

Vision - Potential

Vision Within Every Instructor – Potential Within Every Student

Newsletter of the HBCU College Algebra Reform Consortium*

Number 5 , March 1997

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[1] **Jackie Robinson**
Lawrence Woodward
Grambling State University

Jackie Roosevelt Robinson, the first African American to play baseball in the major leagues, was born January 31, 1919 in Cario, GA. Life was very difficult in Cario so the family, seeking better economic conditions, moved to California. At this time, California was not much better than Georgia in terms of segregation and prejudice against African Americans. To cope with the prejudice and gain respect, Jackie immersed himself in sports. A gifted athlete,

* Supported by the EXXON Educational Foundation and the U.S. Military Academy.

he excelled in football, basketball, baseball, and track while in high school. He went to Pasadena Junior College on a football scholarship and later transferred to the University of California at Los Angeles (UCLA) where he was the first athlete at the university to earn four varsity letters in one year. He also was the country's leading ground gainer in football in 1939.

Jackie served as a Second Lieutenant in the Army. After his discharge in 1945 (because of earlier football injuries to his ankles), he coached the Huston (now Huston-Tillotson) College baseball team. A year later he joined the Kansas City Monarchs baseball team of the National Negro League for a reported \$400 per month. During this time, Branch Rickey, President of the Brooklyn Dodgers, was searching for an African American player to integrate the major leagues. He chose Jackie not only for his excellent athletic and ball handling abilities, but also because of his fierce pride and determination. Brooklyn Dodgers owner, Walter O'Malley, states in Harvey Frommer's book *Rickey and Robinson*: "Branch wanted Jackie because he knew that had absolutely fierce pride and determination." It was these attributes that characterized Jackie during all of his endeavors and was the reason for his many successes on and off the field of athletic competition.

On October 23, 1945, Jackie signed a contract with Branch Rickey to play for the Montreal Royals, a Brooklyn Dodgers farm team in the International League. Many of the owners and sports writers were against the move, claiming that it would “destroy major league baseball.” However, Jackie and Branch were committed to continue with their plan. According to Frommder, Jackie said, “I think that I am the right man to pick for this test. There is no possible chance that I will flunk it or quit before the end for any other reason than I am not a good enough player.” History has shown that not only was Jackie good enough, but rather he was one of the best that has every played the game. However, the task of “breaking into the major league” was not an easy one. In 1947 during Spring Training, Jackie was forced to ride in the back of the bus and games were sometimes canceled because of his presence. Nevertheless, he proved his worth by leading the Royals to the National Championship in the Little World Series. His performance made it clear that he was ready to play in the major leagues, but not all the Dodger players wished this to happen. Some of the players threaten not to play, but backed down in face of the determined Branch Rickey. At the beginning of the 1947 season, the St. Louis Cardinals threatened to strike rather than play against a team that included an African American, e.g., Jackie Robinson. They backed down when National League President Ford Frick threatened to ban all strikers from professional baseball. On the field, pitchers often threw directly at Jackie, base runners tried to spike him, and he was subjected to a steady stream of racial insults from opposing players and fans. He received hate mail, death threats, and a warning that his baby, Jackie, Jr. would be kidnapped. Through it all, Jackie was faithful to the agreement he had reluctantly made with Branch Rickey – to control his explosive temper when subjected to racial taunts on the playing field.

Instead of responding verbally in 1947, Jackie let his playing do the talking for him. It was not

long before he was known as “the most exciting player in baseball.” Fans flocked to the ballpark in high numbers, setting an all time attendance record in 1947. Despite earlier opposition, most of his fellow teammates came to fully supported him because they they respected his abilities and were convinced of his value to the team. He led the league in stolen bases and was named Rookie of the Year. Even though he was much-aligned, he stated in his autobiography *I Never Had It Made*, that he succeeded because “I never cared about acceptance as much as I cared about respect.”

His playing reached a peak in 1949 when his exploits earned him a batting title and the Most Valuable Player Award. By this time, he was famous throughout the world. He had a string of 6 consecutive seasons batting over .300 and was renowned for his many daring steals of home. His success opened the doors for other great African Americans ball players such as Monte Irvin, Larry Doby, Roy Campanella, Don Newcombe, and Junior Gilliam. In 1950, Jackie receive the highest annual salary of any player in the Dodgers history, He retired from baseball in January of 1957 with a career batting average of .311 and 19 career steals of home, the most of any player in the post-World War II era.

After his retirement from baseball, Jackie became a successful businessman and devoted many of his efforts to the pursuit of a better life for African Americans. He was a Vice President of the Chuck O’Nuts restaurant chain, whose restaurants employed many African Americans. He worked for the Harlem YMCA in New York City and was Chairman of the Board for Freedom National Bank. He was a CEO) in a construction company that built houses for African American families. and was involved in various other ventures which were designed to stimulate African Americans participation in business.

Jackie was inducted into Baseball’s hall of Fame in 1962, his first year of eligibility. Even then he was surrounded by controversy, as fellow electee

Bob Feller said that he didn't want to enter the Hall at the same time as Jackie. At his induction, Jackie called three people from the audience to stand with him as he accepted his honor, his mother Mattie, his wife Rachael, and Branch Rickey.

Jackie was a man who chartered his own course in life, answering to his own instincts and refusing to be swayed by those who objected to his choices. He took the blows for being a trailblazer in integrating sports and spearheading opportunities for African Americans in this country. He died in 1972, a day after he threw out the ball to begin the second game of the 75th World Series.

Jackie Roosevelt Robinson will long be remembered as a man with incredible physical skills, mental fortitude, and competitive fire who arrived in the right place at the right time and had a major impact on the African American struggle for equality in this country.

[2] ILAP: "The Mathematics Laboratory at Texas Southern University"

**Della Bell & Tong Wu
Texas Southern University**

Open house activities for The Texas Southern University (TSU) Mathematics Laboratory were held Thursday, February 27, 1997 in Nabrit Hall, Room 141 from 2:00 – 3:30 PM. The "new" mathematics laboratory replaced the former laboratory which was designed for remediation purposes. The current mathematics laboratory was equipped with funds from a National Science Foundation Instrumentation and Laboratory Improvement (NSF-ILI) grant. Texas Southern University provided matching funds.

Equipment purchased with the grant funds include 20 IBM 586 computers, a computer screen projection device, one laser jet printer, 125 TI-83 graphing calculators and a view screen, and several CBL's and TI-92 calculators. Application software purchased include Maple V, Derive, and

EXCEL. Three laptop computers and additional software will be purchased in the future.

The equipment will support the planned reform in course content and the pedagogy being implemented by the TSU Mathematics Department. It will allow for: (1) integration of calculator and computer activities into the classroom; (2) addition of laboratory activities to encourage active student participation in the learning process; (3) addition of cooperative learning experiences and/or group projects; (4) an increase opportunity for students to apply mathematical modeling to problem solving; and (5) curriculum revision. Moreover, many problems in algebra, geometry, trigonometry, calculus, vector analysis, and matrices that require extensive and laborious training can be solved with a few key strokes using Maple V or Derive. As curriculum plans develop, teachers will bring their classes into the laboratory and/or assign activities to be done in the laboratory.

During the Open House activities, Mrs. Tong Wu, Mathematics Laboratory Director, discussed selected features of the computers and demonstrated their use to faculty and students. She also involved faculty and students in several activities using the graphic, symbolic, and numeric capabilities of the computers

[3] ILAP: Calculation of Series Resonance Circuit Frequency & Related Circuit Variables

**Laurette Foster
Prairie View A & M University**

(Interdisciplinary Lively Application Projects (ILAPs) are small group out-of-class projects developed by an interdisciplinary team of faculty. The development and use of ILAPs is central to the U.S. Military Academy's Project INTERMATH program to foster interdisciplinary cooperation and create integrated curriculums in a broad consortium of colleges and universities including Prairie View A & M University and other HBCUs. Project IN-

TERMATH is funded by the National Science Foundation and the Brown Foundation.)

At Prairie View A & M University (PVAMU), MATH 1113 “College Algebra” and ELET 1143 “Alternating Current Circuits” were selected as the courses where the first ILAP developed by the PVAMU team would be implemented. The following is a condensed version of this ILAP. (The full ILAP contains 12 requirements.)

“Calculation of Series Resonance Circuit Frequency and Related Circuit Variables”

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Background: Some students at PVAMU who are enrolled in beginning Circuit Analysis Courses experience difficulties when they are required to use their algebraic skills to rewrite a given equation to solve for a previously known variable. In Circuit Analysis courses, students are frequently required to derive or rewrite equations. This ILAP will present a typical Circuit Analysis problem and offer solutions using fundamental postulates of algebra.

Solution: A circuit contains a 220 pF capacitor (c) and a 10 mh inductor (I). The inherent resistance (DC resistance) of the coil is 200 ohms. The components are connected so that the total current (iT) flows through each component. The circuit receives its energy from a 10 vac, peak-to-peak, single phase source, whose output frequency and amplitude are variable. An investigation of the circuit’s components reveals that the capacitor is made from Mylar with a tolerance of plus or minus 20%; the inductor is wound using #26 American Wire Gauge (AWG) enamel conductor with an air core that yields a tolerance of plus or minus 10%. The schematic diagram is included in the appendix. A written and oral report is required to complete the ILAP.

Requirement #1:

Given: C , where $C = 220$ pico Farads (pF)
 $L = 10$ milli henries (mh)
 $2\pi \approx 6.28$
Solve the resonant frequency equations using the given values

$$Fr = \frac{1}{2\pi\sqrt{LC}}$$

Requirement #2:

Given C as in Requirement #1, use Fr as determined in Requirement #1 to compute the capacitive reactance X_c where $X_c = \frac{1}{2\pi Fr c}$

Requirement #7:

Two years later, several windings of the inductor develop a short across its lower extremities. This problem reduces the inductance of the coil by 14%. Write an equation that can be utilized to compute the Resonance Frequency considering the changed value of the inductor.

Requirement #12:

Write an equation that would predict the Resonance Frequency percent of error due to only two decimal places used for π in the calculation of REQUIREMENT #1 and the maximum of eight decimal places that are available from most scientific calculators.

SOLUTIONS

Solution Requirement #1:

$$\begin{aligned}
 Fr &= \frac{1}{2\pi\sqrt{(10x10^{-3})x(220x10^{-12})}} \\
 &= \frac{1}{6.28\sqrt{(10x220)x(10^{-3}x10^{-12})}} \\
 &= \frac{1}{6.28\sqrt{2200x10^{-15}}} \\
 &= \frac{1}{6.28\sqrt{2.200x10^{-12}}} \\
 &= \frac{1}{6.28(1.4832)x10^{-6}} \\
 &= 107.356x10^{-3} \\
 &= 1.0736x10^{-1}x10^6 \\
 &= 1.0736x10^5 \text{ Hertz}
 \end{aligned}$$

Solution Requirement #2:

$$\begin{aligned}
 X_c &= \frac{1}{2\pi Fr C} \\
 &= \frac{1}{6.28x10736x10^5 C 220x10^{-12}} \\
 &= \frac{1}{1483.2858x10^{-7}} \\
 &= .0006742x10^7 \\
 &= 6.742x10^3 \text{ ohms or } 6.742 \text{ K ohms}
 \end{aligned}$$

Solution Requirement #7:

(Given reduction of coil by 14%)

$$\begin{aligned}
 Fr &= \frac{1}{2\pi\sqrt{LC}} \\
 \text{Let } L &= L - .14L
 \end{aligned}$$

Therefore

$$Fr = \frac{1}{2\pi\sqrt{(L - .14L)C}}$$

Solution Requirement #12

$$\text{Given } Fr = \frac{1}{2\pi\sqrt{LC}}$$

Assume $\pi_0 = 3.14$ and $\pi_s = 3.141592654$

where s is the difference between π_0 and π_s .

Derive an equation for the percent error introduced because of the difference in significant digits used in the calculation of the Resonance Frequency, where π_0 and π_s equals eight decimal places.

Use K as the constant,

$$\begin{aligned}
 K &= \frac{1}{|2\pi\sqrt{LC}|}, \\
 \text{therefore } Fr\pi_0 &= \frac{K}{K}, \\
 \text{and } Fr\pi_s &= \frac{\frac{K}{\pi+s}}{\frac{K}{\pi}} \\
 \text{Percentage Error} &= \frac{\frac{1}{\pi} - \frac{1}{\pi+s} K x 100}{\frac{K}{\pi}} \\
 &= \frac{\frac{\pi+s-\pi}{\pi(\pi+s)} x 100}{\frac{1}{\pi}} \\
 &= \frac{\pi+s-\pi}{\pi(\pi+s)} \pi 100 \\
 &= \frac{s}{\pi+s} 100.
 \end{aligned}$$

[4] Writing Assignment – Direct and Inverse Proportionality

Write a one page essay discussing direct and inverse proportionality between two quantities. Include descriptions of real life examples in your essay. Also give a real life example of two related quantities that are neither in direct nor inverse proportion to one another.

Definition: Quantity y is directly proportional to quantity x if y and x change in such a way that their quotient is always the same. That is, $\frac{y}{x} = k$ or $y = kx$. (k is called the proportionality constant.)

Definition: Quantity y is inversely proportional to quantity x if y and x change in such a way that their product is always the same. That is, $yx = k$ or $y = \frac{k}{x}$. (k is called the proportionality constant.)

Sometimes the term “variation” is used in place of the term “proportional.” Thus one may speak of y being in direct variation with x if y is proportional to x .

Query: Is the slope of a line passing through the origin a proportionality constant? Why?

[5] “L” Numbers – A Discovery Activity

(This is a small group in-class, discovery activity. Students will implement the steps of the Discovery Process: (1) Generate Data, (2) Conjecture a

Pattern, (3) Check their Conjecture. A follow up activity is included to provide students with an opportunity to explore.)

We begin by first illustrating the idea of L numbers with two examples and then give the definition of an L number. Three is an “L” number because 3 dots can be arranged in an L shape. Likewise 5 is an L number because 5 dots can be arranged in an L shape, however 4 is not an L number. We say that the positive integer k is an L number provided k dots can be arranged in an L shape with as many dots on the vertical part as are on the horizontal part. The L diagrams for 3, 5, and 7 are

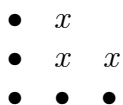


Query: What types of numbers are L numbers? Explain your reasoning.

(Are all numbers L numbers? Are even numbers L numbers? are all odd numbers L numbers? Does a number have to be positive to be an L number?)

Query: Is 1 an L number? Why?

Two L numbers are added by nesting the smaller number inside the larger number. For example, the diagram for the sum of L numbers 3 and 5 looks like (x 's rather than dots are used to show the L number 3.)



Task: Using L numbers, discover a formula for the sum of the first n positive odd numbers.

Step 1: (Generate Data) Draw the diagrams and count the number of dots in the diagram representing the sum of the

- (i) First 2 L numbers (i.e., 1, 3).
- (ii) First 3 L numbers.
- (iii) First 4 L numbers.

Step 2: (Conjecture a Pattern) Based on the diagrams in Step 1, **conjecture** the number of dots in the diagram for the sum of the first n L numbers. (If you do not recognize a pattern, return to Step 2 and continue that step for the first 5 L numbers, first 6 L numbers, etc. until a pattern becomes clear.)

Step 3: (Check Your Conjecture) Using your conjecture from Step 2, determine how many dots there are in the diagram for the sum of the first 6 L numbers. Then draw the diagram and count the number of dots in the diagram for the sum of the first 6 L numbers. Do your numbers agree?

Now, using your conjecture, how can you determine a formula for the sum of the first n positive odd numbers?

(Explain the reasoning behind your answer in terms of the conjecture you made in Step 2 and your answer to the question "What types of numbers are L numbers?")

Follow up Activity: Can you treat positive even integers in the same “spirit” as you treated positive odd integers as L numbers? Can you develop a (geometric) definition for summing even numbers, as you did with L (odd) numbers? Can you use the definition given above for summing L numbers along with your definition for summing even numbers to develop a formula for the sum of the first n positive integers?

[8] Notes

The Deadline for contributions to our April Newsletter is

Friday, April 11, 1997.

Opinion articles, suggestions for writing assignments, small group in-class activities, small group out of class projects, Quick Questions, CBL activities, announcements, etc. are all welcomed. Please send material to Della Bell, Dept. of Mathematics, Texas Southern University, 3100 Cleburne St., Houston, TX 77004.