

Aug 20-9:55 AM

Algebra 2 CC Name \_\_\_\_\_ ID: 1

Polynomial Division & Complex Roots (Day 2) Date \_\_\_\_\_ Period \_\_\_\_\_

**Simplify.**

1) $(6 + 5i)(2 - 7i)$	2) $(-i)(-4i)(5 - i)$
3) $(8 + 4i)(8 + 8i)$	4) $(-5 - 4i)^2$
5) $-2 + (-6 + 4i) - 2$	6) $(-3 - 4i) - (7 + 2i)$
7) $(-8 + 7i) + (7 - 7i)$	8) $(-8 - 4i) + (7 - 5i)$

**Find all zeros.**

9) $f(x) = 3x^4 + x^3 - 3x^2 - x$	10) $f(x) = 5x^4 - 42x^2 + 16$
11) $f(x) = 5x^3 - 29x^2 + 19x + 5$	12) $f(x) = 4x^5 - 2x^4 + 14x^3 - 7x^2 - 8x + 4$

Find all zeros.

9)  $f(x) = 3x^4 + x^3 - 3x^2 - x + 0$       10)  $f(x) = 5x^4 - 42x^2 + 16$

$3 \quad 1 \quad -3 \quad -1 \quad 0$

$\frac{p}{q} = \frac{\pm 0}{\pm 1, 3} = 0$

$x=0$

3	1	-3	-1	0
↓	0	0	0	0
3x <sup>3</sup>	1x <sup>2</sup>	-3x	-1	0

*constant*

$3x^3 + x^2 - 3x - 1$        $\frac{p}{q} = \frac{\pm 1}{\pm 1, \pm 3}$

$x=1$

3	1	-3	-1
↓	3	4	1
3x <sup>2</sup>	4x	1	0

*constant*

$3x^2 + 4x + 1 \Rightarrow X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\begin{matrix} \nearrow & & \nearrow \\ 3+1=4 & & \begin{matrix} 3(1) \\ =3 \\ 3 \cdot 1=3 \end{matrix} \end{matrix}$

$\left(\frac{3x+3}{3}\right)\left(\frac{3x+1}{1}\right)$

$(x+1)(3x+1)$

$x=-1 \quad x=-\frac{1}{3}$

Aug 20-12:37 PM

5)  $-2 + (-6 + 4i) - 2$

$-2 + (-6 + 4i) - 2$

$\boxed{-2 - 6} + 4i \boxed{-2}$

$-10 + 4i$

6)  $(-3 - 4i)(7 + 2i)$

$-3 - 4i - 7 - 2i$

$-10 - 6i$

Aug 20-12:33 PM

Simplify.

1)  $(6 + 5i)(2 - 7i)$

$$(6 + 5i)(2 - 7i)$$

$$12 - 42i + 10i - 35i^2$$

$$12 - 32i - 35i^2$$
$$-35(-1)$$

$$12 - 32i + 35$$

$$47 - 32i$$

2)  $(-i)(-4i)(5 - i)$

$$i = \sqrt{-1}$$

$$(i)^2 = (\sqrt{-1})^2 = -1$$

$$i^2 = -1$$

$$i^3 = i^2 \cdot i$$

$$= -1 \cdot i$$

$$= -i$$

$$i^4 = (-1)(-1) = 1$$
$$i^4 \cdot i^2$$

Aug 20-12:27 PM

2)  $(-i)(-4i)(5 - i)$

$$[(-i)(-4i)](5 - i)$$

$$(4i^2)(5 - i)$$

$$(4(-1))(5 - i)$$

$$-4(5 - i)$$

$$-20 + 4i$$

$$(4i^2)(5 - i)$$

$$20i^2 - 4i^3$$

$$20(-1) - 4(-i)$$

$$-20 + 4i$$

Aug 20-12:30 PM

**Simplify.**

1)  $(6 + 5i)(2 - 7i)$

2)  $(-i)(-4i)(5 - i)$

3)  $(8 + 4i)(8 + 8i)$

4)  $(-5 - 4i)^2$

Aug 20-12:04 PM

5)  $-2 + (-6 + 4i) - 2$

6)  $(-3 - 4i) - (7 + 2i)$

7)  $(-8 + 7i) + (7 - 7i)$

8)  $(-8 - 4i) + (7 - 5i)$

Aug 20-12:04 PM

Find all zeros.

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

10)  $f(x) = 5x^4 - 42x^2 + 16$

Aug 20-12:04 PM

Find all zeros.

9)  $f(x) = 3x^4 + x^3 - 3x^2 - x + 0$       10)  $f(x) = 5x^4 - 42x^2 + 16$

$\frac{p}{q} = \frac{\pm 0}{1, 3}$

$x=0$  ↓

3	1	-3	-1	0
↓	0	0	0	0

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$3x^3 \mid x^2 - 3x - 1 \mid 0$

$3x^3 + x^2 - 3x - 1$

$x=1$  ↓

3	1	-3	-1
↓	3	4	1

---

$3x^2 \mid 4x \mid 1 \mid 0$

$3x^2 + 4x + 1$

constant

$\frac{p}{q} = \frac{\pm 1}{\pm 1, 3}$   
 $= \pm 1, \pm \frac{1}{3}$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

↑      ↓

$1+3=4$        $3(1)=3$   
 $1 \cdot 3=3$        $1 \cdot 3=3$

$\frac{(3x+3)(3x+1)}{3 \cdot 1}$

$(x+1)(3x+1)$

$x=-1$        $x=-\frac{1}{3}$

Aug 20-9:38 AM



$$2) (-i)(-4i)(5-i)$$

$$[(-i)(-4i)](5-i)$$

$$(4i^2)(5-i) \Rightarrow 20i^2 - 4i^3$$

$$(-4)(5-i) \quad -20 + 4i$$

$$-20 + 4i$$

Aug 20-9:32 AM

Find all <sup>roots</sup> zeros.

9)  $f(x) = 3x^4 + x^3 - 3x^2 - x + \text{constant}$  10)  $f(x) = 5x^4 - 42x^2 + 16$

$p = 0$

$\frac{p}{q} = 0$

$x = 0 \mid \begin{array}{cccccc} 3 & 1 & -3 & -1 & 0 \\ \downarrow & 0 & 0 & 0 & 0 \\ \hline 3x^3 & 1x^2 & -3x & -1 & 0 \end{array}$

$\frac{p}{q} = \frac{1}{1, 3}$   
 $\pm 1, \frac{1}{3}$

$x = 1 \mid \begin{array}{cccc} 3 & 1 & -3 & -1 \\ \downarrow & 3 & 4 & 1 \\ \hline 3x^2 & 4x & 1 & 0 \end{array}$

$\frac{p}{q} = \frac{1}{1, 3}$   
 $\pm 1, \frac{1}{3}$

$\begin{array}{c} 3x^2 + 4x + 1 \\ \uparrow \quad \downarrow \quad \uparrow \\ 3+1=4 \quad 3 \cdot 1=3 \end{array}$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\frac{(3x+3)(3x+1)}{3 \quad 1}$

$(x+1)(3x+1)$

$x = -1 \quad x = -\frac{1}{3}$

Aug 20-8:36 AM

$$10) f(x) = 5x^4 - 42x^2 + 16$$

$$5x^4 + 0x^3 - 42x^2 + 0x + 16$$

$$P/Q = \pm \frac{1, 2, 4, 8, 16}{1, 5}$$

$\sqrt{\quad}$  ;  $x^4 = \pm \frac{1}{5}, \frac{2}{5}, \frac{4}{5}, \frac{8}{5}, \frac{16}{5}$

Fraction

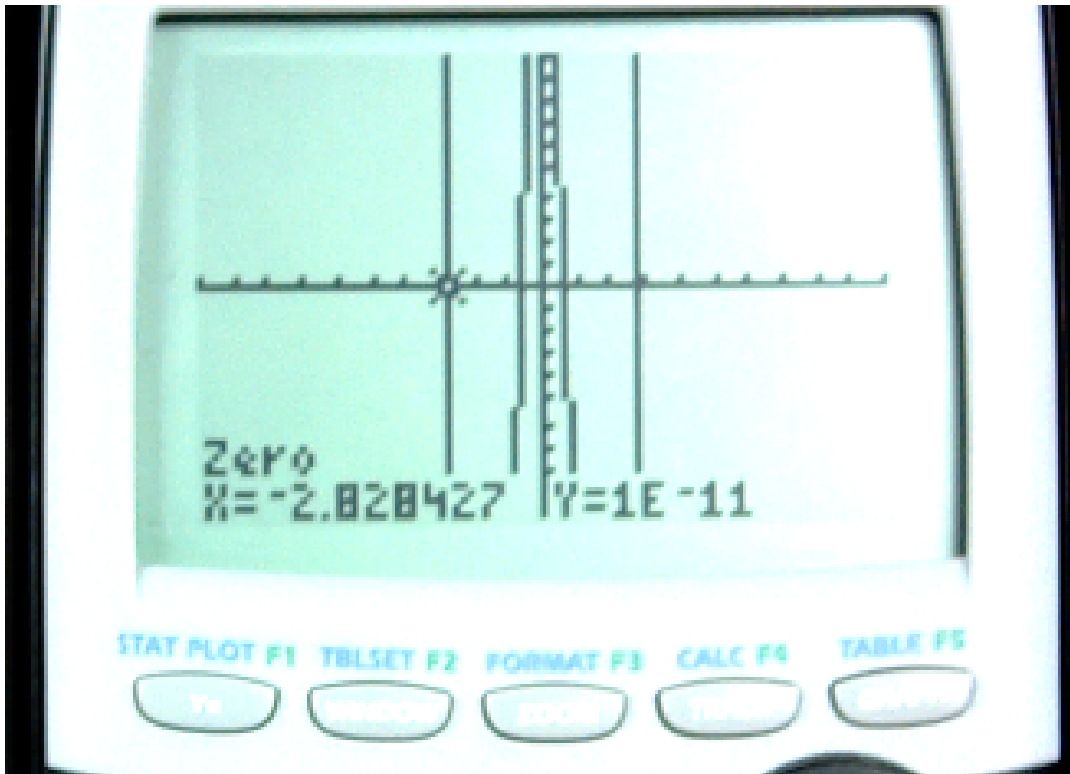
$$x =$$

$$x =$$

$$x =$$

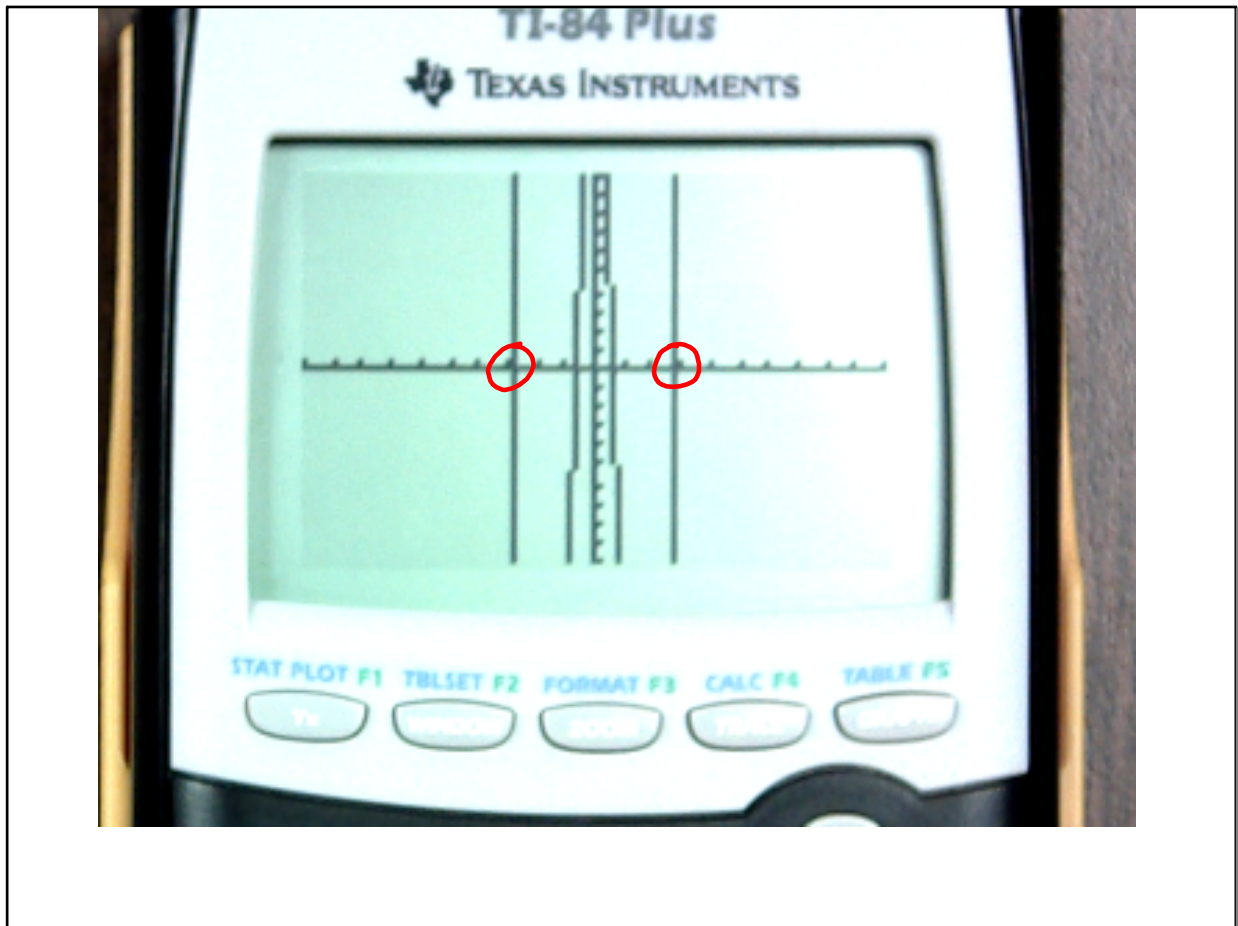
$$x =$$

Aug 20-8:43 AM



Aug 20-8:51 AM





Aug 20-8:46 AM

5)  $-2 + (-6 + 4i) - 2$

6)  $(-3 - 4i) - (7 + 2i)$

7)  $(-8 + 7i) + (7 - 7i)$

8)  $(-8 - 4i) + (7 - 5i)$

$$5) \quad -2 \oplus (-6 + 4i) - 2$$

ADDING

$$\begin{array}{c} (-2 - 6) + 4i - 2 \\ -8 \end{array}$$

$$-10 + 4i$$

$$\begin{array}{c} (-8 - 4i) \oplus (7 - 5i) \\ (-8 - 4i) + (7 - 5i) \\ -1 - 9i \end{array}$$

Aug 20-8:33 AM



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**Simplify.**

1)  $(6 + 5i)(2 - 7i)$   
 $47 - 32i$

2)  $(-i)(-4i)(5 - i)$   
 $-20 + 4i$

3)  $(8 + 4i)(8 + 8i)$   
 $32 + 96i$

4)  $(-5 - 4i)^2$   
 $9 + 40i$

5)  $-2 + (-6 + 4i) - 2$   
 $-10 + 4i$

6)  $(-3 - 4i) - (7 + 2i)$   
 $-10 - 6i$

7)  $(-8 + 7i) + (7 - 7i)$   
 $-1$

8)  $(-8 - 4i) + (7 - 5i)$   
 $-1 - 9i$

**Find all zeros.**

9)  $f(x) = 3x^4 + x^3 - 3x^2 - x$   
 $\left\{0, 1, -\frac{1}{3}, -1\right\}$

10)  $f(x) = 5x^4 - 42x^2 + 16$   
 $\left\{2\sqrt{2}, -2\sqrt{2}, \frac{\sqrt{10}}{5}, -\frac{\sqrt{10}}{5}\right\}$

11)  $f(x) = 5x^3 - 29x^2 + 19x + 5$   
 $\left\{5, -\frac{1}{5}, 1\right\}$   
 $x = 5$   
 $x = 1$   
 $x = -\frac{1}{5}$

12)  $f(x) = 4x^3 - 2x^2 + 14x^3 - 7x^2 - 8x + 4$   
 $\left\{\frac{1}{2}, \frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}, 2i, -2i\right\}$   $\frac{3}{2}$

11)  $f(x) = 5x^3 - 29x^2 + 19x + 5$

$\left\{5, -\frac{1}{5}, 1\right\}$

$x = 5$

$x = 1$

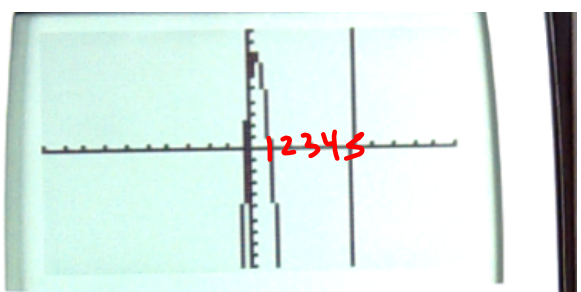
$x = -\frac{1}{5}$

$y =$

clear

$5x \square 3 \square -29 \dots$

graph



54  
27  
 $12x^3 \dots 144$

$x = 5$

$x = 1$

Aug 19-12:56 PM

11)  $f(x) = 5x^3 - 29x^2 + 19x + 5$

$\left\{5, -\frac{1}{5}, 1\right\}$

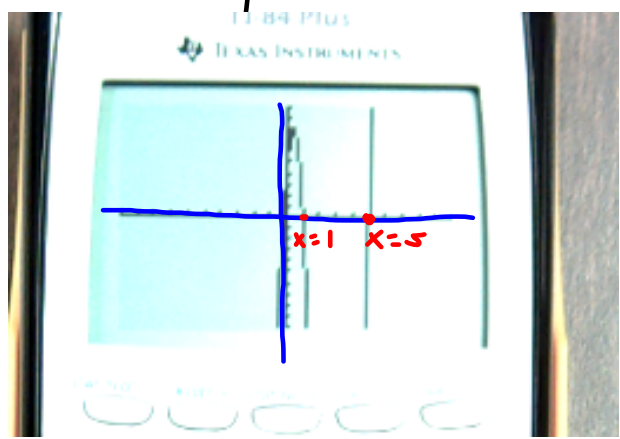
$x = 5$

$x = 1$

$x = -\frac{1}{5}$

$\frac{p}{q} = \frac{(5)}{(5)} \frac{\pm 1, \pm 5}{\pm 1, \pm 5}$

$\pm 1, \pm \frac{1}{5}, \pm 5$



$x=1$     $x=5$

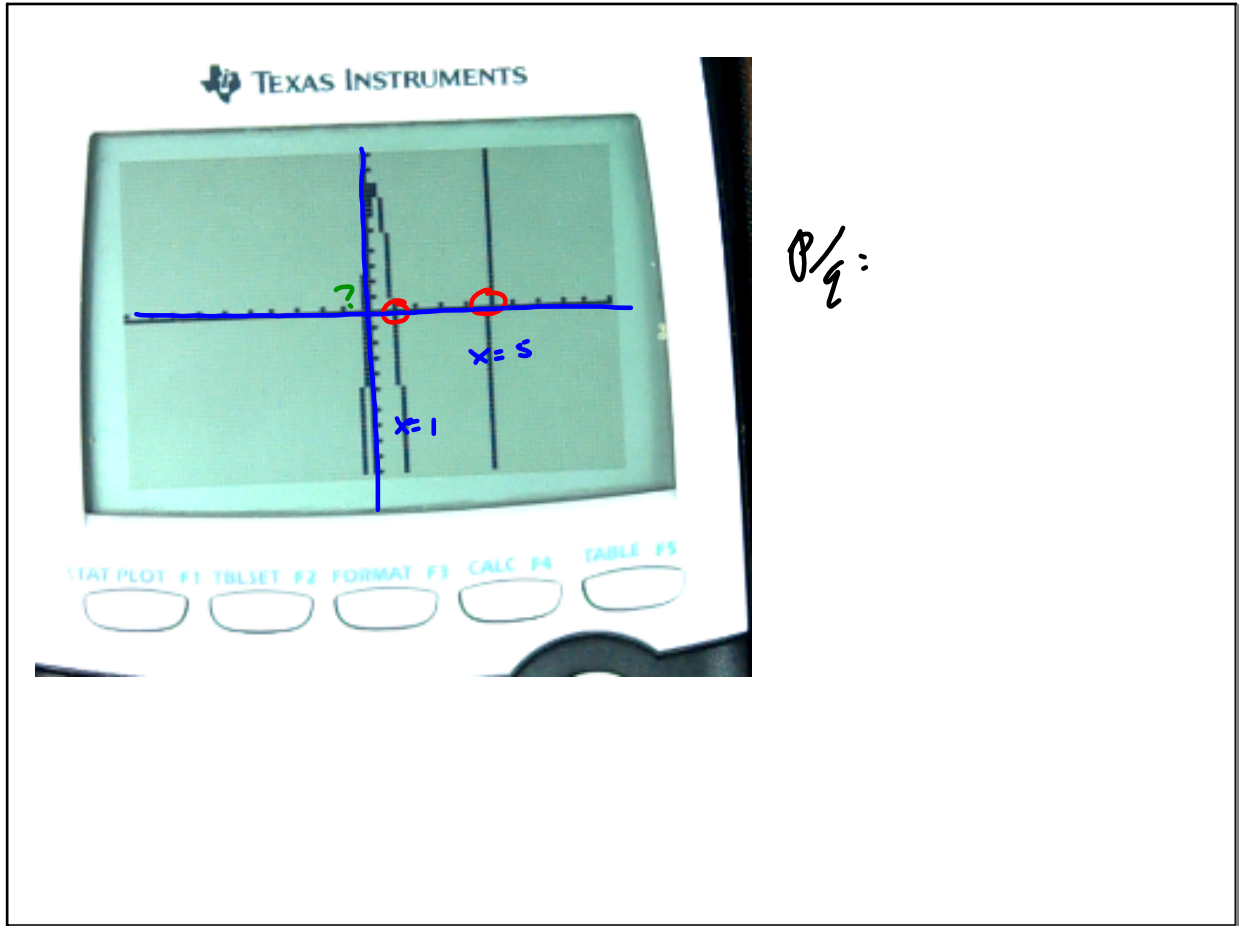
5 | 5   -29   19   5

  ↓   25   -20   -5

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5   -4   -1   0

Aug 19-9:52 AM



Aug 19-9:02 AM