

## Summer Math Packet

 For students taking POR Algebra II
## Dear Student,

Welcome to Algebra 2! Algebra 2 is the branch of mathematics that examines families of functions numerically, algebraically, and graphically.

This summer math packet addresses the material that you were exposed to in previous math courses. It serves two purposes:

1. It will allow you to remain mathematically fresh during the summer; and
2. It will allow you to enter Algebra 2 prepared, and ready with a review of previous mathematical concepts.

To receive credit for this packet, all work MUST be shown in the space provided for each question. This includes the multiple choice section as well. All work must be done in pencil and be neat and organized. In addition, use the answer sheet provided to document your multiple choice answers. This WILL be graded and counted towards the $1^{\text {st }}$ marking period.

We hope that you have an enjoyable summer and return ready for Algebra 2.

Name:
Date:
Period: $\qquad$

## POR Algebra 2 Summer Packet Answer Sheet

Name:
Date: $\qquad$ Period: $\qquad$

## Multiple Choice Answers

1. $\qquad$
2. $\qquad$
3. $\qquad$
4. $\qquad$
5. $\qquad$
6. $\qquad$
7. $\qquad$
8. $\qquad$
9. $\qquad$
10. $\qquad$
11. $\qquad$

Open-Ended Answers
Write your answers within the Open Ended section for these answers.

## Multiple Choice Section:

Identify the choice that best answers the following multiple choice questions. All work for these problems must be shown in the space next to the question. Transfer final answers to the attached answer sheet. No Work = No Credit!

## Solve the equation:

## Using Structure to Solve a Multi-Step Equation

Solve $2(1-x)+3=-8$. Check your solution.

$$
\begin{array}{rlrl}
2-2 x+3 & =-8 & & \text { Multiply. } \\
-2 x+5 & =-8 & & \text { Combine like terms. } \\
\frac{-5}{-2 x} & =-13 \\
\frac{-2 x}{-2} & =\frac{-13}{-2} & & \text { Subtract } 5 \text { from each side. } \\
x & =6.5 & & \text { Dimplify. } \\
\text { Simplify. each side by }-2 .
\end{array}
$$

The solution is $x=6.5$.

## Check

$$
\begin{aligned}
2(1-x)+3 & =-8 \\
2(1-6.5)+3 & \stackrel{?}{=}-8 \\
-8 & =-8
\end{aligned}
$$

## Practice

1. $9 f+4-7 f=8$ (2 points)
a) $f=2$
b) $f=6$
c) $f=1 / 4$
d) $f=-2$
2. $4+6(7-m)=4 \quad$ (2 points)
a) $m=-7$
b) $m=-11$
c) $m=11$
d) $m=7$
3. $8 h+5-3 h=8 h-4 \quad$ (2 points)
a) $h=3$
b) $h=-19$
c) $h=2$
d) $h=-3$

## Evaluating a Function

Evaluate $f(x)=-4 x+7$ when $x=2$ and $x=-2$.

## SOLUTION

$$
\begin{aligned}
& f(x)=-4 x+7 \quad \text { Write the function. } \quad f(x)=-4 x+7 \\
& f(2)=-4(2)+7 \quad \text { Substitute for } x . \quad f(-2)=-4(-2)+7 \\
& \begin{array}{ccc}
=-8+7 & \text { Multiply. } & =8+7
\end{array} \\
& \begin{array}{cc}
=-1 & \text { Add. }=15
\end{array}
\end{aligned}
$$

When $x=2, f(x)=-1$, and when $x=-2, f(x)=15$.

## Practice

4. Evaluate the function $h(x)=5-3 x$ when $x=-2,0$, and 5 . ( 6 points)
a) $h(x)=-1 ; h(x)=5 ; h(x)=-10$
b) $h(x)=11 ; h(x)=-5 ; h(x)=-10$
c) $h(x)=-1 ; h(x)=5 ; h(x)=10$
d) $h(x)=11 ; h(x)=5 ; h(x)=-10$

## Using Graphs to Write Equations

Write an equation of each line in slope-intercept form.
a.


## SOLUTION

a. Find the slope and $y$-intercept.

Let $\left(x_{1}, y_{1}\right)=(0,-3)$ and $\left(x_{2}, y_{2}\right)=(4,3)$.

$$
m=\frac{y_{2}-y_{1}}{x_{2}-x_{1}}=\frac{3-(-3)}{4-0}=\frac{6}{4} \text {, or } \frac{3}{2}
$$

Because the line crosses the $y$-axis at $(0,-3)$, the $y$-intercept is -3 .
So, the equation is $y=\frac{3}{2} x-3$.
5. Find the slope of the line containing the points $(-2,3)$ and $(1,-1) . \quad m=\frac{y_{2}-y_{1}}{x_{2}-x_{1}}$
a) $m=-\frac{4}{3}$
b) $m=\frac{4}{3}$
c) $m=-\frac{3}{4}$
d) $m=\frac{3}{4}$
6. Write an equation of a line with a slope of $-\frac{2}{5}$ and a $y$-intercept of $7 . \quad y-y_{1}=m\left(x-x_{1}\right)$ (2 points)
a) $y=-\frac{2}{5} x-7$
b) $y+7=-\frac{2}{5} x$
c) $y=7 x-\frac{2}{5}$
d) $y=-\frac{2}{5} x+7$
7. Write an equation of the line in slope-intercept form for the graph. $y=m+b$

(2 points)
a) $y=\frac{4}{3} x+2$
b) $y=-\frac{4}{3} x+2$
c) $y=-\frac{3}{4} x+2$
d) $y=\frac{3}{4} x+2$
8. Interpret the slope of the line shown in the graph. $m=\frac{\text { rise }}{\text { run }}$ (2 points)

a) Rise over run
b) $m=\frac{1}{2}$
c) Each day $\frac{1}{2}$ ounce of soap is used
d) Every $\frac{1}{2}$ day an ounce of soap is used

## Graphing a Linear Function in Function Notation

Graph $f(x)=2 x+5$.

## SOLUTION

Step 1 Make an input-output table to find ordered pairs.

| $\boldsymbol{x}$ | -2 | -1 | 0 | 1 | 2 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| $\boldsymbol{f}(\boldsymbol{x})$ | 1 | 3 | 5 | 7 | 9 |

Step 2 Plot the ordered pairs.
Step 3 Draw a line through the points.


## Practice

9. Graph the linear function: $h(x)=-\frac{3}{2} x+4$
a)

c)

(2 points)
b)

d)

10. Use the graph to solve the system of linear equations. Identify the point where the graphs meet. (2 points)

$$
\begin{aligned}
& 5 x-4 y=8 \\
& -x+2 y=-4
\end{aligned}
$$

a) $(0,0)$
b) $(0,-2)$
c) $(-2,0)$
d) $(0,-4)$


## G) Core Concept

## Vertex Form of an Absolute Value Function

An absolute value function written in the form $g(x)=a|x-h|+k$, where $a \neq 0$, is in vertex form. The vertex of the graph of $g$ is $(h, k)$.

Graphing $f(x)=|x-h|+k$ and $g(x)=f(a x)$
Graph $f(x)=|x+2|-3$ and $g(x)=|2 x+2|-3$. Compare the graph of $g$ to the graph of $f$.

## SOLUTION

Step 1 Make a table of values for each function.

| $\boldsymbol{x}$ | -4 | -3 | -2 | -1 | 0 | 1 | 2 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\boldsymbol{f}(\boldsymbol{x})$ | -1 | -2 | -3 | -2 | -1 | 0 | 1 |


| $\boldsymbol{x}$ | -2 | -1.5 | -1 | -0.5 | 0 | 0.5 | 1 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\boldsymbol{g}(\boldsymbol{x})$ | -1 | -2 | -3 | -2 | -1 | 0 | 1 |

Step 2 Plot the ordered pairs.
Step 3 Draw the V-shaped graph of each function. Notice that the vertex of the graph of $f$ is $(-2,-3)$ and the graph is symmetric about $x=-2$.

11. Graph the function $g(x)=|x|-1$ (2 points)
a)

b)

c)

d)


## Open Ended Section:

All work for these problems must be shown in the space next to the question.
No Work = No Credit!
12. Solve the equation. (4 points)

$$
\frac{2}{3}(3-6 x)=-(8 x-4)
$$

13. Solve the equation. (4 points)

$$
8(3 g+2)-3 g=3(5 g-4)-2
$$

14. One or more of the following equations have no solution. Circle all that apply. Hint: No solution means the variables would cancel themselves out. (3 points)
a) $7 y+13=5 y-3$
b) $8+9 p=9 p-7$
c) $3(7 r-2)=21 r-6$
d) $2(3 x+6)=3(2 x-6)$
15. Write an equation in point-slope form of the line that passes through the given point and has the given slope: $(3,4) ; m=\frac{1}{3} \quad y-y_{1}=m\left(x-x_{1}\right) \quad$ (2 points)


## Practice

16. Describe the slope of the line. Then find the slope. (4 points)

17. Graph the linear function: $y=2$ (3 points)

18. Graph the linear function: $\mathrm{q}(\mathrm{x})=-3 \mathrm{x}$ (4 points)

19. Graph the linear function: $y=2 x-5$ (4 points)

20. The function $y=3 x+7$ represents the age in months of a boxer puppy $x$ and the weight in pounds of a boxer puppy y. (2 points each)
a) Find the $x$-intercept (when $y=0$ ) and $y$-intercept (when $x=0$ ).
b) Describe what the y-intercept represents with respect to the puppy.
21. The function $2 x+1.5 y=18$ represents the number of book raffle tickets $x$ and food raffle tickets y you buy at a club event. (2 points each)
a) Solve the equation for y. Hint: Get y by itself.
b) Complete the input-output table to find ordered pairs for the function.

| $x$ | $y$ |
| :---: | :---: |
| 3 |  |
| 6 |  |
| 9 |  |

c) Plot the ordered pairs in a coordinate plane.

22. A dance team has two competitions on the same day. The coaches decide to split the 96 -member team, sending some to each competition. Competition A requires fourmember dance teams per event, and Competition B requires six-member dance teams per event. The equation $4 x+6 y=96$ models this situation, where x is the number of four-member teams and $y$ is the number of six-member teams. Graph the equation. (2 points)
$4 x+6 y=96$

23. The equation $y-2=\frac{5}{4}(x+8)$ represents the cost (in dollars) of making your own juice (in fluid ounces). (2 points each)
a) Write the equation in slope-intercept form. $y=m x+b$
b) What is the slope of the line?
c) Use the linear function in part (a) to determine the base cost of making your own juice.
24. A T-shirt design company charges your team an initial fee of $\$ 25$ to create the team's design. Each T-shirt printed with your design costs an additional $\$ 8$. (2 points each) a) Write a linear model that represents the total cost of purchasing your team's Tshirts with your design as a function of the number of T -shirts.
b) Your team has 35 members. If a T -shirt is purchased for every member, what would be the cost?
25. Solve the system of linear equations by substitution. Check your solution. (4 points)

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

26. Solve the system of linear equations by elimination. Check your solution. (4 points)

$$
\begin{aligned}
& 2 x-3 y=9 \\
& 5 x+3 y=12
\end{aligned}
$$

27. Tell whether the ordered pair is a solution of the system of linear equations. (4 points) $(3,4) ; x+y=7$
$x-2 y=-5$
28. Solve the system of linear equations by graphing. Identify the point where the graphs meet. (4 points)
$y=-\frac{3}{2} x-3$
$y=\frac{1}{2} x+5$

29. Which of the following choices represents a quadratic function? Circle all that apply. (4 points)
a) $y=3 x^{2}-5$
b) $y=(x-6)^{2}+1$
c) $2 x+5 y=8$
d) $f(x)=2 x^{3}$
e) $g(x)=x(x+3)$
f)

g)

h)

30. Kelly and Kim are both babysitters. Kelly charges a flat fee of $\$ 10$ plus $\$ 6$ per hour to babysit. The table shows the total hourly fee that Kim charges to babysit. (2 points each)

| Kim's Babysitter Fee |  |
| :---: | :---: |
| Number of hours, $x$ | Total fee, y |
| 1 | $\$ 22$ |
| 2 | $\$ 26$ |
| 3 | $\$ 30$ |
| 4 | $\$ 34$ |

a) Who charges more per hour?
b) How many hours must Kim and Kelly babysit for their total fees to be the same? Hint: Write two linear equations describing the fee for Kim and Kelly as a system of equations, then solve for $x$.

