

Summer Math: Entering Algebra 1

Totally 10 Activity

Your task is to choose from the list of activities below following these guidelines:

- 1) You must complete ten activities.
- 2) Choose at least one activity from each of the categories:
 - a. The Number System (NS)
 - b. Geometry (G)
 - c. Expressions and Equations (EE)
 - d. Functions (F)
 - e. Statistics and Probability (SP)
- 3) The remaining activities can be chosen from any category. Challenge yourself: do more problems for possible extra credit.
- 4) All work should be done on the provided worksheet.
- 5) Please do one activity per worksheet.
- 6) Fill out the top portion of the Totally 10 Activity Worksheet for each problem. Use *Category Code* provided in parentheses above and the name of the problem under *Question Title*.
- 7) Each activity will be assessed using the state scoring rubric of 0-3.
- 8) Use the general rubric to be sure that each of your answers meets the highest expectations.
- 9) Use the Four Step Problem Solving method for each activity.

Resources that you will need to complete the project: (Available online on Student Portal website)

- 1) Answer Worksheet (One per problem)
- 2) Four Steps to Problem Solving/ Problem Solving Strategies
- 3) General Scoring Rubric
- 4) Graph paper

Additional resources that you may need:

- 1) Calculator
- 2) Ruler
- 3) Protractor

The Number System (NS)

1. Smith's Family

Mr. Smith has six children in his family. The list below tells you about the ages of his children.

- a. No child is more than 10 years old and none of the children are the same age.
- b. Alejandra is older than 8 years old, but less than 10.
- c. Debra is the oldest.
- d. David is 4 years younger than Debra.
- e. Dexter is 3 years younger than David.
- f. If Cristina was 5 years older, she would be as old as Debra.
- g. Joey is older than Dexter but younger than David.

Make a chart showing each child and the child's age. Explain how you got your answers.

2. Busy Schedule

For the sixth graders at the Kent Preparatory Middle School, music, art and physical education are scheduled each month so that music is held only on dates that are multiples of three. Art is held only on dates that are multiples of five, and physical education is held only on dates that are even numbers.

- On which date(s) do music, art, and physical education meet on the same date? Explain how you found your answer, making sure to use mathematical reasons and examples from the problem.
- Jake is a sixth grader at the Kent Preparatory Middle School and has had music, art, and physical education all on the same day only six times during the ten-month school year. Explain why this could happen.

3. Sum of 20

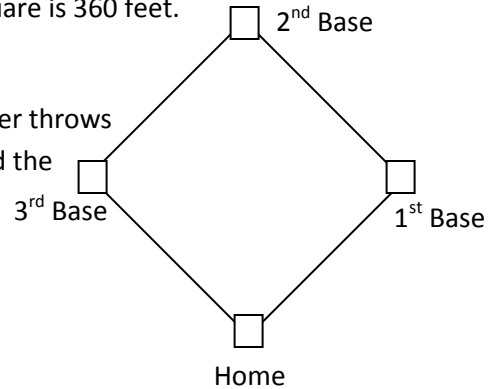
How many ways can you add three different even numbers to get a sum of 20? Different combinations of the same numbers do not count separately: $2 + 4 + 14$ is the same as $4 + 2 + 14$. Do not use zero in this problem. Show all your work.

Geometry (G)

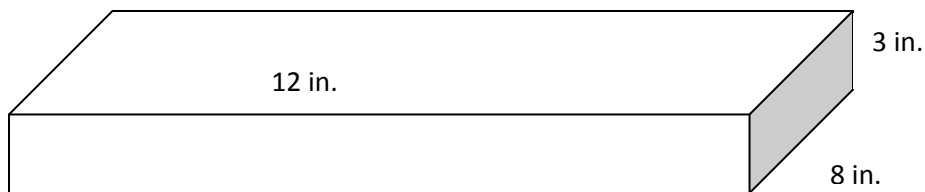
1. Caught Stealing

A baseball “diamond” is really a baseball square. The perimeter of the square is 360 feet.

- What is the area enclosed by the baseball diamond?
- To catch a base runner stealing from 1st base to 2nd base, the catcher throws from home plate to 2nd base. Use the Pythagorean theorem to find the distance that the ball has to travel.



2. Perfect Packing Company



The Perfect Packing Company wants to lower the cost of its boxes by reducing the surface area while keeping the volume the same. One of the boxes is shown above.

- Find the volume of this box. Show how you found your answer.
- Find the surface area of this box. Show how you found your answer.
- Find the dimensions of a box that has the same volume but less surface area. Show how you found your answer.

3. Tricky Triangles

Graph the triangle with the following coordinates: A(2,1), B(5,4), C(8,3).

- Classify the triangle.
- Describe how you could move one of the coordinates to change this into a right triangle.
- What will the coordinates of the original triangle be if it is translated down two units and to the right three units?
- Reflect the original triangle over the x-axis. What are the coordinates of the reflection?

Expressions and Equations (EE)

1. Dunk Tank

A booth at a local carnival is offering a chance to throw balls at a target to knock a clown in the water. The table below shows the relationship between the number of balls and the cost of the balls. Balls must be purchased in quantities of two.

Number of balls	Cost of balls
2	3
4	6
6	9
8	12
10	?
20	?

- If the pattern continues the same way, how much will 10 balls cost?
- In this pattern, what is the cost of 20 balls?
- Frank has \$20.35. What is the greatest number of balls he can throw at the clown? (Remember: Balls must be purchased in quantities of two.)
- Write an equation to show the relationship between the number of balls (b) and the cost (c)

2. Phone Card

Marty bought a phone card for \$25.00. With the card it costs 10 cents a minute to call within his area code and 20 cents a minute to call outside his area code. He plans to make 1 hour of calls within the area code and 2 hours outside the area code. Marty has already made 1 hour of calls within the area code. Based on this information determine:

- How many minutes of calls outside the area code will he be able to make with his card?
- What is the least he could spend for a phone card that would allow him to make the number of calls he wants to make both inside and outside the area code?
- Explain how you determined each of the answers. Make sure to use the mathematical reasons and examples from the problem in your explanation.

3. Charlie's Bike Trip

On a recent 10-day bike trip, Charlie recorded the number of hours he biked each day and the miles traveled.

Charlie's 10-Day Bike Trip

Hours	8	4	10	9.5	4.25	7	5	12.5	10	7.75
Miles	90	48	110	100	51	80	65	120	112	93

- Plot each of the data points on the grid. Make sure to give the graph a title, mark the scale and label each axis.
- Plot each number of miles and the corresponding number of hours it takes to ride that number of miles.
- Use the data in the problem to make a prediction of how many miles Charlie can plan to go in 6 hours of biking.
- Write an explanation of why your prediction is accurate.

Functions (F)

1. Animals

Most animals age more rapidly than humans do. The chart shows equivalent ages for horses and humans.

Horse age (x)	0	1	2	3							
Human age (y)	0	3	6	9							

- Complete the table
- Write an equation that relates human age to horse age.
- Find the equivalent horse age for a human who is 16 years old.
- Find the equivalent human age for a horse who is 9.5 years old.

2. New Bike

The new bicycle you want costs \$355. Suppose you have already saved \$50 toward the cost of the new bicycle. You plan to save \$5 more each week until you have enough money to buy the bike.

- Write an equation for the total amount T you will have w weeks from now.
- Graph the equation.
- Find the total amount saved after 7 weeks.
- How long will it take to save \$355?

3. Home Security

A home security company provides security systems for \$5 per week, plus an installation fee. The total fee for 12 weeks of service is \$210.

- Make a table to show the weekly cost of the security system from 1 to 12 weeks.
- What is the flat fee for installation?
- Write the equation that represents the relationship between the total fee and the number of weeks of service
- Graph the equation.

Statistics and Probability (SP)

1. Salary

The average salary of the nine employees of Paola's Perfect Programming is \$20,000. But the average of these nine employees' salaries and Paola's salary is \$28,000. Based on this information:

- How much does Paola earn per year?
- How much of an increase in total funds would it cost the company to raise the nine employees' salaries so that the average of their salaries is \$28,000?
- Explain how you determined your answer.

2. Favorite-Flavor Ice Cream

The chart below shows the results of the favorite-flavor ice cream survey for the 100 students enrolled in the four ninth-grade classes at Manville High School in Manville, NJ.

Teacher	Enrollment	Chocolate	Vanilla	Strawberry	Peach
Mrs. Weber	20	10	3	2	5
Ms. Zullo	25	20	1	0	4
Mrs. Malinowski	30	15	6	3	6
Ms. Joy	25	5	5	5	10
Total Students	100	50	15	10	25

- Use fractions, decimals or percents to show what part of the entire ninth-grade voted for each of the four flavors.
- Which one of the classes voted the same way for each of the flavors as did the entire ninth-grade?
- Make a circle graph to show the results of the survey for the entire ninth-grade.
- Explain how you know. Provide specific examples to show the flavors have the same ratios.

3. Basketball Shots

During basketball practice for three days this week Mike kept a record of the number of baskets he made and the number he missed.

Mike's Basketball Record

	Made	Missed	Total
Monday	30	20	50
Tuesday	20	10	30
Wednesday	50	50	100
TOTALS	100	80	180

- Find the percent of shots that Mike made for *each* of the three days.
- Suppose Mike shot the same number of baskets over the next three-day period as he did this week. Then suppose he made the same percent of baskets as on his best days this week. How many baskets would he make altogether during the next three days?
- Explain how you determined your answer. Use mathematical reasons for your answer using examples from the problem in your explanation.