

Richard Montgomery High School  
Department of Mathematics

## Summer Math Packet

for students entering

### **IB PreCalculus (SL) and (HL)**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**No Calculator.**

This packet must be completed and ready to turn in to your new math teacher on the first day of school. It will be graded and you will be tested on the material in this packet within the first two weeks of school.

Try to wait until late July or early August to begin working on this packet. We want to make sure the material is fresh in your mind.

You may work with a classmate or a peer. You may use textbooks or other sources to help you complete the packet, however, each student must submit their own packet, and each student is responsible for understanding the material contained in the packet. Calculators are not necessary for any of the problems in this packet. Write your work on this packet, and make sure to show an appropriate amount of work for each question. If you need another sheet, you may attach it.

1. Solve for the variable indicated.

(a) Solve for  $F$ :  $C = \frac{5}{9}(F - 32)$

(b) Solve for  $y$ :  $5x - 4y + 12 = 0$

(c) Solve for  $b_1$ :  $A = \frac{h}{2}(b_1 + b_2)$

(d) Solve for  $v$ :  $S = -\frac{1}{2}gt^2 + vt$

(e) Solve for  $C$ :  $V = C\left(1 - \frac{t}{n}\right)$

(f) Solve for  $t$ :  $V = C\left(1 - \frac{t}{n}\right)$

2. Given  $f(x) = -2x - 3$ ,  $g(x) = 3x^2 + x - 1$ ,  $h(x) = |5x + 2|$ , and  $k(x) = \sqrt{x - 3}$  find each of the following.

(a)  $f(2)$

(b)  $g(-1)$

(c)  $h(-3)$

(d)  $k(19)$

(e)  $g(f(0))$

(f)  $h(k(4))$

(g)  $g(f(x))$

(h)  $h(f(x))$

(i)  $f^{-1}(x)$

(j)  $k^{-1}(x)$

(k)  $3f(x)$

(l)  $g(x) - 4$

(m)  $h(a + b)$

(n)  $k(x^2)$

3. Factor completely.

(a)  $x^2 - 14x + 48$

(b)  $5x^2 + 13x - 6$

(c)  $x^2 - 64$

(d)  $4x^2 + 16x + 15$

(e)  $6x^2 + 18x$

(f)  $3x^3 + 12x^2 + 12x$

(g)  $x^3 + 8$

(h)  $x^2 + 5x - 14$

(i)  $48x^2 - 62xy + 9y^2$

(j)  $4x^2 - 49$

(k)  $24x^2y^2 - 34xy^3 + 12y^4$

(l)  $81x^4 - 1$

(m)  $5x^2 + 13x - 6$

(n)  $4x^3 + 12x^2 - 9x - 27$

(o)  $x^2 - 3x + 2xy - 6y$

(p)  $3x^4 - 3y^4$

(q)  $64x^3 - 1$

(r)  $9x^2 + 12x + 4$

(s)  $6x^2 - 11x - 10$

(t)  $5x^3 - 20xy^4$

(u)  $6x^4 + 13x^2 + 5$

(v)  $10x^4 - 7x^2 - 12$

4. Solve the quadratic equation by the method indicated.

(a)  $12x^2 + 29x + 14 = 0$

(factoring)

(b)  $3x^2 + 6x - 4 = 0$

(quadratic formula)

(c)  $x^2 - 6x + 4 = 0$

(completing the square)

(d)  $2x^2 - 16x + 9 = 0$

(completing the square)

(e)  $2x^2 - x + 5 = 0$

(quadratic formula)

(f)  $6x^2 + 23x - 4 = 0$

(factoring)

(g)  $4x^2 + 6x - 1 = 0$

(completing the square)

(h)  $x^2 - 10x + 20 = 0$

(quadratic formula)

5. Solve for  $x$ . Find all real and imaginary roots. *Remember all your factoring techniques, including factoring by grouping and quadratic form!*

(a)  $(2x - 1)(3x + 2)(x - 7) = 0$

(b)  $x^4 - 20x^2 + 64 = 0$

(c)  $x^4 - 26x^2 + 25 = 0$

(d)  $x^3 - 2x^2 - 6x + 12 = 0$

$$(e) (2x + 5)(x^2 - 8) = 2x + 5$$

$$(f) (4x + 7)(x - 1) = 2(x - 1)$$

$$(g) 2x^3 - 12x^2 + 18x = 0$$

$$(h) 2x^3 + 6x^2 + 6x = 0$$

$$(i) 9x^3 + 36x^2 = x + 4$$

$$(j) \frac{x-4}{x-2} = \frac{1}{x-4}$$

$$(k) \frac{7}{x+5} + 3 = \frac{13}{x+5}$$

$$(l) \frac{x+2}{x-2} + \frac{x-2}{x+2} = \frac{8-4x}{x^2-4}$$

$$(m) \frac{x+7}{x^2-x-6} = \frac{2}{x-3} - \frac{1}{x+2}$$

$$(n) \sqrt{2x-5} = 4$$

$$(o) \sqrt{6x - 8} = x$$

$$(p) \sqrt{x + 22} - 2 = x$$

$$(q) \sqrt{2x + 7} - \sqrt{x} = 2$$

$$(r) \sqrt{3x + 1} - \sqrt{x - 4} = 3$$

$$(s) 5^{x+3} = 25$$

$$(t) 9^x = 27^{x+1}$$

$$(u) 4^{3x+1} = 8^{x-1}$$

$$(v) (\sqrt{5})^{1-x} = 625$$

6. Solve for  $x$ .

$$(a) \log_2 16 = x$$

$$(b) \log_3 x = 5$$

$$(c) \log x = 6$$

$$(d) \log_{2x} 27 = 3$$

(e)  $\log_x 81 = 2$

(f)  $x = 8^{\log_8 5}$

(g)  $\log_2(2x - 1) = 3$

(h)  $\log(2x + 3) - \log x = \log 4$

(i)  $\log_5(x + 3) + \log_5(x + 4) = \log_5(2x + 6)$

7. Find the exact value.

(a)  $\sin 45^\circ$

(b)  $\cos 60^\circ$

(b)  $\tan 30^\circ$

8. Determine whether each statement is true or false (write "True" or "False"). If the statement is false, correct it.

(a)  $(-7)^2 = -49$

(b)  $-7^2 = -49$

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

(d)  $\sqrt{x^2 - 25} = x - 5$

(e)  $(x + 3)^2 = x^2 + 9$

(f)  $\frac{6+2\sqrt{7}}{2} = 3 + 2\sqrt{7}$



(g)  $\sqrt{64} = \pm 8$

(h)  $(2x)^3 = 8x^3$

(i)  $\frac{2x+3}{y+3} = \frac{2x}{y}$

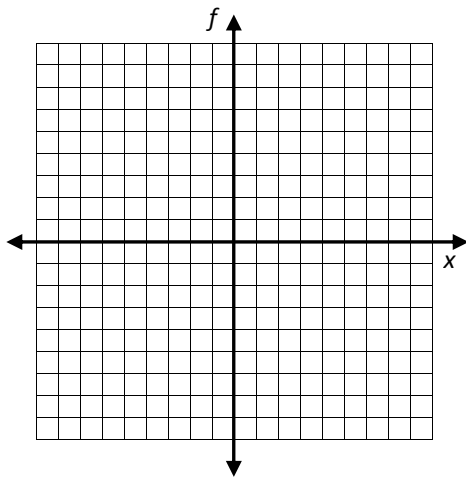
(j) if  $x^2 = 81$ , then  $x = 9$

(k)  $\sqrt{-x}\sqrt{-y} = \sqrt{xy}$

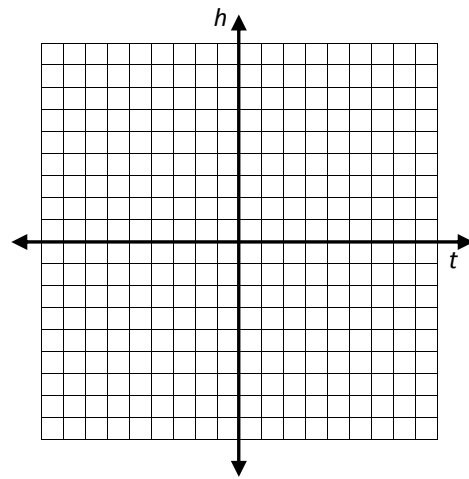
(l)  $x\left(\frac{a}{b}\right) = \frac{xa}{xb}$

9. Graph each function. Then state the domain and range.

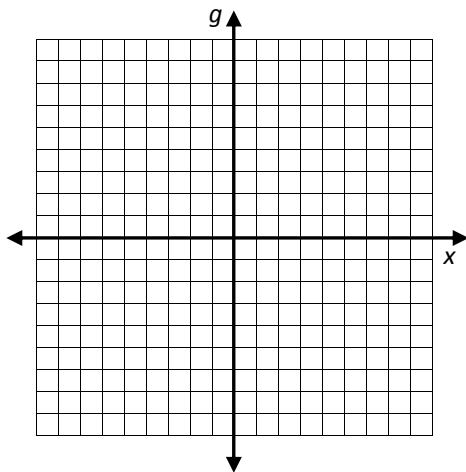
(a)  $f(x) = -x^2 - 4x + 5$



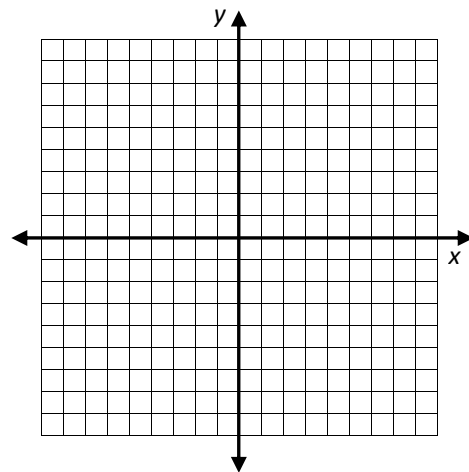
(b)  $h(t) = -|t - 3| - 4$



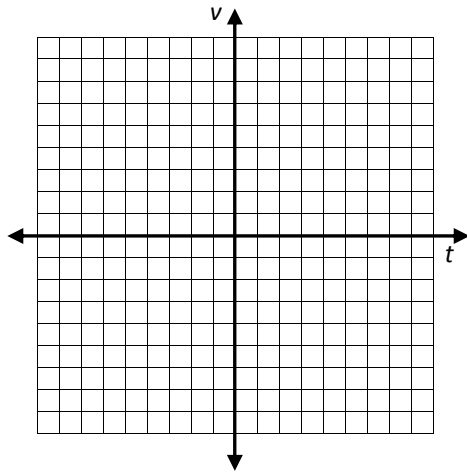
(c)  $g(x) = \frac{2}{x+4} - 1$



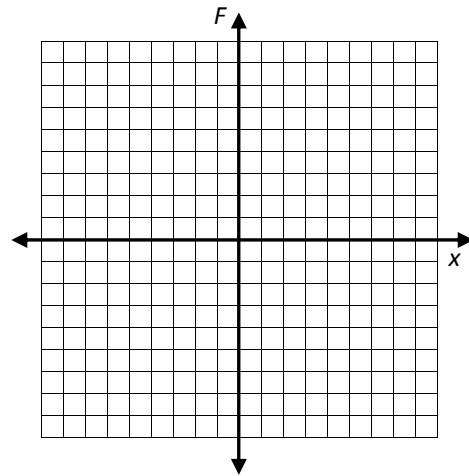
(d)  $y(x) = \left(\frac{1}{4}\right)^x - 2$



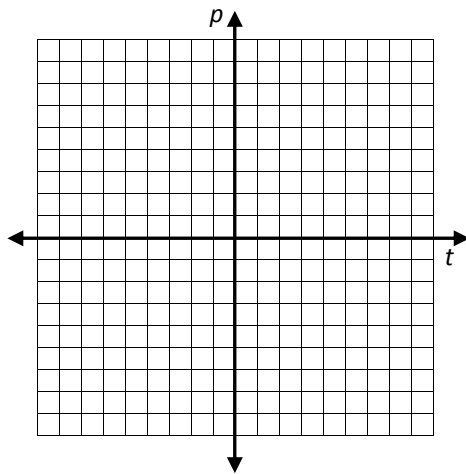
(e)  $v(t) = 5 + \log_2 t$



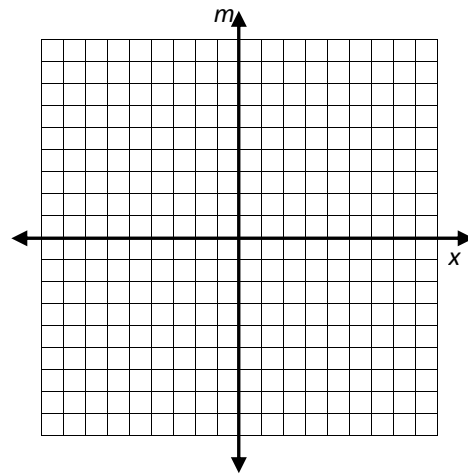
(f)  $F(x) = 2\sqrt{x+1}$



(g)  $p(t) = -t^3 + 2$



(h)  $m(x) = 4 - \sqrt[3]{x}$



10. Find the equation of the line using the given information.

(a) Passes through  $(-5, 2)$  with slope 2

(b) Passes through  $(14, -4)$  and  $(-6, 26)$

(c) Perpendicular to the line  $y = \frac{2}{5}x - 7$  with y-intercept  $-32$ .