

Optional Summer Packet

Date _____ Period _____

This packet is comprised of Algebra 1 and Algebra 2 topics. It would be really beneficial to your success in Pre-Calculus Honors to have mastered these concepts and remember them when you return next year. This packet is a completely optional way to practice these concepts. You may do all of it or just pick and choose to do only topics you need more practice on.

If there are any topics you do not know or do not remember how to do, the topic name is in all capital letters so you can easily search videos on Kahn Academy or YouTube for a refresher.

COMBINING LIKE TERMS - Simplify each expression.

1) $8(3 - 4n) - 1$

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

3) $-4n + 2(1 + 5n)$

4) $-3p - (p + 8)$

EVALUATING FUNCTIONS - Evaluate each function.

5) $f(n) = -3n^2 - 2$; Find $f(-4)$

6) $f(a) = a^2 - 4$; Find $f(5)$

7) $h(x) = x^2 + 1$; Find $h(-1)$

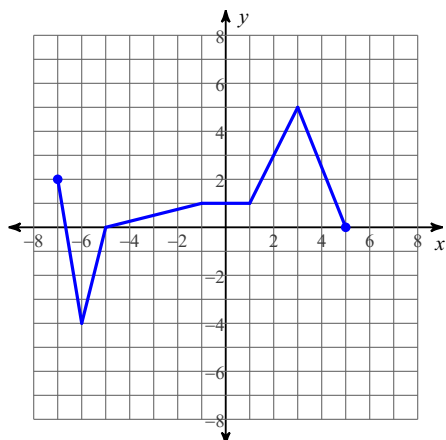
8) $h(t) = t + 3$; Find $h(9)$

9) $f(x) = 5^{2x-1} + 1$; Find $f(0)$

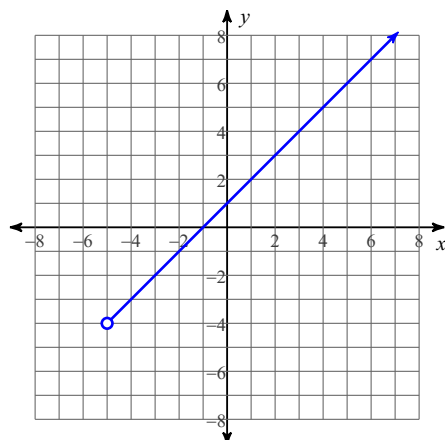
10) $f(a) = 2|-a - 3| + 3$; Find $f(1)$

DOMAIN AND RANGE - Each graph represents a relation. Determine the domain and range. Express your answer in both interval and inequality notation.

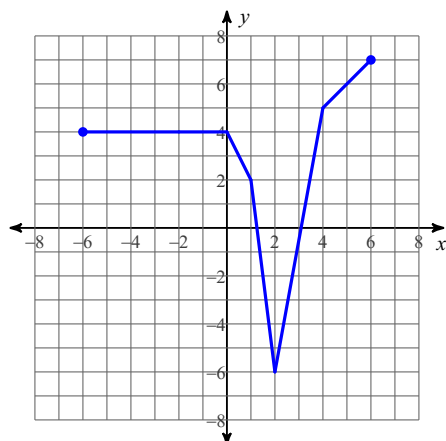
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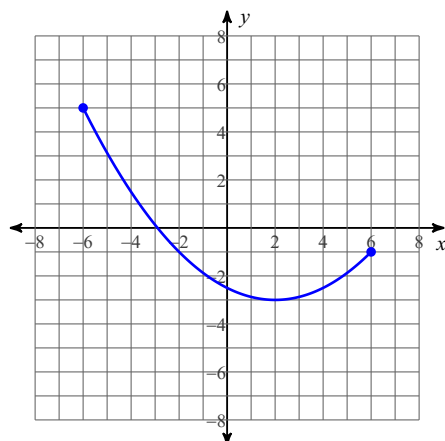
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13)



14)



Identify the domain and range of each. Express your answer in both interval and inequality notation

15) $y = \sqrt{x} - 1$

16) $y = 2\sqrt{x}$

PROPERTIES OF EXPONENTS - Simplify. Your answer should contain only positive exponents.

17) $4x^4 \cdot 3x^{-3}y^3$

18) $4u^{-2} \cdot 4v^{-1}$

$$19) \frac{x^4 y^3}{xy^{-4}}$$

$$20) \frac{3u^{-3}}{2u^4 v^3}$$

$$21) \frac{y^{-1}}{2xy^2 \cdot 3x}$$

$$22) \frac{x^{-3} y^3 \cdot x^{-4} y^4}{4x^{-4}}$$

$$23) \frac{m^0 n^{-1} \cdot 2mn^{-2}}{(2m)^3}$$

$$24) \left(\frac{x^4 y^4}{2xy^4 \cdot 2x^4 y^3} \right)^2$$

$$25) \frac{(u^{-1})^{-2}}{u^{\frac{2}{3}} v^{-\frac{3}{2}} \cdot vu^0}$$

$$26) \frac{x^{-\frac{3}{2}} y^{-\frac{1}{2}} \cdot x}{\left(x^{\frac{1}{2}} y^{-\frac{4}{3}} \right)^{-\frac{2}{3}}}$$

FACTORING - Solve each equation by factoring.

$$27) m^2 = -7m - 10$$

$$28) v^2 - 4v = 12$$

$$29) 5b^2 = -210 + 65b$$

$$30) 5n^2 = 10n$$

$$31) 3x^2 - 14x = -5 - 8x + 2x^2$$

$$32) p^2 + 10p + 25 = 1$$

$$33) -2n^2 - 4 = n - 4 - 3n^2$$

$$34) v^2 - 7v = -1 - 5v$$

$$35) 4a^2 - 7a - 40 = 5a$$

$$36) 5v^2 + 4v = -v$$

$$37) a^2 + 20a + 48 = 6a$$

$$38) 4r^2 + 56 = 36r$$

$$39) 7p^2 + 19p + 10 = 0$$

QUADRATIC FORMULA - Solve each equation with the quadratic formula.

$$40) x^2 - 4x - 5 = 0$$

$$41) n^2 - 3n + 2 = 0$$

$$42) r^2 + r = 12$$

$$43) -n^2 = 3n - 4$$

SIMPLIFYING RATIONAL EXPRESSIONS - Simplify each expression.

$$44) \frac{\frac{a-2}{a^2}}{\frac{4}{a-2}}$$

$$45) \frac{\frac{x^2}{4}}{\frac{x^2}{16}}$$

$$46) \frac{\frac{1}{x}}{\frac{2}{x^2}}$$

$$47) \frac{\frac{25}{x^2}}{\frac{5}{x}}$$

RATIONALIZING EXPRESSIONS - Simplify.

$$48) \frac{3\sqrt{2}}{8\sqrt{7}}$$

$$49) \frac{\sqrt{49}}{\sqrt{21}}$$

$$50) \frac{8}{\sqrt{7}}$$

$$51) \frac{5\sqrt{3}}{8\sqrt{7}}$$

52) $\frac{\sqrt{7}}{\sqrt{3}}$

53) $-\frac{8}{\sqrt{5}}$

ADDING AND SUBTRACTING POLYNOMIALS - Simplify each expression.

54) $(7n^2 + 8n^4 + 5n^3) - (3n^4 + 6n^3 + 7n^2)$

55) $(5x^2 + 6 - 7x^3) + (3x - 8x^3 - 7x^2)$

56) $(3a^3 + a^2 - 2a) - (2a + 2a^2 + 3a^3)$

57) $(7x^4 - 1 - 2x^3) + (5x^4 - 8x^3 - 8)$

MULTIPLYING POLYNOMIALS - Find each product.

58) $(4x + 4)(7x + 7)$

59) $(6x + 4)(3x - 1)$

60) $(6v - 7)(5v + 7)$

61) $(4n - 2)(7n - 2)$

62) $(7r^2 - 5r + 4)(r + 4)$

63) $(4r^2 - 5r + 4)(2r + 4)$

64) $(2k^2 + k + 3)(6k^2 - 7k + 8)$

65) $(7k^2 + 6k + 5)(7k^2 - 4k + 3)$

END BEHAVIOR OF POLYNOMIALS - Describe the end behavior of each function.

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

67) $f(x) = -x^4 - 6x^3 - 10x^2 - 6x - 1$

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

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

DIVIDING POLYNOMIALS - Divide.

70) $(4p^3 - 33p^2 + 16p - 62) \div (p - 8)$

71) $(n^3 + 2n^2 - 17n + 13) \div (n - 3)$

$$72) (k^3 - 9k^2 + 23k - 23) \div (k - 6)$$

$$73) (v^3 - 2v^2 - 22v - 14) \div (v + 3)$$

SOLVING POLYNOMIALS - Given one root, find all roots of the polynomial.

$$74) x^4 - 11x^3 + 38x^2 - 40x = 0; 5$$

$$75) x^4 - 8x^3 + 5x^2 + 50x = 0; -2$$

$$76) x^4 - 9x^3 + 27x^2 - 27x = 0; 3$$

$$77) x^4 + x^3 - 5x^2 + 3x = 0; -3$$

EXPONENTIAL AND LOGARITHMIC EQUATIONS - Rewrite each equation in exponential form.

$$78) \log_{16} 1 = 0$$

$$79) \log_{13} 169 = 2$$

$$80) \log_{289} 17 = \frac{1}{2}$$

$$81) \log_{20} 400 = 2$$

EXPONENTIAL AND LOGARITHMIC EQUATIONS - Rewrite each equation in logarithmic form.

$$82) 17^{-2} = \frac{1}{289}$$

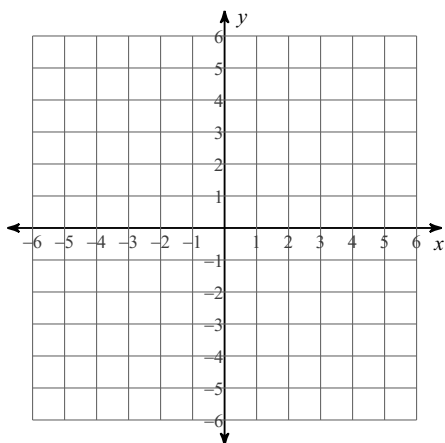
$$83) 64^{-\frac{1}{2}} = \frac{1}{8}$$

$$84) 13^{-2} = \frac{1}{169}$$

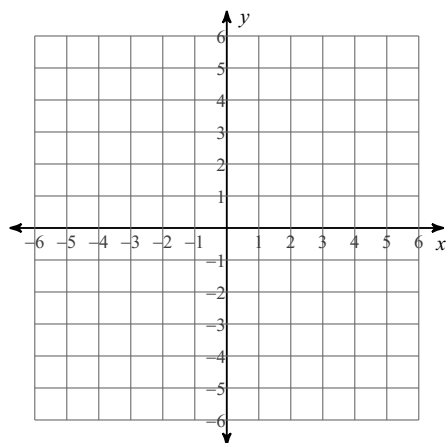
$$85) 3^1 = 3$$

GRAPHING LINEAR FUNCTIONS - Sketch the graph of each line.

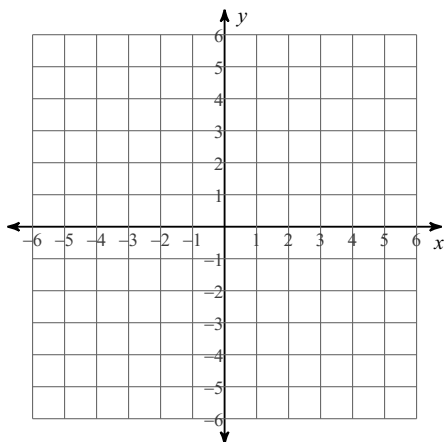
86) $y = -\frac{10}{3}x + 5$



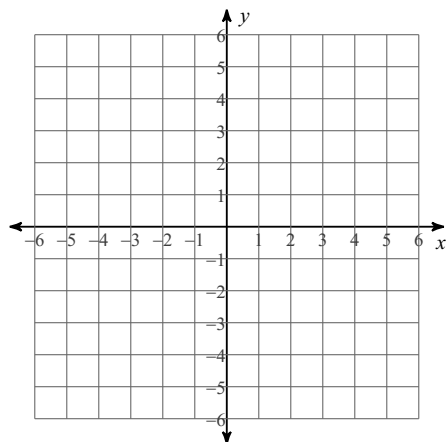
87) $y = \frac{1}{5}x$



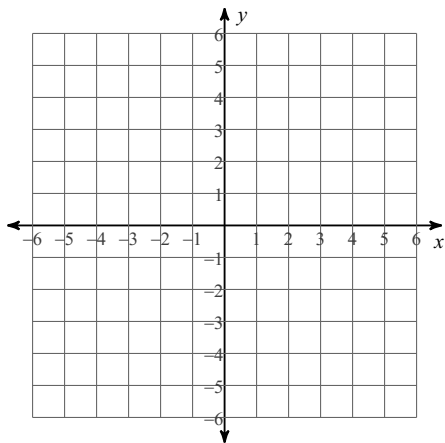
88) $x - 4y = -12$



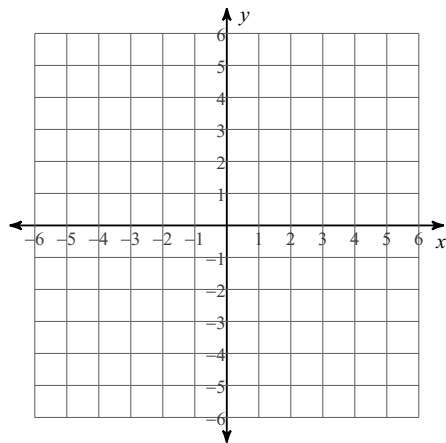
89) $x = 5$



90) $10x = -15 - 3y$

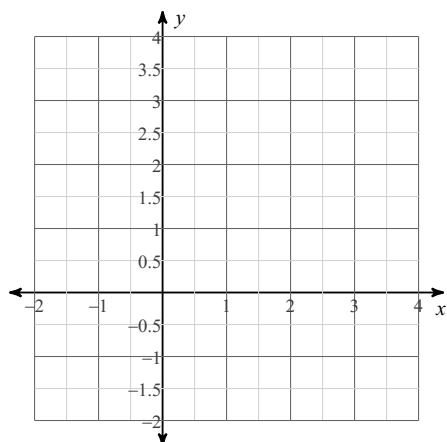


91) $15y = -75 - 12x$

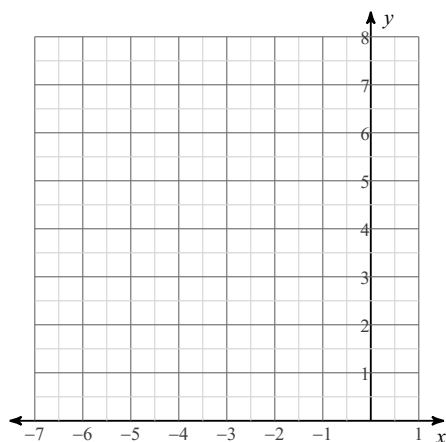


GRAPHING QUADRATICS - Sketch the graph of each function.

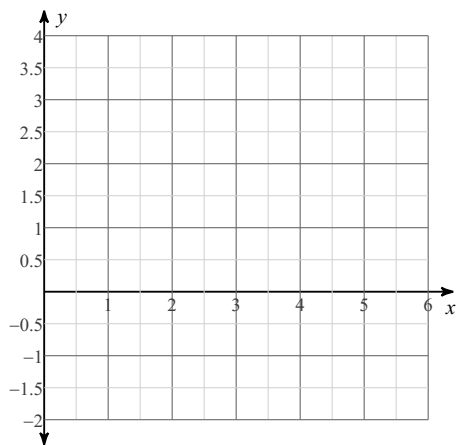
92) $f(x) = (x - 2)^2 - 1$



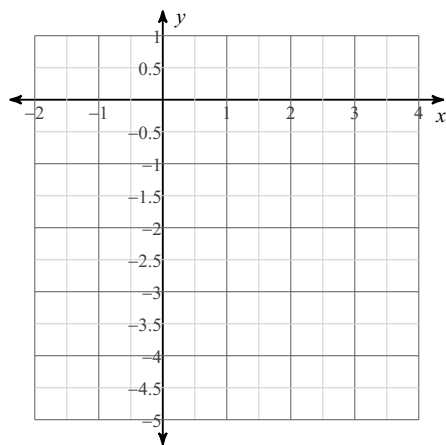
93) $f(x) = (x + 3)^2 + 3$



94) $f(x) = x^2 - 6x + 8$

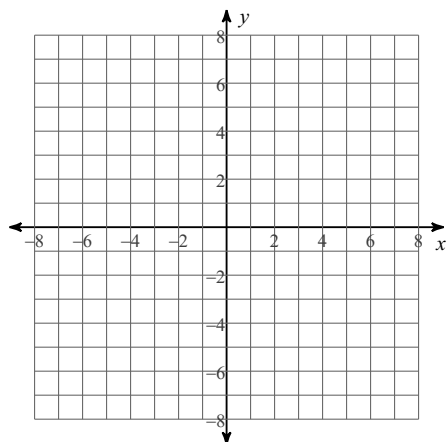


95) $f(x) = x^2 - 4x$

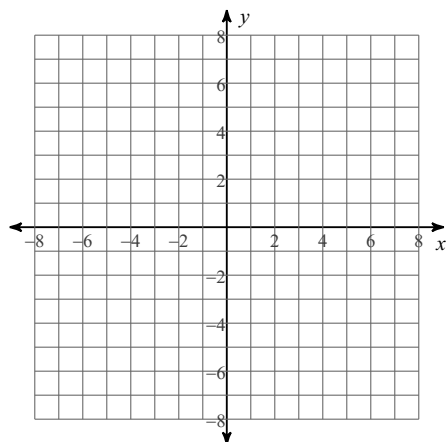


GRAPHING RADICAL EXPRESSIONS - Sketch the graph of each function.

96) $y = \sqrt{x + 3}$

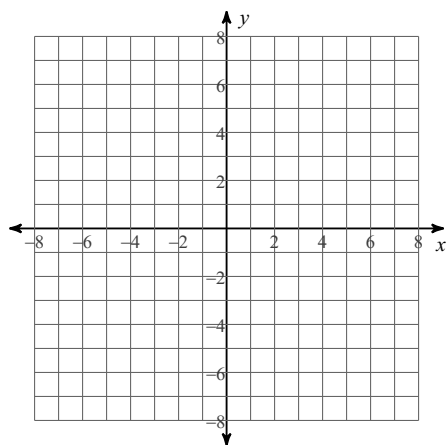


97) $y = 3\sqrt{x}$

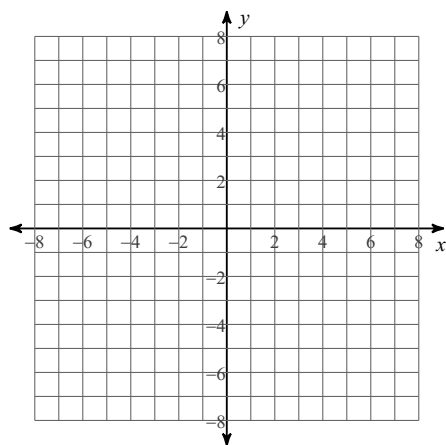


GRAPHING RATIONAL FUNCTIONS - Graph each function.

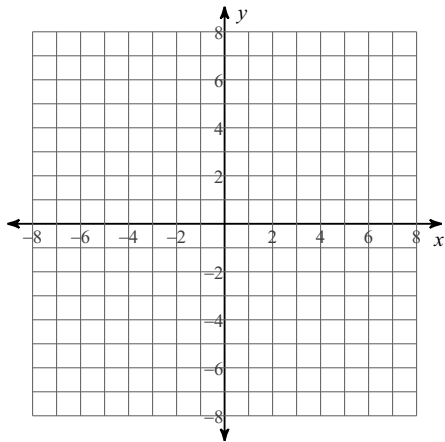
98) $f(x) = -\frac{3}{x + 2}$



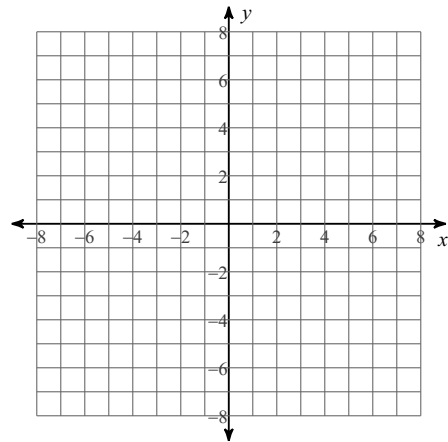
99) $f(x) = \frac{4}{x + 1} - 1$



$$100) f(x) = \frac{2}{x+2} + 3$$

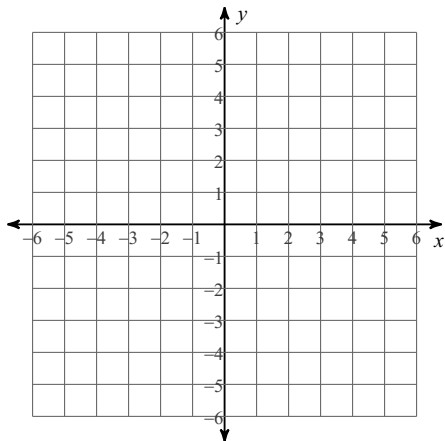


$$101) f(x) = -\frac{1}{x+2} + 1$$

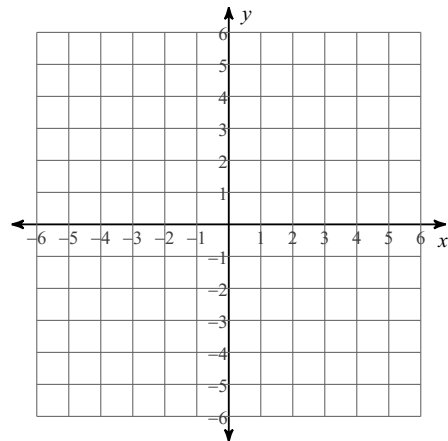


GRAPHING ABSOLUTE VALUE EQUATIONS - Graph each equation.

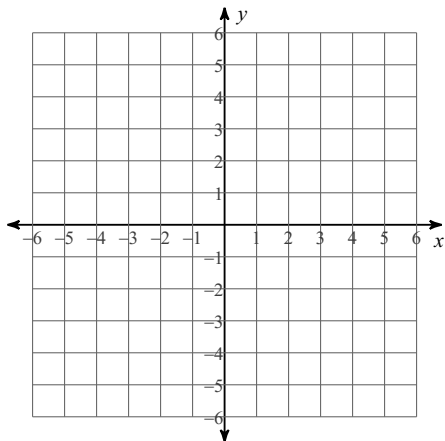
$$102) y = -|x| + 2$$



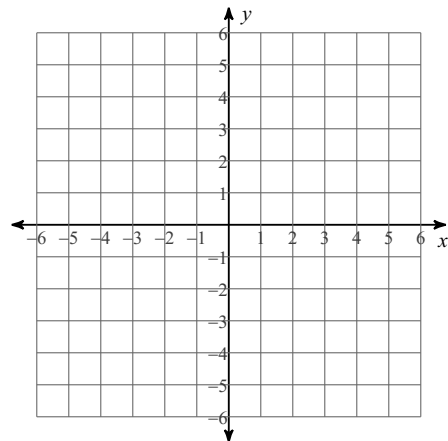
$$103) y = |x - 2|$$



$$104) y = |x + 2|$$

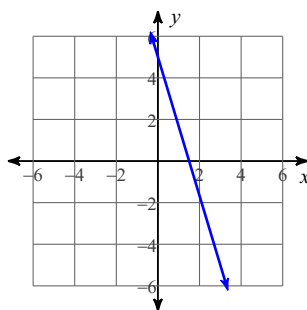


$$105) y = -|x - 2| + 3$$

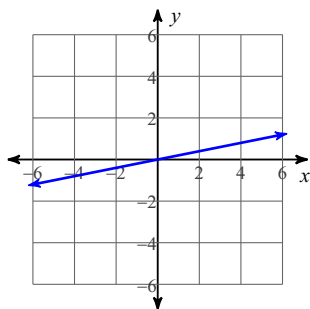


Answers to Optional Summer Packet (ID: 1)

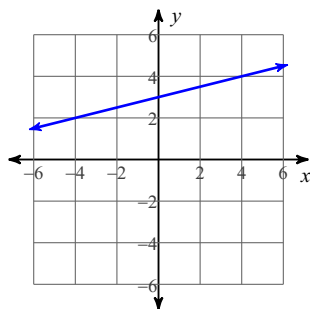
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|--|--|--|---|
| 1) $23 - 32n$ | 2) $-20 - 25a$ | 3) $6n + 2$ | 4) $-4p - 8$ |
| 5) -50 | 6) 21 | 7) 2 | 8) 12 |
| 9) $\frac{6}{5}$ | 10) 11 | 11) Domain: $-7 \leq x \leq 5$
Range: $-4 \leq y \leq 5$ | |
| 12) Domain: $x > -5$
Range: $y > -4$ | 13) Domain: $-6 \leq x \leq 6$
Range: $-6 \leq y \leq 7$ | 14) Domain: $-6 \leq x \leq 6$
Range: $-3 \leq y \leq 5$ | |
| 15) Domain: $x \geq 0$
Range: $y \geq -1$ | 16) Domain: $x \geq 0$
Range: $y \geq 0$ | 17) $12y^3x$ | 18) $\frac{16}{u^2v}$ |
| 19) y^7x^3 | 20) $\frac{3}{2u^7v^3}$ | 21) $\frac{1}{6y^3x^2}$ | 22) $\frac{y^7}{4x^3}$ |
| 23) $\frac{1}{4n^3m^2}$ | 24) $\frac{1}{16x^2y^6}$ | 25) $v^{\frac{1}{2}}u^{\frac{4}{3}}$ | 26) $\frac{x^{\frac{5}{6}}y^{\frac{11}{18}}}{xy^2}$ |
| 27) $\{-5, -2\}$ | 28) $\{6, -2\}$ | 29) $\{7, 6\}$ | 30) $\{2, 0\}$ |
| 31) $\{1, 5\}$ | 32) $\{-6, -4\}$ | 33) $\{1, 0\}$ | 34) $\{1\}$ |
| 35) $\{-2, 5\}$ | 36) $\{-1, 0\}$ | 37) $\{-8, -6\}$ | 38) $\{7, 2\}$ |
| 39) $\{-\frac{5}{7}, -2\}$ | 40) $\{5, -1\}$ | 41) $\{2, 1\}$ | 42) $\{3, -4\}$ |
| 43) $\{-4, 1\}$ | 44) $\frac{a^2 - 4a + 4}{4a^2}$ | 45) 4 | 46) $\frac{x}{2}$ |
| 47) $\frac{5}{x}$ | 48) $\frac{3\sqrt{14}}{56}$ | 49) $\frac{\sqrt{21}}{3}$ | 50) $\frac{8\sqrt{7}}{7}$ |
| 51) $\frac{5\sqrt{21}}{56}$ | 52) $\frac{\sqrt{21}}{3}$ | 53) $-\frac{8\sqrt{5}}{5}$ | 54) $5n^4 - n^3$ |
| 55) $-15x^3 - 2x^2 + 3x + 6$ | 56) $-a^2 - 4a$ | 57) $12x^4 - 10x^3 - 9$ | |
| 58) $28x^2 + 56x + 28$ | 59) $18x^2 + 6x - 4$ | 60) $30v^2 + 7v - 49$ | 61) $28n^2 - 22n + 4$ |
| 62) $7r^3 + 23r^2 - 16r + 16$ | 63) $8r^3 + 6r^2 - 12r + 16$ | 64) $12k^4 - 8k^3 + 27k^2 - 13k + 24$ | |
| 65) $49k^4 + 14k^3 + 32k^2 - 2k + 15$ | | | |
| 66) $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$
$f(x) \rightarrow -\infty$ as $x \rightarrow +\infty$ | 67) $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$
$f(x) \rightarrow -\infty$ as $x \rightarrow +\infty$ | 68) $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$
$f(x) \rightarrow -\infty$ as $x \rightarrow +\infty$ | |
| 69) $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$
$f(x) \rightarrow +\infty$ as $x \rightarrow +\infty$ | 70) $4p^2 - p + 8 + \frac{2}{p-8}$ | 71) $n^2 + 5n - 2 + \frac{7}{n-3}$ | |
| 72) $k^2 - 3k + 5 + \frac{7}{k-6}$ | 73) $v^2 - 5v - 7 + \frac{7}{v+3}$ | 74) $\{0, 2, 4, 5\}$ | 75) $\{0, 5 \text{ mult. } 2, -2\}$ |
| 76) $\{0, 3 \text{ mult. } 3\}$ | 77) $\{0, 1 \text{ mult. } 2, -3\}$ | 78) $16^0 = 1$ | 79) $13^2 = 169$ |
| 80) $289^{\frac{1}{2}} = 17$ | 81) $20^2 = 400$ | 82) $\log_{17} \frac{1}{289} = -2$ | 83) $\log_{64} \frac{1}{8} = -\frac{1}{2}$ |
| 84) $\log_{13} \frac{1}{169} = -2$ | 85) $\log_3 3 = 1$ | 86) | |



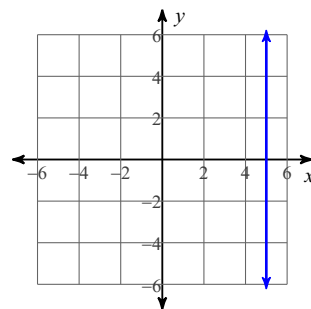
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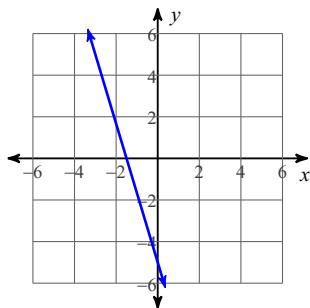
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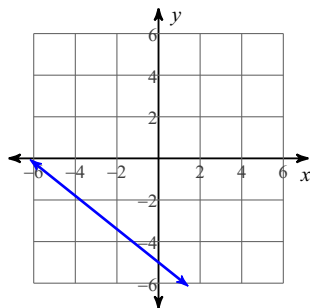
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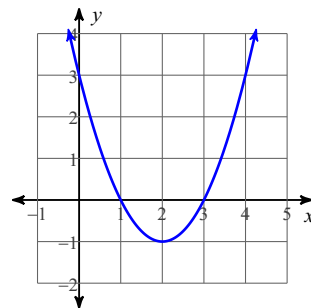
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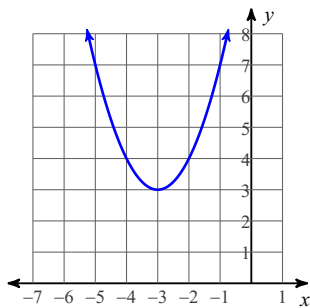
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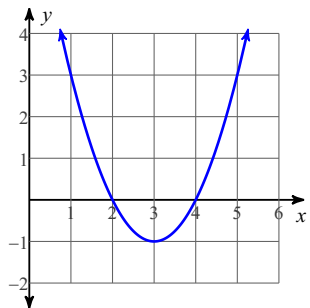
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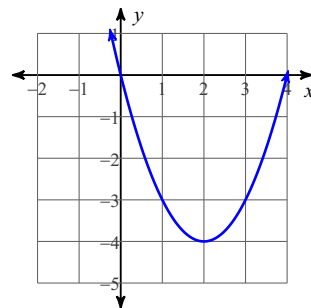
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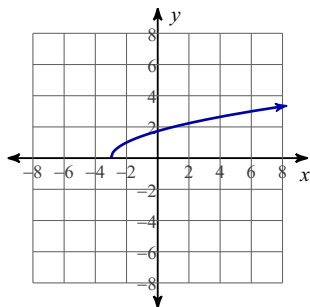
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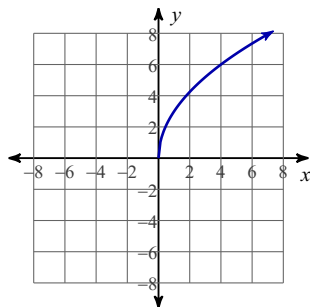
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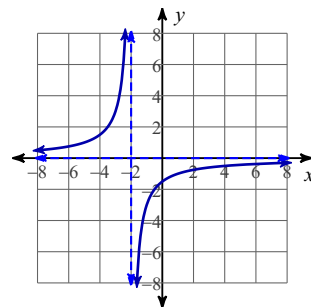
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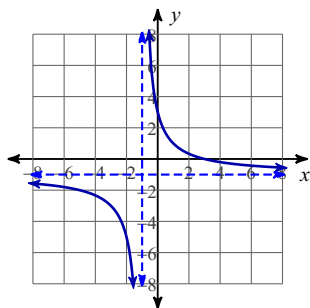
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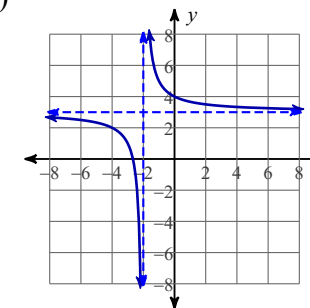
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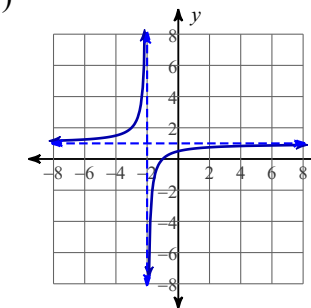
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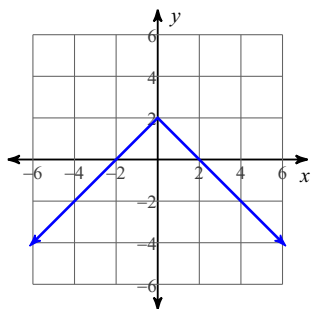
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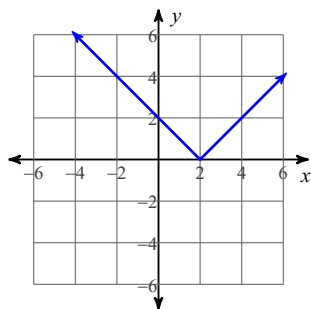
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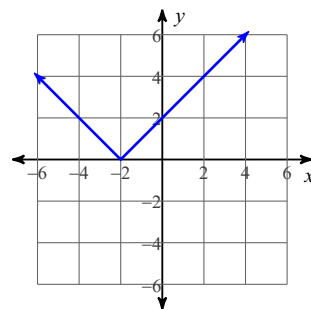
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