

## PREP FOR PRECALCULUS

A) Factor all of the following completely, if possible:

1)  $x^2 - x - 6$

2)  $81y^4 - 16x^8$

3)  $9x^2 - 15x + 6$

4)  $(2x-3)^2 - 6(2x-3) + 8$

5)  $6x^2 + 3xy + 10x + 5y$

6)  $8A^3 - 27B^3$

7)  $36N^4 + 44N^3 + 24N^2$

8)  $4x^2y - 36y$

9)  $9x^4 + 16$

10)  $m(n-2) - 3(2-n)$

11)  $5x^2 - 3x - 2$

12)  $3x^2 - 17x - 6$

**B) Evaluate WITHOUT A CALCULATOR** - making sure to leave NO Radicals in the denominator of your answer and no negative exponents.

1)  $(2^{\sqrt{2}})^{\sqrt{8}}$

2)  $\log_2 32$

3)  $\log_3 \frac{1}{81}$

4)  $\ln(e)$

5)  $\log 100^5$

6)  $27^{\frac{2}{3}}$

7)  $\frac{3^{\sqrt{5}-2}}{3^{\sqrt{5}+1}}$

8)  $25^{\frac{1}{2}}$

9)  $4^{x+1} \cdot 8^x$

10)  $\frac{\sqrt[3]{9}}{\sqrt[6]{3}}$

11)  $\frac{5}{\sqrt{2}}$

12)  $\sqrt{\frac{1}{3}}$

$$13) \frac{3}{2-\sqrt{3}}$$

$$14) \frac{3}{7-i}$$

$$15) (\sqrt{3} + \sqrt{5})^2$$

$$16) (5\sqrt{2} - \sqrt{10})(3\sqrt{2} + 2\sqrt{10})$$

$$17) \frac{x^2 y^3}{y^{-4}} \cdot \frac{y^4}{x^{-2} y^{-3}}$$

$$18) \frac{xy}{3}(xy)^{-1}$$

$$19) \sqrt{420x^2 y^3}$$

$$20) (3x)^3$$

$$21) \sqrt[3]{-64xy^7}$$

### C) Quadratics/Polynomials

1) State the QUADRATIC FORMULA:

2) Solve by using the Quadratic Formula

a)  $x^2 - x + 7 = 0$

b)  $x^2 = 6x - 2$

3) Solve by Completing the Square.

a)  $x^2 - 2x - 8 = 0$

b)  $2x^2 = 9x + 3$

4) Solve by taking the roots.

a)  $x^2 - 16 = 0$

b)  $2(x+3)^2 - 5 = 7$

5) Solve any way you wish.

a)  $x = (x - 6)^2$

b)  $y^2 (y - 3) (y^2 - 9) = 0$

c)  $y^4 - 5y^2 + 4 = 0$

d)  $(x - 4)^3 - 4(x - 4) = 0$

e)  $(x + 1) (x - 5) = 7$

6) The product of three consecutive integers is 21 more than the cube of the smallest integer. Find the three integers

7) A rectangular garden has a perimeter of 66 ft and an area of  $216 \text{ ft}^2$ . Find the dimensions of the rectangle.

8) A farmer plans to use 21 ft of fencing to enclose a rectangular corral having an area of  $55 \text{ ft}^2$ . Since the corral is attached to the back of the barn, the farmer only needs to build 3 sides with fencing using the barn as the fourth side. Find the dimensions of the rectangular corral.

### E) Functions

**Given**  $f(x) = 2x - 5$ ,  $g(x) = x^2 + 3$ , and  $h(x) = \frac{1}{2}x + 5$ , evaluate each of the following, if possible

1)  $f(-2)$

2)  $f(g(2))$

3)  $h(g(0))$

4)  $f(x + 2)$

5)  $f(h(x))$

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

{Find the inverse of  $f(x)$ }

7)  $f(x) + g(x)$

8)  $\frac{g(x)}{f(x)}$

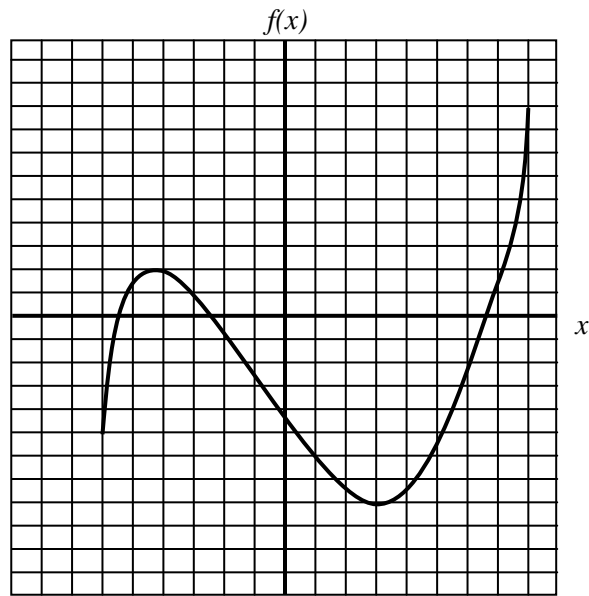
9) What is the domain of  $\frac{g(x)}{f(x)}$ ?

## F) Polynomial and Rational Expressions

1) The graph of  $f(x)$  is given to the right.

*Use the Graph to estimate the following:*

- domain of  $f$
- range of  $f$
- $f(6)$
- estimate the value(s) of  $x$  if  $f(x) = -4$



Perform the indicated operation and simplify. Leave your answer in factored form if necessary.

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

$$3) \frac{x+3}{x^2-4} \div \frac{x^2-x-12}{x^3-8}$$

$$4) \frac{x^2}{x^2-4} - \frac{1}{x}$$

$$5) \frac{x}{x^2+3x+2} + \frac{2x-3}{x^2-1}$$

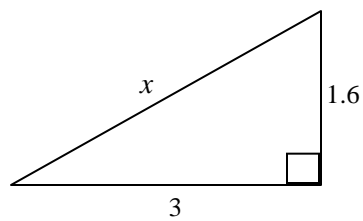
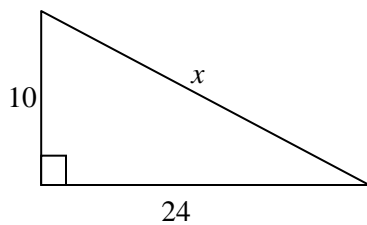
$$6) \frac{\frac{1}{2} + \frac{3}{x}}{\frac{x+3}{4}}$$

$$7) \frac{\frac{x^2}{x-4} + 2}{\frac{2x-2}{x} - 1}$$

8) Solve for  $x$ .  $\frac{5}{x+4} = 4 + \frac{3}{x-2}$

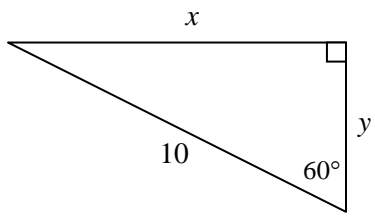
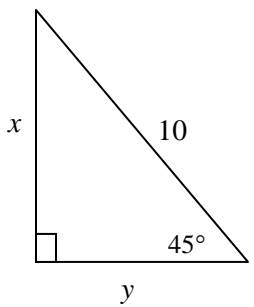
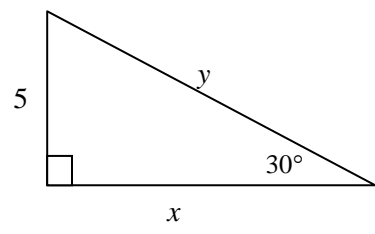
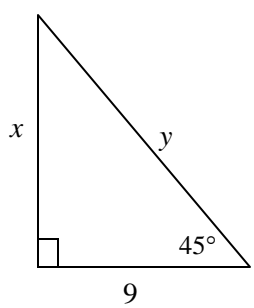
**G) Right Triangles and Trigonometry.**

1) Find the unknown side length

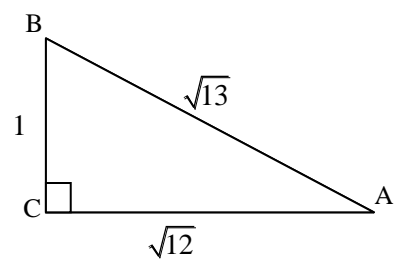
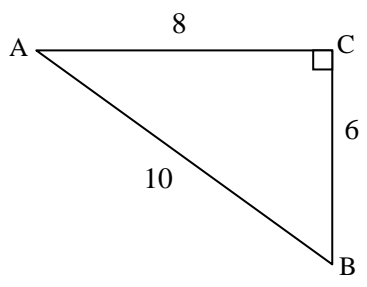




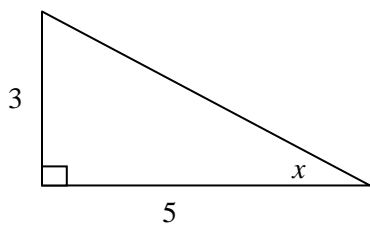
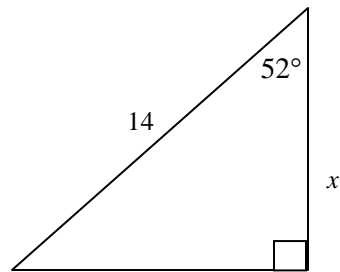
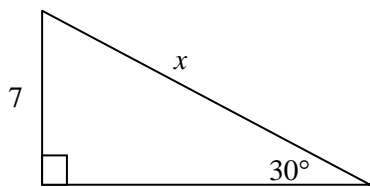
2) Find the value of each variable. Give answer in simplest radical form. (You may have to review special right triangles)



3) Find the sine, the cosine and the tangent of angle A. Express answers in simplest radical form.



4) Use trig to find the value of each variable. Round answers to the nearest hundredth.



5) A boy is 50 ft from a tall tree. The angle from his feet to the top of the tree is  $64^\circ$ . To the nearest tenth, how tall is the tree?

## H) Miscellaneous

1) *Systems*: Solve each system of equations, if possible

a) 
$$\begin{aligned} 3x - y &= 9 \\ x + 2y &= -4 \end{aligned}$$

b) 
$$\begin{aligned} -x + 2y &= -4 \\ 3x - 6y &= 12 \end{aligned}$$

2) Inequalities: Graph each solution set on a number line

a)  $x^2 - 7x + 12 > 0$

b)  $(x^2 - 4x)(x^2 - 4) < 0$

c)  $|x+5| < 9$

d)  $|1-2x| \geq 3$

*Solving:* Check for any extraneous solutions. Round your answer to the nearest hundredth if necessary.

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

4)  $(10x+15)^{\frac{1}{2}} - 4 = x$

5)  $\sqrt[3]{2t-1} = 5$

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

7)  $\log_2(4x) = 5$

8)  $2\log_2 x + 3\log_2 2 = 7$

9)  $7e^x + 2 = 19$

10)  $3^{5x} = 20$

11) Divide  $(2x^2 - 19x + 24) \div (x + 8)$  Use Long Division.

12) Divide  $(x^3 - 28x - 48) \div (x + 4)$  Use Synthetic Division.

13) Find an equation of a line having the given characteristics.

a) containing the points (3, -4) and (2, 1)

b) perpendicular to the line  $3x - y = -4$ ; containing the point (-2, 4)

c) vertical containing the point (-3, 4)