Summer Math Packet for Pre-Calculus

The Spire School

For review of skills, visit

https://www.khanacademy.org/

https://www.virtualnerd.com/

https://www.youtube.com/

and simply put the topic on the left upper corner of the worksheet into the search engine.

Operations with Complex Numbers

ID: 1

Simplify.

1) $(2+3i)+(1-4i)$

2) $(1+i)-(-1+2i)$

3) $(-2-5i)-(-7+2i)$

4) $(8-3i)-(1-5i)$

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

6) $(3-8i)(3+5i)$

7) $(7-5i)^2$

8) $(-8i)(-2i)(2-6i)$

9) $\dfrac{7-5i}{7-2i}$

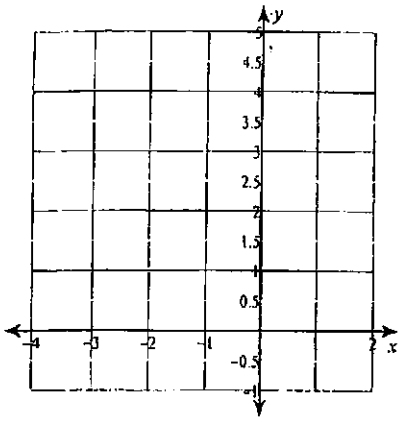
10) $\dfrac{-6-10i}{-3+7i}$

Graphing Quadratic Equations

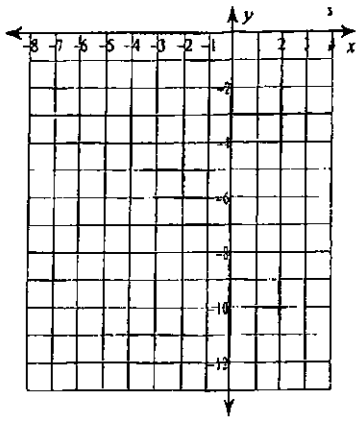
ID: 1

Sketch the graph of each function.

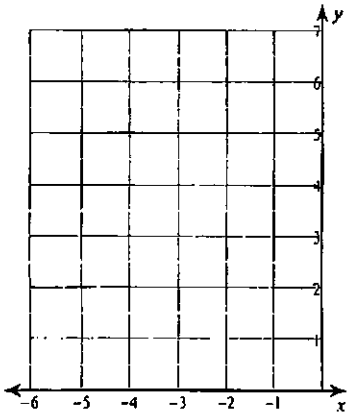
1) $y = x^2$



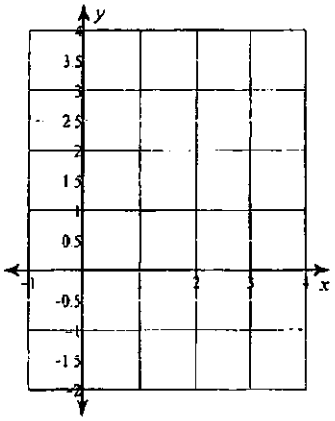
2) $y = -2x^2 - 8x - 12$



3) $y = x^2 + 4x + 6$



4) $y = \frac{1}{2}x^2 - \frac{3}{2}x + 2$



Polynomial Functions

ID: 1

Evaluate each function at the given value.

1) $f(m) = m^3 - 9m^2 + 22m - 22$ at $m = 5$

2) $f(a) = 3a^4 + 8a^3 - 7a^2 - 17a - 22$ at $a = -3$

3) $f(x) = x^3 + x^2 - 25x + 23$ at $x = -6$

4) $f(x) = x^3 - x^2 - 9x + 10$ at $x = -3$

5) $f(m) = m^4 + m^3 - 2m^2 - 5m - 5$ at $m = 2$

6) $f(x) = x^3 - 4x^2 + 5$ at $x = 4$

7) $f(m) = m^3 + 3m^2 - 4m + 21$ at $m = -5$

8) $f(x) = 2x^3 + 10x^2 - 10x + 24$ at $x = -6$

Perform the indicated operation.

9) $f(a) = -a - 4$
$g(a) = a^2 - 2a$
Find $\left(\frac{f}{g}\right)(a)$

10) $f(t) = 4t + 4$
$g(t) = t^3 + 5t^2$
Find $(f - g)(t)$

11) $f(n) = -3n + 2$
$g(n) = 2n^2 + 5 + n$
Find $(f + g)(n)$

12) $g(t) = 3t + 1$
$h(t) = t^3 + 3t$
Find $(g \cdot h)(t)$

13) $f(x) = -4x - 3$
$g(x) = x^3 - 3x^2 - x$
Find $f(-4) - g(-4)$

14) $f(x) = x^2 + 4x$
$g(x) = 3x - 3$
Find $(f \cdot g)(-1)$

15) $g(t) = t - 3$
$f(t) = t^3 + 2t$
Find $\left(\frac{g}{f}\right)(-3)$

16) $g(n) = 4n + 2$
$f(n) = n + 2$
Find $(g + f)(-5)$

Inverse Functions

ID: 1

State if the given functions are inverses.

1) $g(x) = \frac{3}{x} - 1$

$f(x) = \frac{3}{x+1}$

2) $g(x) = -x^5 - 1$

$f(x) = \sqrt[5]{-x-1}$

3) $f(x) = \frac{-x-1}{3}$

$g(x) = -3x - 1$

4) $g(x) = 2x + 5$

$f(x) = -x - 4$

Find the inverse of each function.

5) $g(x) = \sqrt[3]{x+1} - 1$

6) $h(x) = \frac{3}{x} - 1$

7) $g(x) = \frac{2}{x+2} - 2$

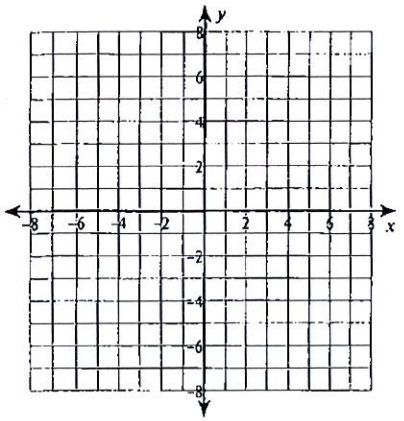
8) $h(x) = -\frac{5}{2}x - \frac{25}{2}$

Properties of the Quadratic Function

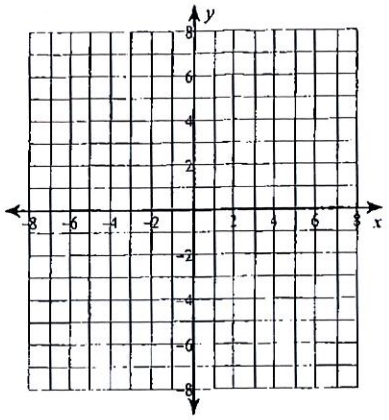
ID: 1

Identify the vertex, axis of symmetry, direction of opening, min/max value, y-intercept, and x-intercepts of each. Then sketch the graph.

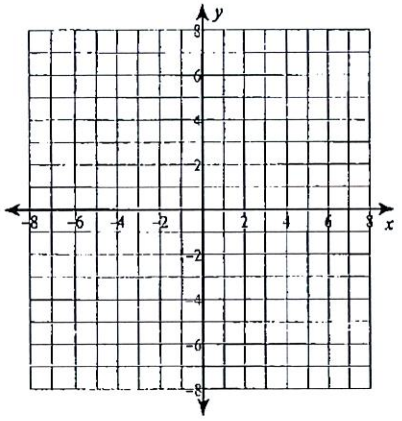
1) $y = x^2 - 6x + 5$



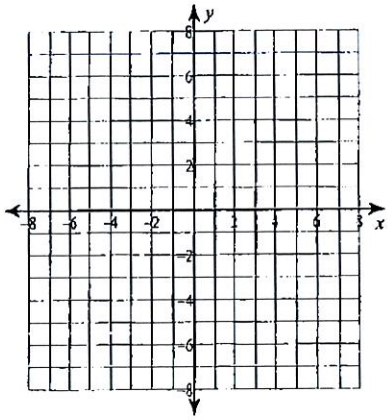
2) $y = x^2 - 10x + 21$



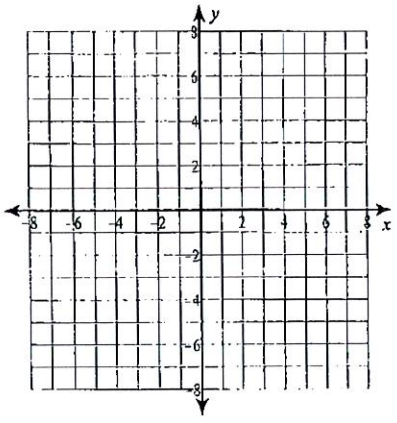
3) $y = x^2 - 12x + 39$



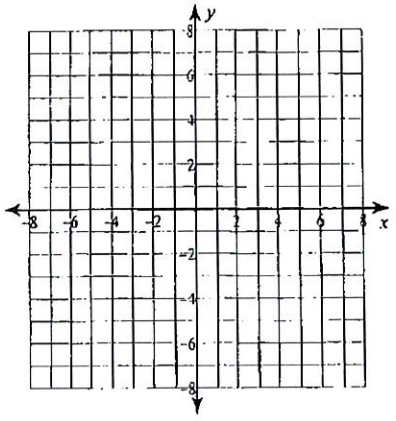
4) $y = 2x^2 - 12x + 16$



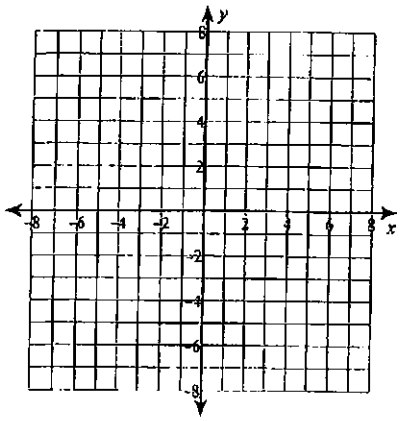
5) $y = -\frac{1}{2}x^2 + \frac{9}{2}$



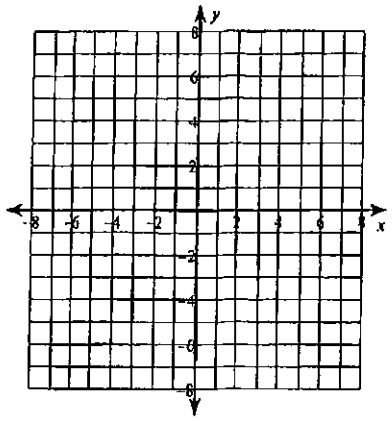
6) $y = -x^2 + 6x - 9$



7) $y = \frac{1}{2}x^2 - 5x + \frac{25}{2}$



8) $y = -2x^2 - 20x - 51$

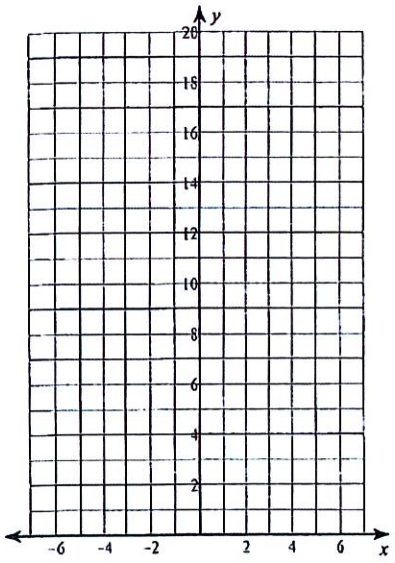


Exponential and Logarithmic Functions

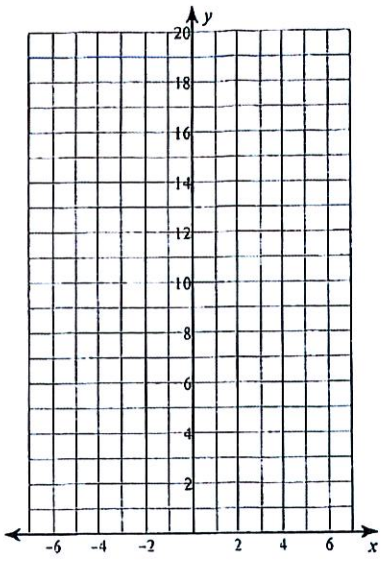
ID: 1

Sketch the graph of each function.

1) $y = \frac{1}{4} \cdot 6^x$



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



Solve each equation.

3) $3^{2-3m} = 243$

4) $3^{-2n-1} = 3^{n+2}$

5) $4^{2n} = 4^{-n}$

6) $16^{-2n-2} = 64$

7) $36^k = 216$

Rewrite each equation in exponential form.

8) $\log_{13} 1 = 0$

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

Rewrite each equation in logarithmic form.

10) $14^2 = 196$

11) $3^2 = 9$

Solve each equation.

12) $\log a = \log (8 - 3a)$

13) $\log_4 28 = \log_4 (-4x + 8)$

14) $\log_2 3 - \log_2 -2x = \log_2 18$

15) $\log_2 x - \log_2 (x + 6) = 1$