius 4

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

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

REF: 061514geo

5 ANS:

$(-2, 0)$ and 3

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

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

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

REF: 081626a2

6 ANS:

center $(0, 6)$ and radius 4

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

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

REF: 061712geo

7 ANS:

center $(0,3)$ and radius $= 2\sqrt{2}$

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

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

REF: 011718geo

8 ANS:

 $(-3,2)$ and 6

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

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

REF: 011617geo

9 ANS:

center $(2,-4)$ and radius 3

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

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

REF: 081616geo

10 ANS:

 $(8,-3)$

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

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

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

REF: 011415a2

11 ANS:

5

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

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

REF: 081509geo

12 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