

For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question.

1.

The function $f(x) = \frac{x-3}{x^2+2x-8}$ is undefined when x equals

- (1) 2 or -4
(2) 4 or -2
(3) 3, only
(4) 2, only

$$x^2 + 2x - 8 = 0$$

$$(x+4)(x-2) = 0$$

-4, 2

2.

Which expression is equivalent to $(3k - 2i)^2$, where i is the imaginary unit?

- (1) $9k^2 - 4$
(2) $9k^2 + 4$
(3) $9k^2 - 12ki - 4$
(4) $9k^2 - 12ki + 4$

$$(3k - 2i)(3k - 2i)$$

$$9k^2 - 12ki + 4i^2$$

$$9k^2 - 12ki - 4$$

3.

The roots of the equation $x^2 + 2x + 5 = 0$ are

- (1) -3 and 1
(2) -1, only
(3) $-1 + 2i$ and $-1 - 2i$
(4) $-1 + 4i$ and $-1 - 4i$

$$x = \frac{-2 \pm \sqrt{4 - 4(1)(5)}}{2}$$

4.

The solution set for the equation $\sqrt{x+14} - \sqrt{2x+5} = 1$ is

- (1) {-6}
(2) {2}
(3) {18}
(4) {2, 22}

$$-1 \pm \frac{4i}{2}$$

Chk Choices!

5. $\sqrt{2+14} - \sqrt{2 \cdot 2 + 5} = 1$

Which equation represents a parabola with the focus at $(0, -1)$ and the directrix $y = 1$?

- (1) $x^2 = -8y$
(2) $x^2 = -4y$
(3) $x^2 = 8y$
(4) $x^2 = 4y$

$$-4(y) = \left(-\frac{1}{4}x^2\right) \cdot -4$$

$$-4y = x^2$$

6.

What are the zeros of $P(m) = (m^2 - 4)(m^2 + 1)$?

- (1) 2 and -2, only
(2) 2, -2, and -4
(3) -4, i , and $-i$
(4) 2, -2, i , and $-i$

$$m^2 - 4 = 0 \quad | \quad m^2 + 1 = 0$$

$$(m-2)(m+2) = 0 \quad | \quad m^2 = -1$$

$$m = \pm 2 \quad | \quad m = \pm \sqrt{-1}$$

$$m = \pm i$$

7.

A polynomial equation of degree three, $p(x)$, is used to model the volume of a rectangular box. The graph of $p(x)$ has x intercepts at -2 , 10 , and 14 . Which statements regarding $p(x)$ could be true?

- (4)
 A. The equation of $p(x) = (x - 2)(x + 10)(x + 14)$.
 B. The equation of $p(x) = -(x + 2)(x - 10)(x - 14)$.
 C. The maximum volume occurs when $x = 10$.
 D. The maximum volume of the box is approximately 56.

Put in Calc.

graph $p(x)$ in calc and do 2nd calc max.

- (1) A and C
 (2) A and D

~~(3) B and C~~
~~(4) B and D~~

8.

Which expression is equivalent to $\frac{4x^3 + 9x - 5}{2x - 1}$, where $x \neq \frac{1}{2}$?

- (1) $2x^2 + x + 5$
 (2) $2x^2 + \frac{11}{2} + \frac{1}{2(2x - 1)}$
 (3) $2x^2 - x + 5$
 (4) $2x^2 - x + 4 + \frac{1}{2x - 1}$

$$\begin{array}{r} 2x^2 + x + 5 \\ 2x - 1 \overline{) 4x^3 + 0x^2 + 9x - 5} \\ \underline{-4x^3 - 2x} \\ 2x^2 + 9x - 5 \\ \underline{-2x^2 - 1x} \\ 10x - 5 \\ \underline{-10x - 5} \\ 0 \end{array}$$

9.

Which binomial is *not* a factor of the expression $x^3 - 11x^2 + 16x + 84$?

- (1) $x + 2$
 (2) $x + 4$
 (3) $x - 6$
 (4) $x - 7$

Plug in Calc

$$\begin{array}{r} 10x - 5 \\ \underline{-10x - 5} \\ 0 \end{array}$$

10.

The expression $6xi^3(-4xi + 5)$ is equivalent to

- (1) $2x - 5i$
 (2) $-24x^2 - 30xi$
 (3) $-24x^2 + 30x - i$
 (4) $26x - 24x^2i - 5i$

$$-24x^2 \cdot i^4 + 30xi^3$$

11.

The solution to the equation $4x^2 + 98 = 0$ is

- (1) ± 7
 (2) $\pm 7i$
 (3) $\pm \frac{7\sqrt{2}}{2}$
 (4) $\pm \frac{7i\sqrt{2}}{2}$

$$\frac{-98}{4} = x^2$$

$$\pm \sqrt{\frac{-98}{4}} = x$$

$$\pm \sqrt{\frac{-49}{2}} = x = \frac{\pm 7\sqrt{-1}}{\sqrt{2}} = \frac{\pm 7i\sqrt{2}}{2}$$

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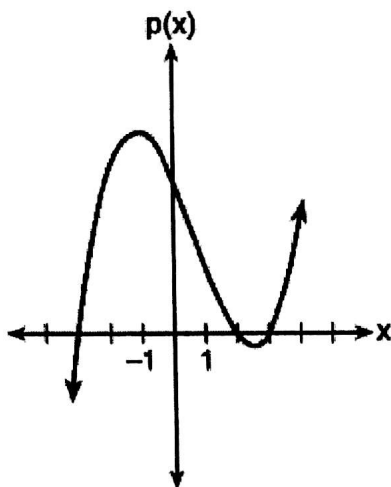
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Key

Algebra 2 – Rational/Radicals Summary

12.

The graph of the function $p(x)$ is sketched below.



Which equation could represent $p(x)$?

(1) $p(x) = (x^2 - 9)(x - 2)$

(2) $p(x) = x^3 - 2x^2 + 9x + 18$

(3) $p(x) = (x^2 + 9)(x - 2)$

(4) $p(x) = x^3 + 2x^2 - 9x - 18$

$x^2(x^2-4) - 4(x-2)$ factor by grouping does not work.

13.

Which binomial is a factor of $x^4 - 4x^2 - 4x + 8$?

(1) $x - 2$

(3) $x - 4$

(2) $x + 2$

(4) $x + 4$

14.

For $x \neq 0$, which expressions are equivalent to one divided by the sixth root of x ?

$\frac{1}{\sqrt[6]{x}} = x^{-1/6}$

I. $\frac{\sqrt[6]{x}}{\sqrt[3]{x}}$

II. $\frac{x^{1/6}}{x^{1/3}}$

III. $x^{-1/6}$

$\frac{x^{1/6}}{x^{1/3}} = \frac{x^{1/6}}{x^{2/6}} = x^{-1/6}$

(1) I and II, only

(3) II and III, only

(2) I and III, only

(4) I, II, and III

15.

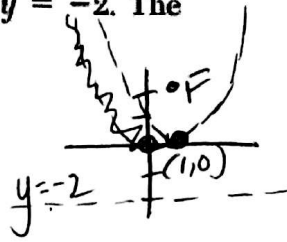
A parabola has its focus at (1,2) and its directrix is $y = -2$. The equation of this parabola could be

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

(3) $y = 8(x - 1)^2$

(2) $y = \frac{1}{8}(x + 1)^2$

(4) $y = \frac{1}{8}(x - 1)^2$



$p = 2$

~~$y = 8(x-1)^2$~~
 $y = \frac{1}{8}(x-1)^2$

For each statement or question, show all work necessary to earn credit.

1.

Explain how $(-8)^{\frac{4}{3}}$ can be evaluated using properties of rational exponents to result in an integer answer.

$\sqrt[3]{-8}^4$ ← Write as a radical
 $(-2)^4 = \boxed{16}$

2.

Given $r(x) = x^3 - 4x^2 + 4x - 6$, find the value of $r(2)$.

$$\begin{aligned} r(2) &= 2^3 - 4(2)^2 + 4(2) - 6 \\ &= 8 - 16 + 8 - 6 \\ &= \boxed{-6} \end{aligned}$$

What does your answer tell you about $x - 2$ as a factor of $r(x)$? Explain.

$x - 2$ is not a factor of $r(x)$ b/c we get a remainder of -6 and not 0 .

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Algebra 2 - Rational/Radicals Summary

Key

3.

Over the set of integers, factor the expression $4x^3 - x^2 + 16x - 4$ completely.

$$x^2(4x-1) + 4(4x-1)$$
$$(x^2+4)(4x-1)$$

4.

Solve algebraically for all values of x:

* Must Always
chk radical eqns
for "extraneous"
roots.

$$\sqrt{x-4} + x = 6$$
$$\sqrt{x-4} = (6-x)$$
$$x-4 = (6-x)^2$$
$$x-4 = 36 - 12x + x^2$$
$$x^2 - 13x + 40 = 0$$

$$(x-8)(x-5) = 0$$
$$x = 8, 5$$
$$5$$

5.

Write $\sqrt[3]{x} \cdot \sqrt{x}$ as a single term with a rational exponent.

$$x^{\frac{1}{3}} \cdot x^{\frac{1}{2}} = x^{\frac{1}{3} + \frac{1}{2}} = x^{\frac{2}{6} + \frac{3}{6}} = x^{\frac{5}{6}}$$

M^ad^sp^m

6.

Algebraically determine whether the function $f(x) = x^4 - 3x^2 - 4$ is odd, even, or neither.

$$f(-x) = (-x)^4 - 3(-x)^2 - 4$$
$$= x^4 - 3x^2 - 4$$

fn stays same
∴ Even

Even
When $f(-x) = f(x)$

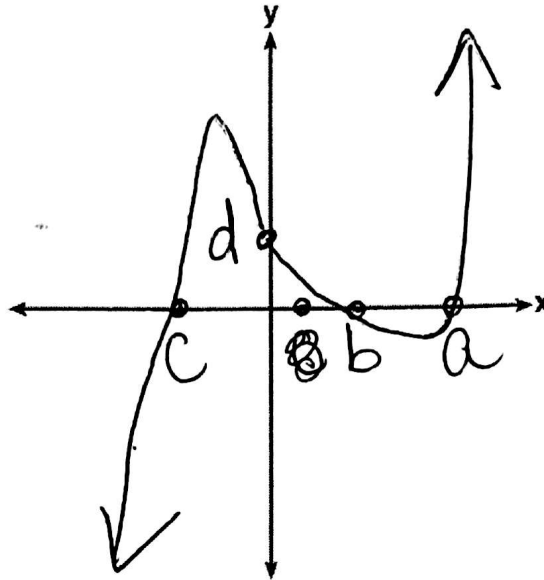
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Algebra 2 - Rational/Radicals Summary

7.

On the axes below, sketch a possible function $p(x) = (x - a)(x - b)(x + c)$, where a, b , and c are positive, $a > b$, and $p(x)$ has a positive y -intercept of d . Label all intercepts.



8.

Solve for all values of p : $\left[\frac{3p}{p-5} - \frac{2}{p+3} = \frac{p}{p+3} \right] \frac{(p+3)(p-5)}{1}$

Excluded Values
←
 $p \neq 5, -3$

$$3p(p+3) - 2(p-5) = p(p-5)$$

$$3p^2 + 9p - 2p + 10 = p^2 - 5p$$

$$2p^2 + 12p + 10 = 0$$

$$2(p^2 + 6p + 5) = 0$$

$$2(p+1)(p+5) = 0$$

$P = -1, -5$

← Both good answers