

# **JD's** Regents Preparation

-Presents-

## **ALGEBRA I NEXT GENERATION LEARNING STANDARDS**

A REVIEW OF RADICALS  
AND  
SYSTEMS OF LINEAR AND  
QUADRATIC EQUATIONS

*Each Question Linked to a Solution Video*

# IRRATIONAL VALUES

1. Is the product of  $\sqrt{16}$  and  $\frac{4}{7}$  rational or irrational? Explain your reasoning.

06 2018 31



2. A teacher wrote the following set of numbers on the board:

$$a = \sqrt{20} \quad b = 2.5c = \sqrt{225}$$

Explain why  $a + b$  is irrational, but  $b + c$  is rational.

08 2017 25



3. State whether  $7 - \sqrt{2}$  is rational or irrational. Explain your answer.

06 2017 27



4. Is the sum of  $3\sqrt{2}$  and  $4\sqrt{2}$  rational or irrational? Explain your answer.

08 2016 29



5. Determine if the product of  $3\sqrt{2}$  and  $8\sqrt{18}$  is rational or irrational. Explain your answer.

06 2016 26



# RADICALS

1. Simplify the following radical expressions.

a)  $\sqrt{144x^2y^{20}c^{14}}$

b)  $\sqrt{12a^7b^8z^{19}}$

Radicals 01



2. Simplify the following radical expressions.

a)  $\sqrt{64a^{16}b^{18}c^6}$

b)  $\sqrt{54a^{10}b^9z^{11}}$

Radicals 02



3. Add or subtract the following expressions as indicated.

a)  $5a\sqrt{14} + 6a\sqrt{14}$

b)  $2x\sqrt{50x} - 3x\sqrt{8x}$

Radicals 03



4. Add or subtract the following expressions as indicated.

a)  $\sqrt{20} + 3\sqrt{5}$

b)  $2xy\sqrt{12x^5} - 5x^3\sqrt{3xy^2}$

Radicals 04



5. Multiply the following expressions.

a)  $\sqrt{6x^2} \cdot x\sqrt{2}$

b)  $\sqrt{5y^2} \cdot \sqrt{6y^3}$

Radicals 05



6. Multiply the following expressions.

a)  $\sqrt{10x} \cdot \sqrt{8x^2}$

b)  $\sqrt{3xy^4} \cdot \sqrt{6xy^3}$

Radicals 06



7. Rationalize the denominator.

a)  $\frac{5}{\sqrt{2}}$

b)  $\frac{4}{\sqrt{3x}}$

c)  $\frac{4}{5+\sqrt{3}}$

Radicals 07



8. Rationalize the denominator.

a)  $\sqrt{\frac{8}{3}}$

b)  $\frac{5+\sqrt{2}}{2-\sqrt{3}}$

Radicals 08



9. Rationalize the denominator.

a)  $\frac{4}{\sqrt{5a}}$

b)  $\frac{5}{7-\sqrt{2}}$

Radicals 09



# RADICALS AND EQUATIONS

1. Solve the following equation.

$$\sqrt{x + 5} - 1 = 2$$

Radicals EQ01



2. Solve the following equation.

$$\sqrt{x - 2} + 9 = 7$$

Radicals EQ02



3. Solve the following equation.

$$\sqrt{x + 12} = x$$

Radicals EQ03



4. Solve the following equation.

$$\sqrt{x + 10} + 2 = x$$

Radicals EQ04



5. Solve the following equation using the square root method.

$$x^2 - 25 = 0$$

Radicals EQ054



6. Solve the following equation using the square root method.

$$2x^2 - 7 = -15$$

Radicals EQ06



7. Solve the following equation using the square root method.

$$(2x + 8)^2 = 27$$

Radicals EQ07



8. Solve the following equation using the square root method.

$$(8x - 3)^2 + 4 = 9$$

Radicals EQ08



9. Solve the following equation using the square root method.

$$(2x + 1)^2 - 2 = 23$$

Radicals EQ09

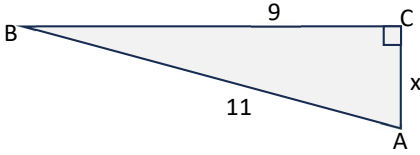


# PYTHAGOREAN EQUATIONS

Solve the following using the Pythagorean Theorem.

Approximate decimal solution rounded to the nearest tenth

1. Solve for  $x$  in right triangle ABC below.



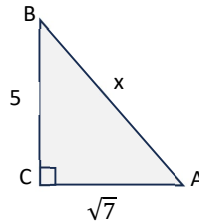
PYEQ 01



Solve the following using the Pythagorean Theorem.

State solution in simplest radical form.

2. Solve for  $x$  in right triangle ABC



PYEQ 02



Solve the following using the Pythagorean Theorem.

Approximate decimal solution rounded to the nearest tenth

3. In right triangle ABC if side  $a = 5$ , and side  $c = 8$  find side  $b$ .

PYEQ 03



Solve the following using the Pythagorean Theorem.

State solution in simplest radical form.

4. Find the hypotenuse in right triangle ABC given side  $a = 5$ , and side  $b = 10$ .

PYEQ 04



5. A rope from the top of a circus tent pole is 70 feet long and is anchored to the ground 60 feet from the bottom of the pole. How tall is the pole? Round to nearest whole number.

PYEQ 05



# SOLVING SYSTEMS

1. What is the solution set of the following system of equations?

$$y = 3x + 6$$

$$y = (x + 4)^2 - 10$$

1)  $\{(-5, -9)\}$

2)  $\{(5, 21)\}$

3)  $\{(0, 6), (-5, -9)\}$

4)  $\{(0, 6), (5, 21)\}$

2. Solve Algebraically.

$$5x + y = -10$$

$$x^2 - 6x - 16 = y$$

3. Solve Algebraically.

$$9x - y = 9$$

$$y = -x^2 - 10x - 9$$

4. Solve Algebraically.

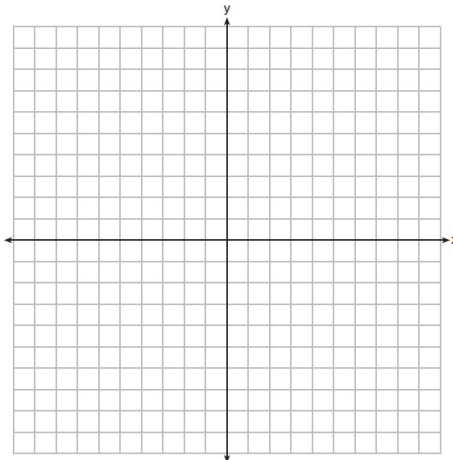
$$2x - y = -5$$

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

5. Solve Graphically.

$$x + y = -10$$

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



06 2019 03



Systems 01



Systems 02



Systems 03



Systems 04

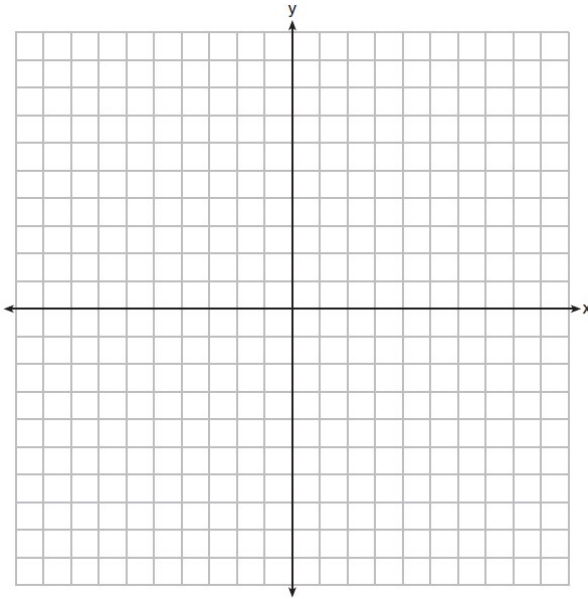




6. Solve Graphically.

$$3x - y = 13$$

$$x^2 - 6x + 5 = y$$



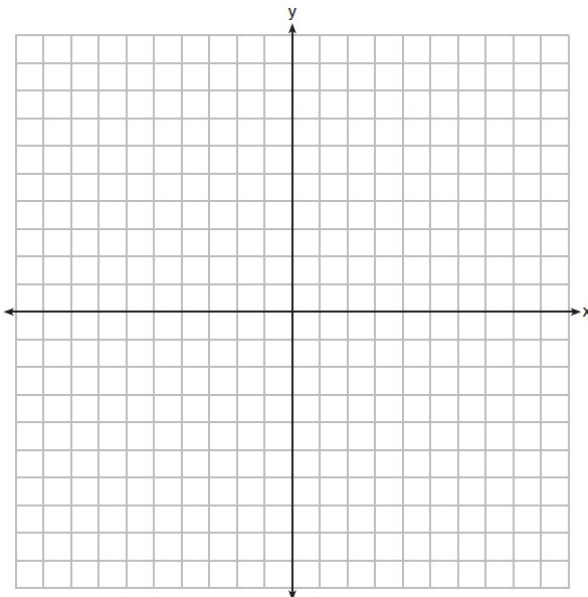
Systems 06



7. Solve Graphically.

$$2x + y = 5$$

$$y = -x^2 + 4x - 3$$



Systems 07



## Irrational Values

1. The product  $\frac{16}{7}$  is a rational value as per the definition, 2 numbers that can be expressed as a ratio/fraction of two integers.

2.  $a + b \approx 6.972\dots$  the result is an irrational value, a non-terminating, non-repeating decimal that cannot be written as a ratio/fraction of two integers.

$b + c = 17.5$  or  $\frac{35}{2}$ , the result is a rational value, a terminating decimal that can be written as a ratio/fraction of two integers.

3.  $7 - \sqrt{2} \approx 5.5858\dots$  the result is an irrational value, a non-terminating, non-repeating decimal that cannot be written as a ratio/fraction of two integers.

4.  $7\sqrt{2} \approx 9.899\dots$  the result is an irrational value, a non-terminating, non-repeating decimal that cannot be written as a ratio/fraction of two integers.

5. 144 is a real, rational value. It can be written as a ratio/fraction of two integers.

## Simplifying Radicals

1a.  $12xy^{10}c^7$

b.  $2a^3b^4z^9\sqrt{3az}$

2a.  $8a^8b^9c^3$

b.  $3a^5b^4z^5\sqrt{6bz}$

3a.  $11a\sqrt{14}$

b.  $4x\sqrt{2x}$

4a.  $5\sqrt{5}$

b.  $-x^3y\sqrt{3x}$

5a.  $2x^2\sqrt{3}$

b.  $y^2\sqrt{30y}$

6a.  $4x\sqrt{5x}$

b.  $3xy^3\sqrt{2y}$

7a.  $\frac{5\sqrt{2}}{2}$

b.  $\frac{4\sqrt{3x}}{3x}$

c.  $\frac{10-2\sqrt{3}}{11}$

8a.  $\frac{2\sqrt{6}}{3}$

b.  $10 + 5\sqrt{3} + 2\sqrt{2} + \sqrt{6}$

9a.  $\frac{4\sqrt{5a}}{5a}$

b.  $\frac{35 + \sqrt{2}}{47}$

## Radicals in Equations

1.  $x = 4$
2.  $x = 6$ ; Does not check.
3.  $x = 4$  and  $x = -3$ ;  $x = -3$  does not check.
4.  $x = 6$  and  $x = -1$ ;  $x = -1$  does not check.
5.  $x = \pm 5$
6.  $x = \pm 2i$ ; No solution.
7.  $\frac{-8 \pm 3\sqrt{3}}{2}$
8.  $\frac{3 \pm \sqrt{5}}{8}$
9.  $x = 2$  and  $x = -3$

## Pythagorean Equations

1. 6.3
2.  $4\sqrt{2}$
3. 6.2
4.  $5\sqrt{5}$
5. 36 feet

## Solving Systems

1. 3.  $(0, 6), (-5, -9)$
2.  $(-2, 0), (3, -25)$
3.  $(-19, -180), (0, -9)$
4.  $(0, 5), (2, 9)$
5.  $(-2, -8), (-1, -9)$
6.  $(2, 1), (4, -3)$
7.  $(6, 5), (3, -4)$

