

Richard Montgomery High School

Department of Mathematics

Summer Math Packet

for students entering

IB Math Studies or IB PreCalculus

Name: _____

Date: _____

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 few 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 allowed. You are expected to show an appropriate amount of work to support your answers.

Please do your work directly on this packet. Additional work, completed on separate paper, may be attached to the back of the packet.

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 without the use of a calculator. Find all real and imaginary roots.

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. $x^4 + x^3 - 2x^2 - 6x - 4 = 0$

f. $(2x + 5)(x^2 - 8) = (2x + 5)$

g. $(4x + 7)(x - 1) = 2(x - 1)$

h. $2x^3 - 12x^2 + 18x = 0$

i. $2x^3 + 6x^2 + 6x = 0$

j. $9x^3 + 36x^2 = x + 4$

k. $\frac{x - 4}{x - 2} = \frac{1}{x - 4}$

l. $\frac{7}{x + 5} + 3 = \frac{13}{x + 5}$

m. $\frac{x+2}{x-2} + \frac{x-2}{x+2} = \frac{8-4x}{x^2-4}$

n. $\frac{x+7}{x^2-x-6} = \frac{2}{x-3} - \frac{1}{x+2}$

o. $\sqrt{2x-5} = 4$

p. $\sqrt{6x-8} = x$

q. $\sqrt{x+22} - 2 = x$

r. $\sqrt{2x+7} - \sqrt{x} = 2$

s. $\sqrt{3x+1} - \sqrt{x-4} = 3$

t. $5^{x+3} = 25$

u. $9^x = 27^{x+1}$

v. $4^{3x+1} = 8^{x-1}$

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

6. Solve for x without the use of a calculator.

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. $\log_{2x} 27 = 3$

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

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

7. Convert to radians. Leave answers in terms of π .

a. 150°

b. 450°

c. -40°

d. 320°

8. Convert to degrees.

a. $\frac{\pi}{18}$

b. $-\frac{4\pi}{9}$

c. $\frac{3\pi}{10}$

d. $\frac{7\pi}{24}$

9. Convert to degrees. Round to the nearest degree.

a. 3.14159

b. 4.89

c. -2.37

d. 7.5

10. Find the exact value without the use of a calculator.

a. $\sin \frac{2\pi}{3}$

b. $\cos \frac{\pi}{4}$

c. $\tan \frac{\pi}{6}$

d. $\cos \frac{5\pi}{6}$

e. $\tan \frac{7\pi}{4}$

f. $\cos \frac{4\pi}{3}$

g. $\sin \frac{5\pi}{4}$

h. $\cos \left(-\frac{\pi}{2}\right)$

i. $\sin \frac{11\pi}{3}$

j. $\sin \left(-\frac{3\pi}{4}\right)$

k. $\tan \pi$

l. $\sin \frac{\pi}{2}$

m. $\tan \frac{5\pi}{3}$

n. $\cos \frac{7\pi}{6}$

o. $\sin \frac{7\pi}{6}$

p. $\cos \left(-\frac{\pi}{3}\right)$

11. Determine whether the 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. $x \left(\frac{a}{b}\right) = \frac{xa}{xb}$