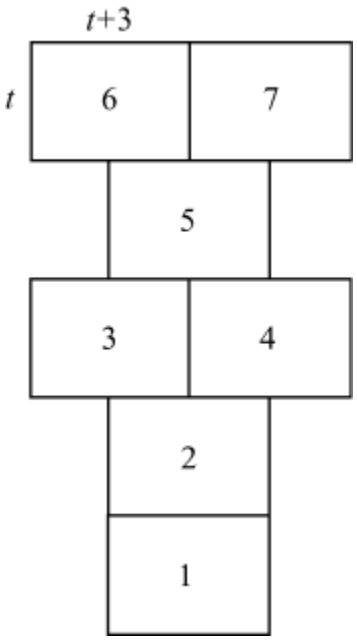
Name: _____

Algebra 1 Part 2 Final Exam

Directions: Answer the questions below. Make sure to show your work and justify all your answers.

1. Children play a form of hopscotch called *Jumby*. The pattern for the game is as given below.



Find the area of the pattern in simplest form.
(SHOW WORK)

2. A boat travels 33 miles downstream in 4 hours. The return trip takes the boat 7 hours. Find the speed of the boat in still water.
(SHOW WORK)

3. An owner of a key rings manufacturing company found that the profit earned (in thousands of dollars) per day by selling n number of key rings is given by $n^2 - 2n - 3$, where n is the number of key rings in thousands. Find the number of key rings sold on a particular day when the total profit is $5,000.
(SHOW WORK)

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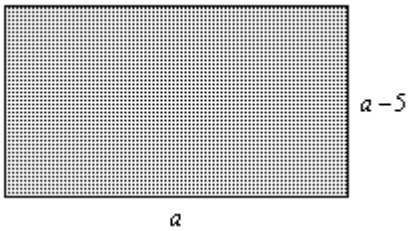
Directions: Answer the questions below. Make sure to show your work and justify all your answers.

4. Two trains A and B are 240 miles apart. Both start at the same time and travel toward each other. They meet 3 hours later. The speed of train A is 20 miles faster than train B. Find the speed of each train.
(SHOW WORK)

5. A hawk flying at a height of 60 feet spots a rabbit on the ground. If the hawk dives at a speed of 55 feet per second, how long will it take the hawk to reach the rabbit?
(Hint: A model for the vertical motion of a projected object is given by the equation $h = -16t^2 + vt + s$, where h is the height in feet, t is the time in seconds, v is the initial velocity in feet per second, and s is the starting height of the object in feet. Use this equation to find the time taken by the hawk to reach the rabbit.)
(SHOW WORK)

6. Half of the students in a freshman class are 14 years old. One-third are 15 and the rest are 13. Is the mean age greater than or less than the median age? **Explain.**

7. The rectangle has an area of 24 square centimeters. Find the length a of the rectangle.



(SHOW WORK)

8. Samir is trying to decide between two checking account plans. After researching plans at two banks, he finds that Unity Bank offers a monthly compounded interest rate of 0.14%, while Sunrise Banking offers 1.6% interest compounded annually. Which is the better plan? **Explain.**
(SHOW WORK)

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Directions: Answer the questions below. Make sure to show your work and justify all your answers.

9. The maximum horizontal range of a projectile is given by the formula $R = \frac{u^2}{g}$, where u is the initial velocity and g is the acceleration due to gravity. Find the velocity with which a ball can be thrown to have a maximum range of 20 meters when the acceleration due to gravity is equal to 9.8 m/s.
(SHOW WORK)

10. Mr. Bryant is trying to figure out which class project to work on for community service. He surveyed the junior and senior students about their preferred project. The frequency table shows the responses of the students.

	Juniors	Seniors	Total
Park Cleanup	30	26	56
Food Kitchen	50	34	84
Clothing Drive	10	50	60
Total	90	110	200

Determine the joint frequency of being a senior and wanting to have a park cleanup. **Explain what this answer represents**.

11. Andy is learning to play the guitar. Last week he recorded the minutes per day that he practiced. Find the mean absolute deviation. **Round to the nearest tenth**.

Day	S	M	T	W	T	F	S
Minutes	40	55	35	60	20	50	55

12. Tara owes $14,375 in credit card debt. The interest accrues at a rate of 5.3%. She is also borrowing $570 each month for rent from her parents. She does not pay interest on the money she borrows from her parents.

a. Let $f(t)$ represent the amount of money Tara owes in credit card debt, where t is the number of years after interest begins to accrue. Let $g(t)$ represent the amount of money Tara owes to her parents, where t represents the number of years passed. Write a function $(f + g)(t)$ to represent the total money that Tara owes.

b. How much will Tara have to repay if she continues this way without any repayment for 2 years?
(SHOW WORK)

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Algebra 1 Part 2 Final Exam

Directions: Answer the questions below. Make sure to show your work and justify all your answers.

Suppose a car dealer receives a profit of $500 for each mid-sized car m sold and $750 for each sport-utility vehicle s sold. The dealer must sell at least two mid-sized cars for each sport-utility vehicle and must earn at least $3500 per week.

13. Suppose a car dealer sells 2 sport-utility vehicles. How many mid-sized cars must be sold to earn at least $3500? **(SHOW WORK)**

Determine the model that best describes the data and then write an equation for the function that models the data.

14. An engineer recorded the acceleration of an experimental rocket.

time (sec)	0	1	2	3	4
speed (mph)	4	12	36	108	324

(SHOW WORK)

15. The city bike rental program is analyzing their growth in member rates. The number of regular members is growing by 4.7% per month. The number of VIP members is growing by 65% per year. Write a function to represent the number of regular members after *t* years. Then, write an equivalent function that represents the regular members with only 1 compounding per year. What is the effective **yearly** rate of growth of regular members? Determine the effective rate of growth per year for regular members. Which type of member is growing at a faster rate?

a. What is the effective YEARLY rate of the growth for regular members?

b. Which type of member is growing at a faster rate?

16. Becky is building a square rabbit cage. The length and width are both 3 feet less than the square dog pen she built for her dog. The area of the rabbit cage is 25 ft.

a. Using *D* to represent the side of the square dog pen, write an expression to represent the area of the rabbit cage.

Name:_____

Algebra 1 Part 2 Final Exam

Directions: Answer the questions below. Make sure to show your work and justify all your answers.

b. Use the expression and the given area to find the length of a side of the square dog pen.

c. How many feet of fencing is needed to enclose the 4 sides of the **rabbit cage**? **(SHOW WORK)**

17. David is throwing a stone in the air at an angle from the ground with an initial velocity of 30 feet per second. The equation $h = -10t^2 + 40t + 2$gives the height of the stone thrown. Find the maximum height of the stone.
(SHOW WORK)

18. The table shows the amount of money in a savings account after several weeks.

Week	Savings
1	$125
2	$140
3	$155
4	$170
5	$185
6	$200

a. Is the sequence arithmetic or geometric? Explain. Find the common difference or common ratio.

b. Write a recursive formula for the sequence.

c. Write an explicit formula for the sequence.

19. The passing yards for the top 5 quarterbacks in the country are 3,832, 3,779, 3,655, 3,642, and 3,579. Find the variance and standard deviation. Round to the nearest hundredth.
(EXPLAIN WORK)

20. Jack has 20 more stamps than Dylan has. Together they have 46 stamps. Find the number of stamps each has.

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Algebra 1 Part 2 Final Exam

Directions: Answer the questions below. Make sure to show your work and justify all your answers.