CP Precalc & Trig Name Answer Key

SUMMER PACKET Period____

Factor each completely.

1) $2x^2 - 11x + 14$

$(2x+2)(x-7)$

2) $4x^2 + 20x$ GCF of $4x$

$4x(x+5)$

3) $2x^5 - 9x^3 + 10x$ GCF: x

$x(2x^4 - 9x^2 + 10)$

4) $3m^2 - 8m + 5$

$(3m-5)(m-1)$

5) $4r^3 - 3r^2 + 20r - 15$ by "Hacking"

$(4r-3)(r^2+5)$

$r^2(4r-3) + 5(4r-3)$

$(r^2+5)(4r-3)$ by "grouping"

6) $r^2 - 4r + 4$

$(r-2)(r-2)$

$(r-2)^2$

7) $25r^2 - 1$

$(5r-1)(5r+1)$ Difference of Squares.

8) $81m^4 - 16$

$(9m^2-4)(9m^2+4)$ Difference of Squares... twice

$(3m-2)(3m+2)(3m-2)(3m+2)$

$(3m-2)^2(3m+2)^2$

9) $k^4 + 4k^2 + 4$

$(k^2+2)(k^2+2)$

$(k+2)^2$

10) $x^6 - 8x^3 + 16$

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

$x^6 - 4x^3 - 4x^3 + 16$

$x^6 - 8x^3 + 16$

Simplify.

11) $\frac{6x-3}{12}$ $\frac{3(2x-1)}{12} = \boxed{\frac{(2x-1)}{4}}$

12) $\frac{4x^2+4x}{x+1}$ $\frac{4x\cancel{(x+1)}}{\cancel{(x+1)}} = \boxed{4x}$

GCF of 5

13) $\dfrac{5k-5}{k^2+k-2}$

$\dfrac{5(k-1)}{(k+2)(k-1)} = \dfrac{5\cancel{(k-1)}}{(k+2)\cancel{(k-1)}} = \boxed{\dfrac{5}{(k+2)}}$

GCF $2k^2$

14) $\dfrac{4k^2-2k^3}{k^2-k-2}$ → Factoring out a -1 leaves you with $(-1)(-2+k)$ ↺ commutative property lets you re-order

$\dfrac{2k^2(2-k)}{(k-2)(k+1)} = \dfrac{2k^2(-1)\cancel{(k-2)}}{\cancel{(k-2)}(k+1)} = \dfrac{(-1)(2k^2)}{k+1} = \boxed{\dfrac{-2k^2}{k+1}}$

GCF $2x$

15) $\dfrac{2x^3-8x^2+6x}{x^3-6x^2+5x}$ → GCF x

$\dfrac{2x(x^2-4x+3)}{x(x^2-6x+5)}$

$= \dfrac{2\cancel{x}(x-3)\cancel{(x-1)}}{\cancel{x}(x-5)\cancel{(x-1)}} = \boxed{\dfrac{2(x-3)}{(x-5)}}$

16) $\dfrac{k^2-7k+10}{k^2+2k-8}$

$\dfrac{(k-5)\cancel{(k-2)}}{(k+4)\cancel{(k-2)}} = \dfrac{(k-5)}{(k+4)}$

Simplify each expression.

Divide... we multiply by the reciprocal

17) $\dfrac{7n+35}{n+5} \cdot \dfrac{1}{n-7}$

$\dfrac{7\cancel{(n+5)}}{\cancel{(n+5)}} \cdot \dfrac{1}{(n-7)}$

$\dfrac{7}{1} \cdot \dfrac{1}{(n-7)} = \boxed{\dfrac{7}{(n-7)}}$

18) $\dfrac{2}{r+3} \div \dfrac{1}{4r+12}$

$\dfrac{2}{r+3} \cdot \dfrac{4(r+3)}{1} = \dfrac{8\cancel{(r+3)}}{\cancel{(r+3)}} = \boxed{8}$

Add/Subt Fractions... we need a common denom.

19) $\dfrac{9x}{2} \div \dfrac{x^2+6x-40}{2x-8}$

$= \dfrac{9x}{2} \cdot \dfrac{2\cancel{(x-4)}}{(x+10)\cancel{(x-4)}}$

$= \dfrac{18x}{2(x+10)} = \boxed{\dfrac{9x}{(x+10)}}$

20) $\dfrac{m+3}{4m+8} - \dfrac{m-6}{4m+8}$

$\dfrac{m+3-(m-6)}{4m+8} = \dfrac{m+3-m+6}{4m+8}$

$= \dfrac{9}{4m+8} = \boxed{\dfrac{9}{4(m+2)}}$

21) $\dfrac{4}{2n} + \dfrac{6n}{5n-1}$ common denom. of $(2n)(5n-1)$

$\dfrac{4(5n-1)}{2n(5n-1)} + \dfrac{6n(2n)}{2n(5n-1)}$

$= \dfrac{20n-4+12n^2}{2n(5n-1)} = \dfrac{4(3n^2+5n-1)}{2n(5n-1)}$

$\boxed{= \dfrac{2(3n^2+5n-1)}{n(5n-1)}}$

22) $\dfrac{5}{a+3} - \dfrac{6a-4}{2a-1}$

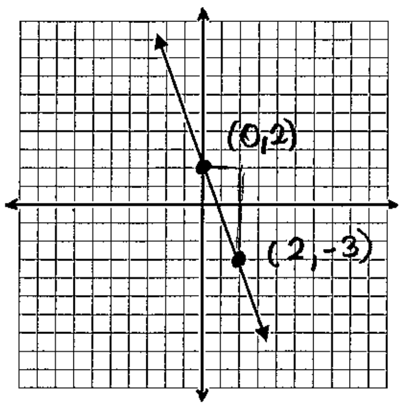
$\dfrac{5(2a-1)}{(a+3)(2a-1)} - \dfrac{(6a-4)(a+3)}{(a+3)(2a-1)}$

$\dfrac{10a-5}{(a+3)(2a-1)} - \dfrac{(6a^2+18a-4a-12)}{(a+3)(2a-1)}$

$\dfrac{10a-5-6a^2-18a+4a+12}{(a+3)(2a-1)}$

$= \boxed{\dfrac{-6a^2-4a+7}{2a^2+5a-3}}$

1) Find the slope of the line



Use 2 points. Count
Rise = +5
Run = −2

Slope = $\boxed{-\frac{5}{2}}$

Slope: $-\frac{5}{2}$

2) Find the slope of the line through the pair of points:

a) (-3 , 6) and (9 , -12) slope:________

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{-12-6}{9-(-3)} = \frac{-18}{12} = \boxed{-\frac{3}{2}}$

b) (8 , 6) and (4 , -6) slope: $-\frac{3}{2}$

3) Find the slope of the line

point-slope form

a) y-3 = ½(x-2) slope: $1/2$

b) 5x – 3y = 15 slope: $5/3$

$y-3 = \frac{1}{2}(x-2)$

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

$y = \frac{1}{2}x + 2$

$5x - 3y = 15$

$\frac{-3y}{-3} = \frac{-5x+15}{-3}$

$y = \frac{5}{3}x - 5$

4) Find the slope of the line parallel to the given line:

a) $y = -\frac{7}{3}x - 3$ slope: $-7/3$

b) 4x – 2y = 12 slope: 2

parallel lines have equal slopes.

$4x - 2y = 12$

$\frac{-2y}{-2} = \frac{-4x}{-2} + \frac{12}{-2}$

$y = 2x - 6$

5) Find the slope of the line perpendicular to the given line:

a) $y = \frac{2}{3}x - 4$ slope: $-3/2$

b) 2x + 6y = 12 slope: $+3/1$

perpendicular lines have opposite reciprical slopes.

$2x + 6y = 12$

$6y = -2x + 12$ So $y = -\frac{1}{3}x + 2$

6) Find the value of x or y so that the line through the points has the given slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

a) (x , 2) and (- 7 , -4) ; Slope = 1

b) (4 , y) and (-2 , 7); Slope of ½

$1 = \frac{-4-2}{-7-x}$

$-7 - x = -6$

$\boxed{x = -1}$

$\frac{1}{2} = \frac{7-y}{-2-4}$

cross multi.

$\frac{1}{2} = \frac{7-y}{-6}$

$-6(1) = 2(7-y)$

$-6 = 14 - 2y$

$\boxed{y = 10}$

7) Solve the system by Graphing:

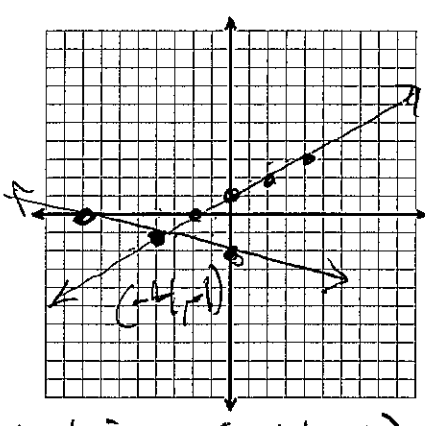
$x = -2 + 2y$

$-x - 8 = 4y$

$\frac{2y}{2} = \frac{x}{2} + \frac{2}{2}$

$y = \frac{1}{2}x + 1$

slope y-int



$-x - 8 = 4y$

Rewrite

$\frac{4y}{4} = \frac{-x}{4} - \frac{8}{4}$

$y = -\frac{1}{4}x - 2$

Solution: (−4,−1)

8) Solve the system by substitution:

$-x + y = 2$

$-8x + 4y = -4$

$y = 2 + x$

let $y = x + 2$

Substitute (x+2) for "y" in 2nd Eq.

$-8x + 4(x+2) = -4$

Solve for x.

$-8x + 4x + 8 = -4$

$-4x + 8 = -4$

$-4x = -12$

$\boxed{x = 3}$ plug x=3 back into either equation to find "y."

$-x + y = 2$

$-(3) + y = 2$

$\boxed{y = 5}$

Check:

$-8(3) + 4(5) = -4$ ✓

Solution is point of intersection

9) Solve the system by elimination:

$$x + 3y = 29$$
$$3x + 2y = 31$$

times 3

$$\begin{aligned} &3x+9y=87 \\ -\ &3x+2y=31 \\ \hline &0x+7y=56 \end{aligned}$$

SUBTRACT

$$\frac{7y}{7} = \frac{56}{7}$$

$\boxed{y=8}$

plug back in to find x: $x+3(8)=29$

$\boxed{x=5}$

Solution (5,8)

10) Find the distance between each pair of points:

a) (-1 , -5) and (5 , -3)
b) (-3 , 6) and (8 , 1)

$d = \sqrt{(y_2-y_1)^2+(x_2-x_1)^2}$

A) $\sqrt{(-5-(-3))^2+(-1-5)}$

$\sqrt{(-2)^2+(-6)^2}$

$\sqrt{4+36}$

$\sqrt{40} = 2\sqrt{10}$

B) $\sqrt{(1-6)^2+(8-(-3))^2}$

$\sqrt{(-5)^2+(11)^2}$

$\sqrt{25+121}$

$\sqrt{146}$

11) Find the midpoint of the line with the given endpoints: (-9 , -9) and (9 , 3)

$$\text{Midpoint} = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$M = \left(\frac{-9+9}{2}, \frac{-9+3}{2}\right)$$

$$M = \left(\frac{0}{2}, \frac{-6}{2}\right)$$

$M = (0,-3)$

12) Given the midpoint and one endpoint of a line segment, find the other endpoint.

Endpoint (5 , -2) ; midpoint (10 , -10)

$$10, -10 = \left(\frac{5+x}{2}, \frac{-2+y}{2}\right)$$

$10 = \frac{5+x}{2}$

$20 = 5+x$

$x=15$

$-10 = \frac{-2+y}{2}$

$-20 = -2+y$

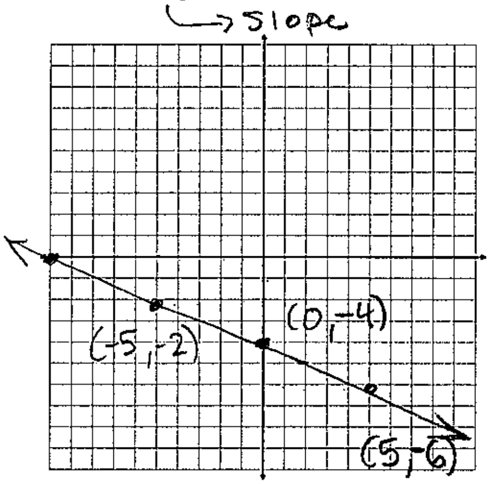
$-18 = y$

Endpoint (15,-18)

13) Sketch the graph:

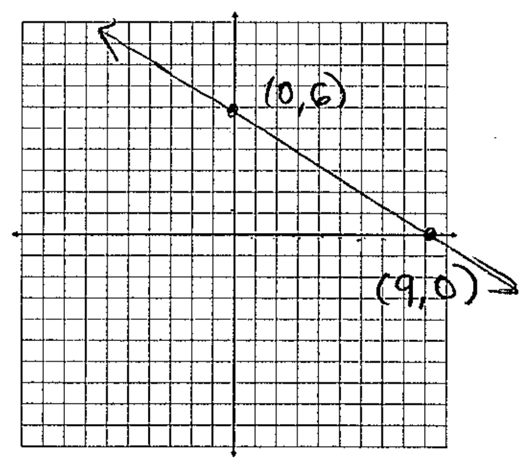
$y = -\frac{2}{5}x - 4$ → y-intercept

→ slope



14) Sketch the graph:

2x + 3y = 18



x	y
0	6
9	0

*using intercepts

OR write in $y=mx+b$ form.

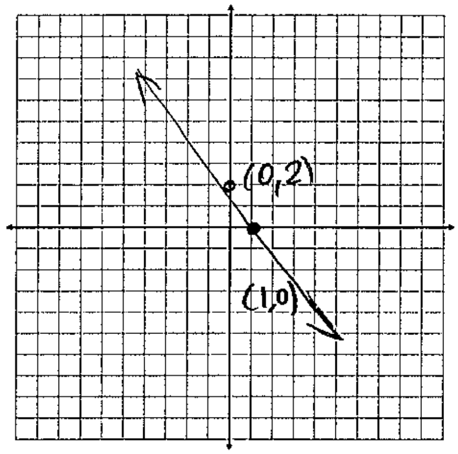
$2x+3y=18$

$3y = -2x+18$

$y = -\frac{2}{3}x+6$

15) Sketch the graph:
x-intercept = 1 and y-intercept = 2

(1,0) (0,2)

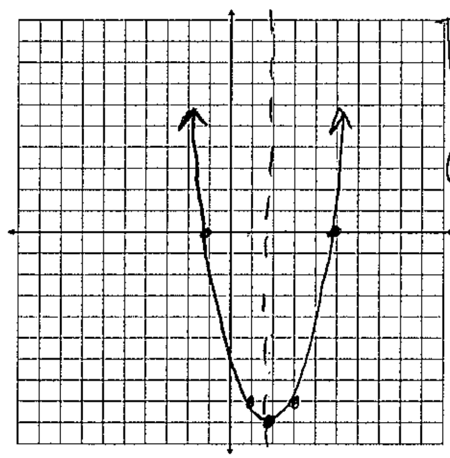


to find x-intercept... let y=0

to find y-intercept... let x=0

16) Sketch the graph:
$y = x^2 - 4x - 5$

Quadratic so graph is a parabola.



x-intercept

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

$(x-5)(x+1) = 0$

$x = 5$

$x = -1$

x	y
0	-5
1	-8
2	-9
3	9-12-5=-8
4	16-16-5=-5

opens UP

y-int at (0,-5)

vertex (2,-9)

AOS: $x = \frac{-b}{2a}$

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

$(2)^2 - 4(2) - 5$

$4 - 8 - 5$

$-4 - 5 = -9$

17) Write the equation on the line that passed through (2 , 3) and has a slope of ½.

point-slope

$y - y_1 = m(x - x_1)$

$y - 3 = \frac{1}{2}(x - 2)$

Writing the equation in slope-intercept form we get...

$y - 3 = \frac{1}{2}(x - 2)$

$y - 3 = \frac{1}{2}x - \frac{1}{2} \cdot \frac{2}{1}$

$y - \cancel{3} = \frac{1}{2}x - 1$

$\quad + \cancel{3} \qquad +3$

$y = \frac{1}{2}x + 2$

Writing in Standard Form we get...

$y = \frac{1}{2}x + 2$

$-\frac{1}{2}x + y = 2$

$\frac{1}{2}x + y = 2$ Multiply by 2 $x + 2y = 4$

18) Write the equation of the line that passes through the points (1 , -4) and (4 , 5).

to write the equation we need the SLOPE!

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{5-(-4)}{4-1} = \frac{9}{3} = \frac{3}{1}$

Using $m = \frac{3}{1}$ and the point (1, -4)

point-slope: $y - (-4) = 3(x - 1)$

$y + 4 = 3(x - 1)$

slope-intercept: $y + 4 = 3x - 3$

$\quad -4 \qquad -4$

$y = 3x - 1$

Standard Form: $-3x + y = -1$

$3x - y = 1$

19. <u>GIVEN :</u> $f(x) = 3x - 1$

$g(x) = 2x^2$

<u>EVALUATE:</u>

a) f(4)

b) g(-3)

c) f($-2x^2 + 3$)

d) (f + g)(x)

e) (g – f)(x)

f) (f ∘ g)(x)

g) (g ∘ f)(-1)

a.) $f(4) = 3(4) - 1 = 12 - 1 = 11$

b.) $g(-3) = 2(-3)^2 = 2(9) = 18$

c.) $f(-2x^2+3) = 3(-2x^2+3) - 1 = -6x^2 + 9 - 1 = -6x^2+8$

d.) $(f+g)(x) = f(x) + g(x) = (3x-1) + (2x^2) = 2x^2+3x-1$

e.) $(g-f)(x) = g(x) - f(x) = 2x^2 - (3x-1) = 2x^2-3x+1$

f) $(f \circ g)(x) = f(g(x)) = 3(2x^2) - 1 = 6x^2-1$

g) $(g \circ f)(x) = g(f(x)) = 2(3x-1)^2 = 2(3x-1)(3x-1)$

$= 2(9x^2-3x-3x+1)$

$= 2(9x^2-6x+1)$

$= 18x^2-12x+2$