**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Algebra 2 Fall Final Exam Review**

**1. Linear Applications**

a. Kim and Cyndi are starting a business tutoring students in math. They rent an office for $400 per month and charge $40 per hour per student.  Write an equation to represent their profit. Then find their profit for a single month if they have 15 students for one hour per week? (Assume 4 weeks per month)

b. To fix Ms. Dukes’s car, Bob’s Bumper Repair charges a flat fee of $40 plus $45 per hour.

 i) Write an algebraic equation using C for the cost and h for the number or hours.

 ii) How much would it cost to repair the car if it took 8 hours to complete?

c. A tree 5 feet tall grows an average of 6 inches each year.

 i) Write and graph a linear equation to model the tree’s height (in feet) as a function of time (in years).

 ii) How tall will the tree be in 20 years?

**2. Graphing Absolute Value Functions**

a. Given the function $f\left(x\right)=-\left|x+2\right|-1$

 i. What is the vertex?

 ii. Opens: Up or Down (circle answer)

 iii. Stretched/Compressed/Neither

 iv. Graph the function



b. Given the function $f\left(x\right)=2\left|x+4\right|+5$

 i. What is the vertex?

 ii. Opens: Up or Down (circle answer)

 iii. Stretched/Compressed/Neither

 iv. Graph the function

c. Given the function $f\left(x\right)=\left|x\right|+1$

 i. What is the vertex?

 ii. Opens up or down (circle answer)

 iii. Stretched/Compressed/Neither

 iv. Graph the function

**3. Solve the System of Equations by Graphing**

a. $\begin{matrix}-2x+y=3\\y=-5x-4\end{matrix}$ b. $\begin{matrix}4x+y=1\\x+y=-2\end{matrix}$ c. $\begin{matrix}y=\frac{1}{2}x-2\\-3x+6y=12\end{matrix}$

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**4. Use either Substitution or Elimination to solve the following system of equations.**

a. $\begin{matrix}-3x-4y=2\\3x+3y=-3\end{matrix}$ b. $\begin{matrix}y=5x-7\\-3x-2y=-12\end{matrix}$ c. $\begin{matrix}-4x+y=6\\-5x-y=21\end{matrix}$

**5. Graph the inequality.**

a. $y\leq \frac{1}{2}x-3$ b. $2x-3y\geq 9$ c. $y<-5x+1$

**6. Graphing Quadratic Functions**

a. Graph the function: $y=-(x+4)^{2}+5$

i. What is the vertex?

ii. What is the y-intercept?

iii. Stretched/Compress/Neither (circle one).



b. Graph the function: $y=(x+5)(x+9)$

i. What is the vertex?

ii. What is the y-intercept?

iii. Stretched/Compress/Neither (circle one).



c. Graph the function: $y=x^{2}-3$

i. What is the vertex?

ii. What is the y-intercept?

iii. Stretched/Compress/Neither (circle one).

**7. Quadratic Applications- Maximum/Minimum/Zeroes**

a. A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into the lake after exploding at its maximum height. The rocket’s height above the surface of the lake is given by the function $h\left(t\right)=-16t^{2}+64t+80$. What is the maximum height reached by the rocket? When does the rocket hit the ground?

b. A small business’ profits over the last year have been related to the price of the only product. The relationship is $R\left(p\right)=-0.4p^{2}+64p-2400$ where $R$ is the revenue measured in thousands of dollars and $p$ is the price of the product measured in dollars. What price would maximize the profit?

c. A ball is thrown and follows the path described by the function $h\left(t\right)=-5t^{2}+20t+1$, where $h$ is the height of the ball and $t$is the time since the ball was released. How long does it take for the ball to reach its maximum height? When does the ball hit the ground?

**8. Solve the equations by factoring:**

1. v2 – 18 = -3v b) 5n2 + 31n + 30 = 0 c) $6x^{2}-10x-4=0$

**9. Solve the equations with the quadratic formula:**

 a) 2k2 – 4k – 16 = 0 b) r2 + 5r + 24 = 0 c) 5v2 +10v – 3 = 0

**10. Simplify the expressions:**

1. (3 – 7i) + (-2 + 3i) b) (8 + 6i) - (-1 – i) c) (7 – 3i)(-4 – 8i)

**11. Simplify the expressions:**

1. (2x4 + 5) – (3x4 – 1) b) (2x3 + 5x4) + (3x4 + x3) c) (6 – 2n2) + (4n – 14n2 + 11)

**12. Simplify the expression:** (8m4n3 + 4) – (-12 + 8m2n3 + 14m4n3) + (14m2n3 – 13)

**13. Find the Product:**

1. 5r (7r + 4) b) (6v – 5) (3v + 5) c) (7x2 + 3x + 1)(4x – 3)

**14. Use long division to simplify:** $ $

1. $\left(3x^{2}-11x-26\right)÷(2x-5)$ b) $\left(7x^{3}+11x^{2}+7x+5\right)÷\left(x^{2}+1\right)$ c) $\frac{x^{2}+x-17}{x-4}$

**15. Use synthetic division to simplify:**

1. $\left(2x^{2}-7x+10\right)÷(x-5)$ b) $\frac{x^{4}-5x^{3}-8x^{2}+13x-12}{x-6}$ c) $\left(x^{3}-5x^{2}-2\right)÷\left(x-4\right)$

**16. Factor the following:**

1. $x^{3}+64$ b) $125n^{3}-27$ c) $27a^{3}-1000$

d) $x^{3}-3x^{2}-16x+48$ e) $x^{3}+7x^{2}-9x-63$ f) $g^{3}+3g^{2}-g-3$

**17. Solve the following:**

a) $x^{3}+2x^{2}-25x-50=0$ b) $3x^{3}-27x=0$ c) $n^{4}+6n^{3}=0$

d) $16g^{2}-625=0$ e) $3x^{3}+15x^{2}-18x=0$ d) $x^{3}-25x=0$

**18. Solve the following systems either by algebraically or by graphing:**

a) $\begin{matrix}y=-3x^{2}+3\\y=x+3\end{matrix}$ b) $\begin{matrix}y=x^{2}-4x+6\\y=x+2\end{matrix}$ c) $\begin{matrix}y=x^{2}+8x+16\\y=x+6\end{matrix}$

**19. Find the average rate of change of the following:**

 a) Find the average rate of change from b) Find the average rate of change from

$x=2$ to $x=5$ $x=-1$ to $x=1$



c) Find the average rate of change from $x=0$ to $x=2$

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| --- | --- |
| $$x$$ | $$f(x)$$ |
| 0 | 5 |
| 1 | 1 |
| 2 | -3 |
| 3 | -7 |
| 4 | -11 |