Circles

$$(x-h)^2 + (y-k)^2 = r^2$$

Center = (h, k)

Radius = $\sqrt{r^2}$

$$(x-2)^2 + (y+5)^2 = 16$$

Center = $(2, -5)$

Radius = $\sqrt{16} = 4$

$$x^2 + ax + y^2 + by = C$$
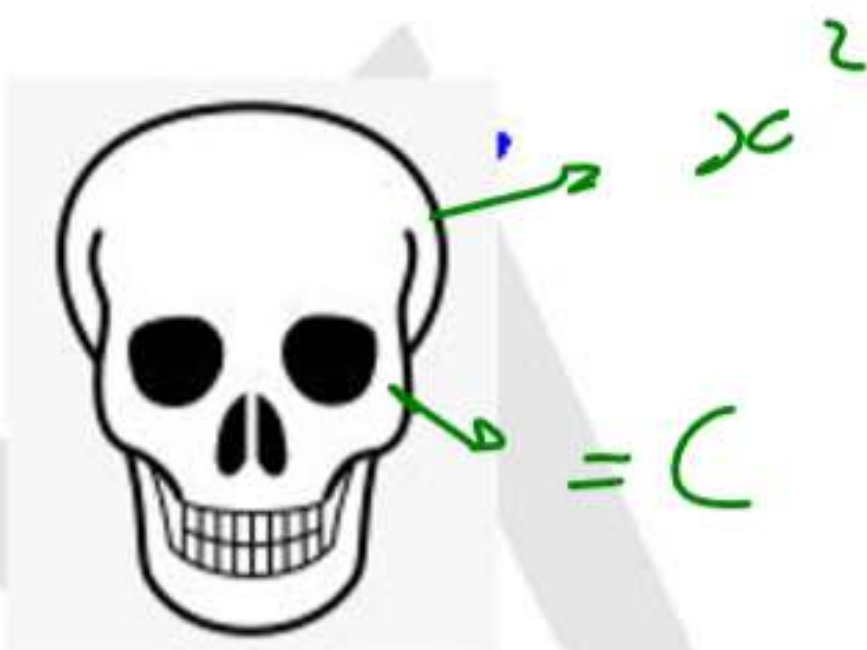
Center = $\left(\dfrac{a}{-2}, \dfrac{b}{-2}\right)$

Radius = $\sqrt{\left(\dfrac{a}{-2}\right)^2 + \left(\dfrac{b}{-2}\right)^2 + C}$

$$x^2 - 4x + y^2 + 10y = 7$$

Center = $\left(\dfrac{-4}{-2}, \dfrac{10}{-2}\right)$

Radius = $\sqrt{\left(\dfrac{-4}{-2}\right)^2 + \left(\dfrac{10}{-2}\right)^2 + 7}$

1

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

The equation above forms a circle when graphed in the *xy*-plane. What is the radius of the circle?

2

In the *xy*-plane, a circle has center $(0, 0)$ and radius 2. Which of the following is an equation of this circle?

A) $2x^2 + y^2 = 0$

B) $x^2 + y^2 = 4$

C) $(x + 2)^2 + (y + 2)^2 = 0$

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

3

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

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) $(20, 16)$

4

What is the radius of the circle in the *xy*-plane with equation $x^2 + y^2 = 25$?

$\sqrt{25} = 5$

5

Which of the following is an equation of a circle in the *xy*-plane with center $(3, -1)$ and a radius of 4?

A) $(x - 3)^2 + (y + 1)^2 = 4$ $= 4^2$

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

C) $(x + 1)^2 + (y - 3)^2 = 4$

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

6

In the *xy*-plane, the graph of

$$\frac{2x^2}{2} - \frac{6x}{2} + \frac{2y^2}{2} + \frac{2y}{2} = \frac{45}{2}$$ is a circle. What is the radius of the circle?

A) 5 $x^2 - 3x + y^2 + 1y = 22.5$

B) 6.5 $r = \sqrt{\left(\frac{-3}{-2}\right)^2 + \left(\frac{1}{-2}\right)^2 + 22.5}$

C) $\sqrt{40}$

D) $\sqrt{50}$ $= 5$

7

In the xy-plane, what is the x-coordinate of the center of the circle with equation

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

8

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

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

9

The graph of $x^2 - 4x + y^2 + 6y - 24 = 0$ in the xy-plane is a circle. What is the radius of the circle?

A) $2\sqrt{6}$

B) $\sqrt{11}$

$x^2 - 4x + y^2 + 6y = 24$

$r = \sqrt{\left(\frac{-4}{-2}\right)^2 + \left(\frac{6}{-2}\right)^2 \rightarrow 24}$

C) $\sqrt{37}$

D) $\sqrt{76}$

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Mode
5
1

a	b	c
)	1	8
)	-1	2

$x + y = 8$

$x - y = 2$

Find x 5

Cancel _____

$2x - y = 8$

$x - 2y = 1$

find x

Cancel 5

$1x + 1y = 8$

$1x - 1y = 2$

find y

Cancel 3 _____

$2x - y = 8$

$x - 2y = 1$

find y

Cancel 2

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1

$$4x + 3y = 11$$
$$3x + 2y = 7$$

Which ordered pair, (x, y), is the solution to the system of equations above?

~~A)~~ $(5, -1)$

B) $(3, 1)$

C) $(1, 2)$

(D) $(-1, 5)$

2

Mode 5 1

$$x + y = 7$$
$$x - y = 1$$

If (x, y) is the solution to the system of equations above, what is the value of x?

4

3

$$\begin{cases} -2x + 5y = 39 \\ 3x = -4y + 45 \end{cases}$$

$-2x + 5y = 39$
$3x + 4y = 45$

From the system of equations above, what is the value of $2x + 7y$?

x = 3
y = 9

A. -57

B. 15

C. 39

(D.) 69 $2(3) + 7(9) = 69$

4

$$2x + y = 8$$
$$x + 4y = 11$$

If the x- and y-coordinates of a point in the xy-plane satisfy the system of equations above, what is the value of $6x + 10y$?

5

$$2x + y = 5$$
$$x + y = 3$$

If (x, y) is the solution to the system of equations above, what is the value of $3x + 2y$?

A) 1

B) 2

C) 8

D) 15

6

$$\begin{cases} \dfrac{2}{3}x + y = -3 \\ \dfrac{x}{3} + \dfrac{y}{2} = -3 \end{cases}$$

What is the solution of the above system?

A. $(-6, 1)$

B. $(6, 9)$

C. $(6, -7)$

D. $\varnothing$

1

A library sells new and used books. If, out of the total of 474, there are twice as many new books as old ones. How many new books are there in the library?

Mode
S
1

A. 316
B. 158
C. 352
D. 238

$n + u = 474 \Rightarrow n + u = 474$
$n = 2u \Rightarrow n - 2u = 0$

$n = 316$
$u = 158$

2

The total revenue of a magic show is 16,360 EGP. If each adult ticket to attend the show cost 12 EGP and each children ticket cost 2 EGP, then what is the number of tickets of each type sold if 3,480 tickets in all were sold?

A. 930 adult tickets and 2,550 children tickets
B. 940 adult tickets and 2,540 children tickets
C. 955 adult tickets and 2,525 children tickets
D. 960 adult tickets and 2,520 children tickets

$a + C = 3480$
$12a + 2C = 16360$
_____
$a = 940$ $C = 2540$

Mode
S
1

3

A truck contains 15 identical boxes that are either red or blue.

The red box weighs 3 kg and the blue box weighs 2 kg.

If the total weight of the boxes is 36 kgs, what is the difference between the red and blue boxes in the truck?

A. 6
B. 9
C. 1
D. 3

4

Amina went to the flower shop and bought 2 roses and 5 daisies for 6 EGP. Lara bought from the same shop, 4 roses and 2 daisies for 4 EGP. How much should Ahmad pay to buy 2 roses and 2 daisies?

A. 1 EGP
B. 1.5 EGP
C. 2 EGP
D. 3 EGP

Mr. Kably

29

$$ax + by = C$$
$$dx + ey = f$$

no Sol: $\dfrac{a}{d} = \dfrac{b}{e}$

1 Sol: $\dfrac{a}{d} \neq \dfrac{b}{e}$

∞ Sol: $\dfrac{a}{d} = \dfrac{b}{e} = \dfrac{C}{f}$

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1

$$3x + 2y = 5$$
$$6x + ny = 12$$

In the system of equations above, n is a constant If the system has no solutions, what is the value of n ?

A) 2

B) 4

C) 6

D) 12

$$\frac{3}{6} = \frac{2}{n}$$

$$n = \frac{2 \times 6}{3} = 4$$

2

$$\begin{cases} 2x + 15y = 18 \\ kx - 5y = -7 \end{cases}$$

What is the value of k if the above system of simultaneous equations admits no solutions?

A. $-\frac{1}{3}$

B. -6

C. $-\frac{2}{3}$

D. $\frac{2}{3}$

$$\frac{2}{k} = \frac{15}{-5}$$

$$k = \frac{2x-5}{15} = -\frac{1}{3}$$

3

$$3x + 7y = 14$$
$$ax + 28y = 56$$

In the system of the equation above, a is a constant. If the system has infinitely many solutions, what is the value of a?

A) 2

B) 3

C) 4

D) 12

$$\frac{3}{a} = \frac{7}{28} = \frac{14}{56}$$

$$a = \frac{3 \times 28}{7} = 12$$

4

$$2x + 3y = 5$$
$$4x + cy = 8$$

In the system of equations above, c is a constant. For what value of c will there be no solution (x, y) to the system of equations?

A) 3

B) 4

C) 5

D) 6

5

$$6x - 8y = 24$$

$$-\frac{2}{3}x + \frac{8}{9}y = m$$

In the system of equations above, m is a constant. If the system has more than one solution, what is the value of m?

A) $-\frac{8}{3}$

B) $-\frac{1}{3}$

C) $\frac{2}{3}$

D) $\frac{8}{3}$

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Mode
2

$i = \sqrt{-1}$ ~~(crossed out)~~

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$

$i^{\boxed{0} + 4}$

i

$i^{7-4} = i^3 = -i$

$i^{-2+4} = i^2 = -1$

$i^{15-12} = i^3 = -i$

$(5-i)(2+i)$

(-1)

$10 + 5i - 2i - i^2$

$10 + 5i - 2i + 1$

$11 + 3i$

$\dfrac{2+i}{5+i} \times \underline{\quad\quad}$

$\sqrt{-1} = i$

1

$2+3i \quad -4 \quad -5i+6$

$2 + 3i + \boxed{4i^2} + 5i^3 + 6i^4 \quad 6(1)$

If the expression above is equivalent to $a + bi$, where a and b are constants, what is the value of $a + b$? (Note $i = \sqrt{-1}$)

A) 2
B) 6
C) 10
D) 12

$a + bi = 4 - 2i$

$a = 4$

$b = -2$

$a + b$
$4 + (-2) = 2$

2

$(-1)(-5) = 5$

$(-3+2)(-3-2)$

$(3i^2+2)(3i^2-2)$

The expression shown above can be written as the complex number $ai+b$, where a and b are real numbers. What is the value of $a+b$?
(Note $i = \sqrt{-1}$)

5

3

If the expression $\dfrac{-2i-i^3}{1+3i}$ is written in the form $a+bi$ where a and b are real numbers and $i = \sqrt{-1}$, what is the value of $b - a$?

$\dfrac{-3}{10} - \dfrac{1}{10}i$

$a = \dfrac{-3}{10}, \ b = \dfrac{-1}{10}$

$b - a = -\dfrac{1}{10} - \left(\dfrac{-3}{10}\right)$

$= \dfrac{1}{5}$

4

In the complex number system, what is the value of the expression $16i^4 - 8i^2 + 4$? (Note: $i = \sqrt{-1}$)

5

Which of the following is equal to $(5 + 2i)(5 - 2i)$? (Note: $i = \sqrt{-1}$)

A) 21
B) 29
C) $21 - 20i$
D) $29 + 20i$

6

For $i = \sqrt{-1}$, which of the following is equivalent to $\dfrac{2i - 3}{i - 5}$?

A. $\dfrac{13 - 7i}{24}$
B. $\dfrac{13 - 13i}{24}$
C. $\dfrac{17 - 7i}{26}$
D. $\dfrac{17 - 13i}{24}$

Mr. Kably

33

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$a^2 - b^2 = (a-b)(a+b)$$

$$a^2 + b^2$$ ~~(crossed out)~~

$$a^2 - b^2 = 20, \quad a - b = 5$$

$$a + b = \text{_____}$$

$$(a-b)(a+b) = 20$$

$$5(a+b) = \frac{20}{5}$$

$$\boxed{a + b = 4}$$

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1

$$a^2 - b^2 = (a-b)(a+b)$$

$$(2x+3)(2x-3)$$

$$4x^2 - 9 = (px + t)(px - t)$$

In the equation above, p and t are constants. Which of the following could be the value of p ?

A) 2

B) 3

C) 4

D) 9

2

If $a^2 + b^2 = 20$ and $ab = 8$, then what is $(b - a)^2$?

(Grid in)

$$a^2 - 2ab + b^2$$

$$20 - 2(8) = 20 - 16$$

$$(4)$$

3

If $a^2 - b^2 = 21$ and $a - b = 3$, what is the value of $a \div b$?

4

$$4x^5 - 16x^3y^2 + 16xy^4$$

Which of the following is equivalent to the expression shown above?

A. $x(2x^2 - 2y)^2$

B. $x^2(2x^2 - 2y^2)^2$

C. $x(2x^2 - 4y^2)^2$

D. $x(4x^2 - 4y^2)^2$

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