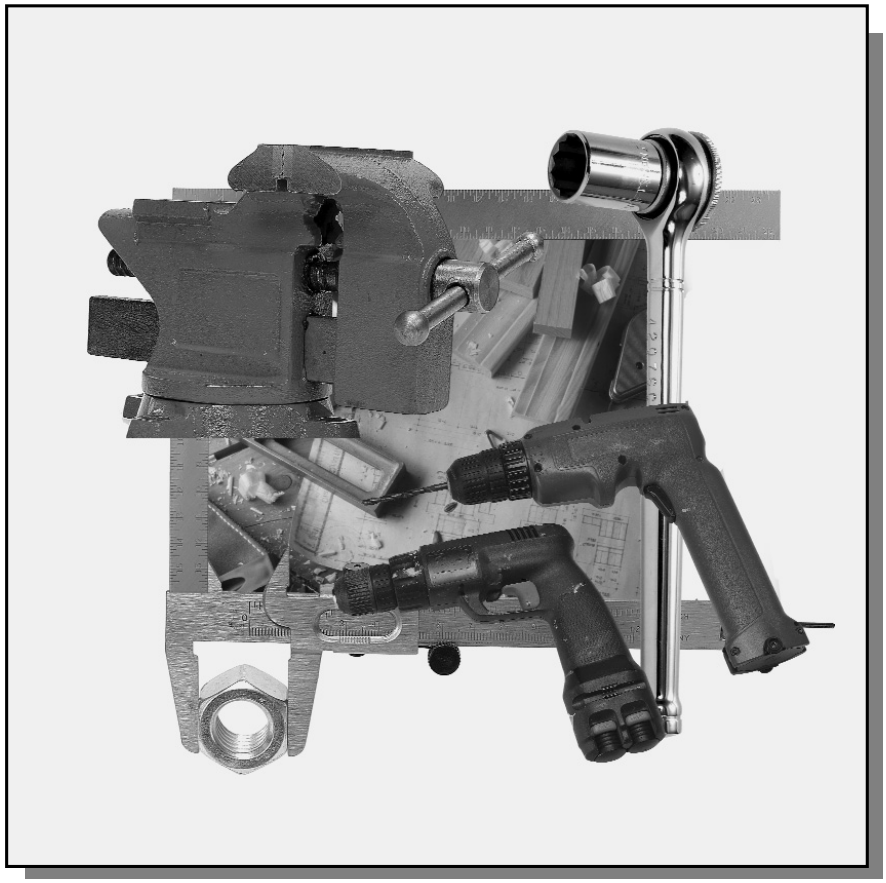
Character and Skills for Home and Careers

This chapter requires a companion activity book in which students respond to questions on text content. Answers are found in the *Teacher's Resource Kit*.



Chapter 2

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CHAPTER 2
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Warning

Students under the age of 18 should not attempt projects described in this course without supervision by a competent adult.

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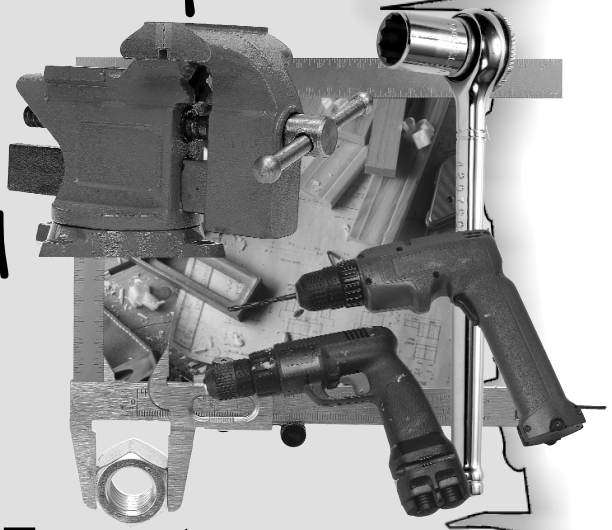


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"To be a success in any line of work requires courage, persistence, a willingness to pinch and go without many pleasures and pastimes while you are young and getting a good start in life."



—Lee De Forest

Lesson 1

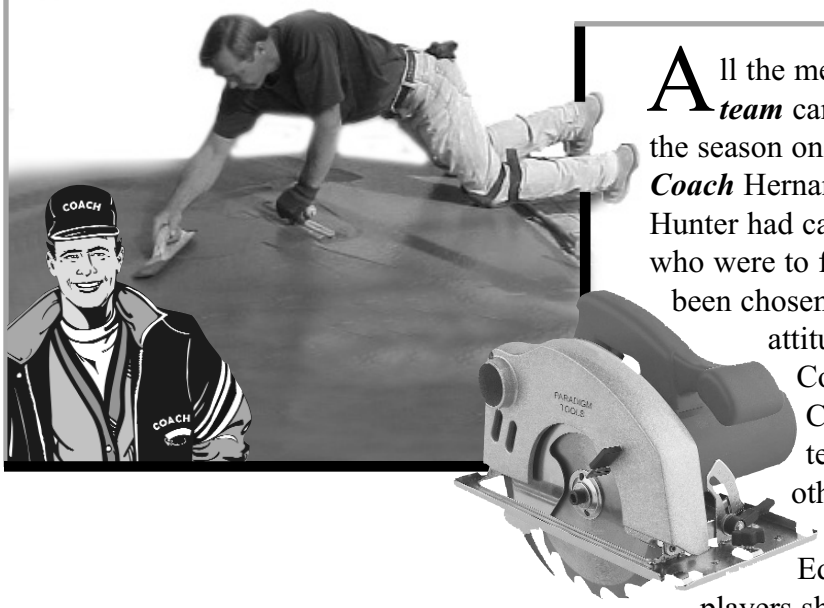
Chapter 2

Construction

THE TEAM

Section 1

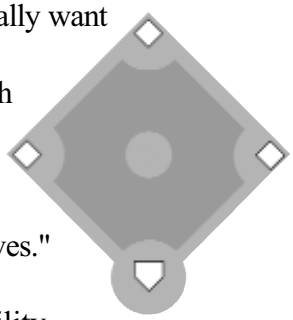
Lessons 1-5



All the members of the Cardinal Baseball ***team*** came together for their first practice of the season on a bright, sunny, spring afternoon. ***Coach*** Hernandez and Assistant Coach Brad Hunter had called a meeting of the eleven players who were to form a team. The young men had been chosen because of their baseball skills and attitudes. For convenience, David, Coach Hernandez' s son and Matt, Coach Hunter's son, were put on the team coached by their fathers. The other nine players were Sam, Mark, Andrew, Jose, Joe, Jake, Tim, Edward and Arturo. These eleven players showed a lot of enthusiasm for the game of baseball as well as support for one another. All the guys went to school together at Thomas Jefferson School, and they were looking forward to school being out and having a summer filled with baseball. Coaches Hernandez and Hunter both worked at the Mosser Construction Company. Both men had an interest in baseball because they had enjoyed the sport as boys, and wanted to pass that experience on to their sons and to other boys. The players and the coaches gathered around in a circle and talked about all the things they wanted to accomplish during the season. Edward and Tim wanted to win the city championship, Sam and Mark wanted to beat the rival Hawks, and Andrew and Jose wanted most of all to win the state championship.

Coach Hernandez said, "What I really want to see is for all of you to grow in your leadership abilities and sportsmanship, both as individuals and as a team. I want you to know that you are special, and I am eager to see you prove that to me, to the community, and—most of all—to yourselves."

Looking out over the field, he continued, "Part of the team's responsibility



baseball field

VOCABULARY

Team: a group of people trained to work together
Coach: a director of team players; head of a team
Implements: tools used for various tasks
Rake: tool with long handle and a set of teeth at one end, used to gather leaves
Hoe: tool with a long handle and a flat blade, used for weeding
Shovel: tool with a long handle and a scoop at one end

is to keep the field neat and well groomed. You will also take responsibility for the uniforms that will be issued to you in just a few minutes. After each game, I expect you to take them home, wash them and have them ready to go for the next game. Do each of you understand these responsibilities?"

"We understand you, Coach," Jose responded.

The players were then assigned to their respective positions and went out on the field where they received a good hour and a half workout. When they had finished, they gathered around Coach Hernandez's truck to receive his tips on improvement.

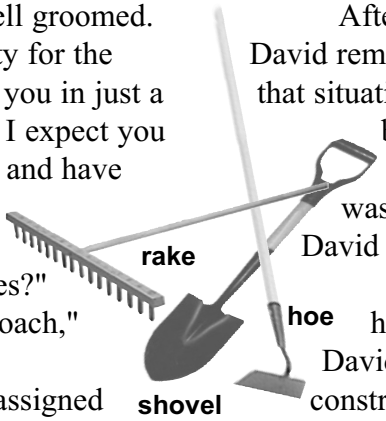
When he had finished talking to them about baseball, Coach instructed them, "Get all of the ***implements*** out of the bed of my pickup so we can have a quick cleanup."

The boys began grabbing the ***rakes***, ***hoes*** and ***shovels***. Coach assigned each player a task to perform, and the team began an organized cleanup effort. After about thirty minutes the team had accomplished the task of cleaning the baseball field so they loaded the tools into the back of the pickup.

The next day at school all of the Cardinal players met at one of the tables in the school cafeteria during lunch. Of course, the topic of discussion was the new baseball season and all the things Coach Hernandez had discussed. While most of the team was trying to talk at the same time, Jake remained quiet. Finally, during a lull in the conversation, Jake spoke, "I'm enthusiastic about the season, guys, and I loved everything that Coach had to say yesterday, but there is one thing that is bothering me."

"What's that, Jake?" asked Sam.

"It's just that I sure am going to get tired of loading and unloading tools out of the back of Coach's pickup!"



After a good laugh by everyone, David remarked, "Maybe we can remedy that situation by putting up a permanent building at the ballpark."

All of the guys thought that was an excellent idea and asked David to speak with his dad about it.

As soon as David's dad arrived home from work that evening, David introduced the idea of constructing a storage building at the baseball field. David explained that the team could store water hoses, sprinklers, hoes, rakes, shovels and lawn equipment in the building. They could even store their bats, bases and pitching net there.

The idea began to sound like a good one to David's dad, but he told David that some things had too be considered before making a commitment to the project. Finally, he said, "David, I love this team's enthusiasm! Just try to keep the idea of the building alive, but don't tell anyone that we're going to build it for sure until I get back to you."

LIFE PRINCIPLE



"Nothing great was ever achieved without enthusiasm."

—Ralph Waldo Emerson



Lesson 2

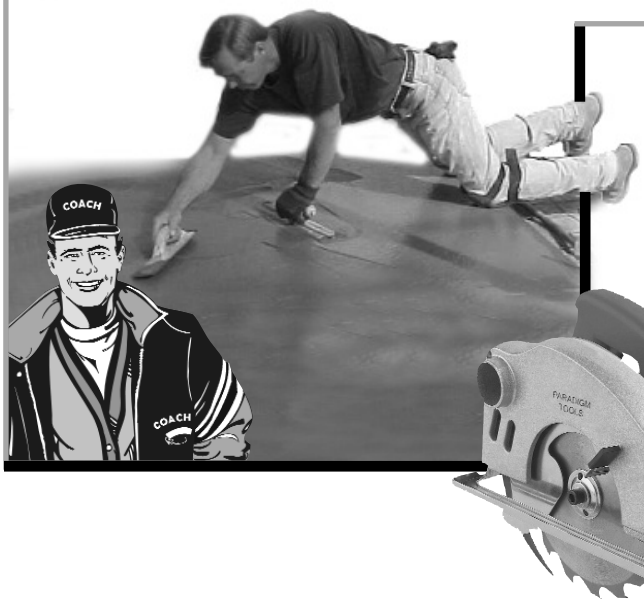
Chapter 2

Construction

THE PLAN

Section 1

Lessons 1-5



David was standing in his driveway swinging a bat when his dad arrived home from work. David had been thinking all day about getting out to the baseball field.

As Dad got out of the truck, he said to David, "Let's load up the equipment and go to the field. I'm running behind schedule, and if we don't hurry, we'll be late for practice." They quickly began putting all the equipment that would be needed into the back of the pickup truck. As they drove to the field, Dad explained, "The reason that I'm running late is because I went by City Hall to check on the feasibility of building a storage shed at the city-owned baseball field where the team practices and plays. I talked with the City Manager, Mr. Choate. Guess what? I found out that he is Edward's uncle. I told him about the storage building idea. He expressed confidence that the City Council would approve the storage shed idea in their regularly scheduled meeting next week. He also suggested that I go to the Parks and Recreation Department to talk with its director, Mrs. Coleman."

Dad said he immediately recognized that Mrs. Coleman was Andrew's mom. Mrs. Coleman was delighted with the idea of a storage building and she thought the City Council could probably furnish the field maintenance equipment and baseball field supplies if the park had a place for storage. She expressed confidence that the project could involve all of the Little League teams.

"At that point," Dad said, "I suggested that each team be assigned a large lockable locker for their personal equipment. After about fifteen minutes of exchanging ideas, Mrs. Coleman decided to call a meeting of the park board and the baseball league officers to work out the details."

"Wow! That sounds great, Dad," David exclaimed.

"Now all I have to do is draw up a set of working plans for her

VOCABULARY

Parallel: extending in the same direction equidistant everywhere, never meeting

Dugout: a designated bench where players sit while waiting to bat

Perpendicular: being at right angles to a plane or flat surface

Hypotenuse: the side of a right triangle opposite the 90° angle

90 degrees: $\frac{1}{2}$ of 180 degrees or a straight line, thus producing a 90-degree or right angle

Rectangle: a parallelogram with all corners being right angles

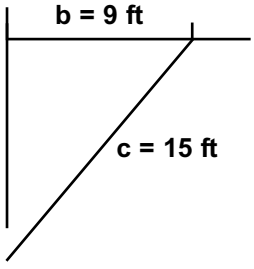
and Mr. Choate to use in their presentation." Dad added, "When we first had the idea, I did not know all this paperwork would be necessary."

Soon, Dad and David arrived at the field. The Cardinals had another good practice, and the other team members went home after about an hour and a half. While David and Matt loaded the equipment into the pickup, their dads took out some string, a one-hundred ft measuring tape, stakes and a hammer and began to outline the location for the storage shed.

They first measured fifteen ft away from the left fence in two places. Next, they placed two stakes at those places and tied a string to each stake. This gave them a long line ***parallel*** to the left field After that, they measured down the fence thirty ft past the end of the left ***dugout*** and put a stake on the line running parallel to the fence.

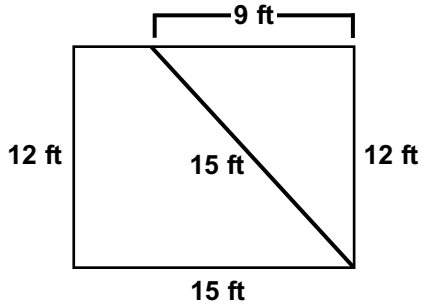
This point would be the corner of the new shed. From this point they would have to construct a line perpendicular to the line that was parallel to the fence. In order to construct this ***perpendicular*** line, Coach Hernandez decided to use a geometric theorem called the *Pythagorean Theorem* which states that the sum of the squares of the sides of a right triangle equals the square of the ***hypotenuse*** or $a^2 + b^2 = c^2$.

The coaches showed their sons how to measure 9 ft from the corner stake along the line running parallel to the fence and put a stake at that point. Next, they measured 12 ft from the corner stake away from the fence. They left the tape measure extended past 12 ft and used another tape to measure 15 ft from the second stake that was 9 ft from the corner stake.



This measurement of 15 ft is the hypotenuse of the right triangle and would meet the 12 ft measurement of the other tape measure when the two lines become perpendicular. At the point where the 12 ft mark on one tape measure met the 15 ft mark on the second tape measure, a stake was driven to mark the second corner of the shed. This formed one, ***90-degree*** corner.

The men measured down the string line running parallel to the fence line a distance of 15 ft from the first corner stake and drove another stake that would mark the third corner of the shed. From that point, they constructed another corner of 90-degrees, using the same right triangle method as used on the first corner and drove a stake to mark the fourth corner.

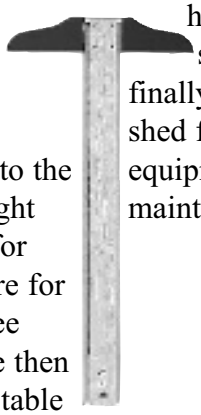


The coaches and the boys tied a string between all the stakes to form a ***rectangle*** that was fifteen ft by twelve ft. This was to be the size of the storage shed.

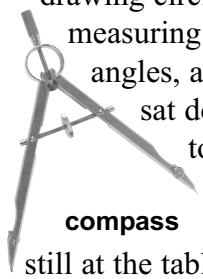
There was just one more thing to check before they left the field and that was to see if the rectangle formed by the strings was a true rectangle. A rectangle must have four, ninety degree angles. Coach Hunter suggested that one way to be sure the stakes and the strings were placed correctly to form a true rectangle was to measure the two diagonal distances from opposite corners of the rectangle. In a true rectangle, the two diagonal distances are equal. Measuring the length of the two diagonal distances confirmed that the corner angles were equal, so no adjustments were needed.

Soon darkness set in and sent everyone home. David knew that his dad and Coach Hunter were excited about the possibility of constructing the storage shed.

After dinner, Dad went into the garage/shop and returned to the house with a T-square for drawing straight lines and 90-degree angles, a compass for drawing circles, a combination square for measuring 45-degree and 90-degree angles, and a No. 2 H pencil. He then sat down at the dining room table to begin working on the actual plans for the shed. At ten o'clock that night he was still at the table drawing lines and measuring angles. David walked by to take a peek at the drawings on his way to bed. "Wow! This is great! I can actually 'see' the storage shed taking shape right there on that piece of paper!"



T-square



compass

David could hardly close his eyes when he went to bed, and when he did, he dreamed of nails, saws, freshly cut wood, and finally a completed storage shed filled with the teams' equipment and all of the field maintenance supplies!



combination square

LIFE PRINCIPLE



"A goal properly set is halfway reached."

—Zig Ziglar



Lesson 3

Chapter 2

Construction

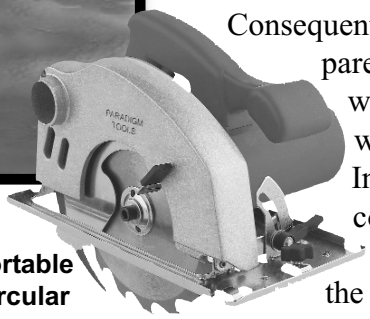
GETTING STARTED

Section 1

Lessons 1-5

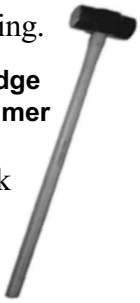


David was excited! Good things were happening! A week of baseball practice had passed, and the players were really beginning to come together as a team. Dad had also found out that the ***city council*** had authorized the storage shed and had issued a permit for it to be built. Consequently, Dad had also begun to contact parents of the players throughout the week so that they could participate in a work day set up for Saturday morning. In preparation for this, he had contacted the R & G Gravel Company to bring a truckload of sand to the building site Saturday morning.



portable circular saw

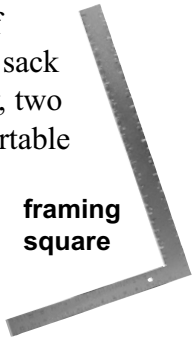
Coach Hernandez awoke early Saturday morning to go to the lumberyard to get some building materials for the storage shed. He came back by the house, and asked David to load the construction equipment on top of several 16 and 12 ft 2" x 4"s, some 1" x 4"s, some stakes, a roll of concrete reinforcement wire, and a sack of nails. The equipment included a wheelbarrow, two shovels, two rakes, a 100 ft extension cord, a portable circular saw, a framing square, a level, a claw hammer, and a sledge hammer.



sledge hammer



claw hammer



framing square

extension cord



As Dad turned the corner and the baseball field came into view, you would have thought a game was scheduled for that morning. People were everywhere! Dad stopped the pickup truck next to the staked-out storage shed. It gave Dad a good feeling when he realized that people were already unloading his truck before he opened the door to get out! Dad and David spent about

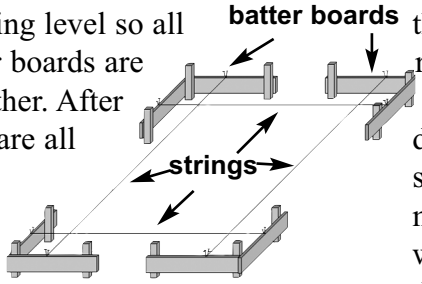
VOCABULARY

City Council: elected officials who govern a city
Concrete: a mixture of a sand, gravel, lime, cement and water that dries to a hard substance; used in construction projects
Batter boards: boards used to establish squareness and height
Slab: concrete foundation/floor
Plumb: a straight, vertical position verified by a plumb bob
Cured concrete: dried; hardened

fifteen minutes just visiting with everyone. Then one of the men said, "Give us some instructions on what you want done, Coach!"

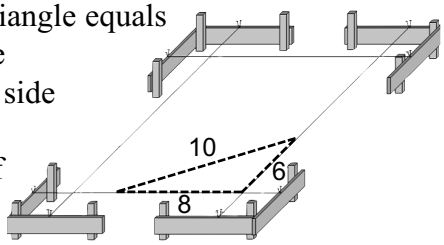
Coach Hernandez laughed and told Edward's dad, "In preparation for pouring a ***concrete*** foundation,we need to place ***batter boards*** at each corner of the 15 ft by 12 ft area about 2 ft back from the stakes. The batter boards will be installed by driving three stakes at each corner forming another corner 2 ft back from the staked corner and attaching 1" x 4" boards horizontally to the stakes at a predetermined level.

All four corner batter boards should be installed and then the 1" x 4"s leveled with a string level so all eight of the batter boards are level with each other. After the batter boards are all level with each other, a nail should be put into the top of the batter board in line with the corner stake for each corner. A string should be run to each of the nails and held tight to outline the area where the ***slab*** is to be installed. This string should be checked to be sure it is level all the way around the perimeter of the area for the slab."



The construction string that Dad spoke about is one of the very important items at the beginning of a building project, because the position of the foundation, and in this case, the slab, would be determined by measuring and leveling from this construction string.

In order to be sure the building would be square, Dad proposed to use what is called the *6-8-10* method. This method involves the use of right triangles to be sure a corner is square. The 6-8-10 method makes use of the Pythagorean Theorem of geometry, which states that the sum of the squares of the two legs of a right triangle equals the square of the hypotenuse (the side opposite the 90 degree angle). If a right triangle has one leg of 6 units and one leg of 8 units then the length of the side opposite the 90 degree angle will be 10 units (6-8-10).



In order to be sure the foundation was square, Dad measured 6 ft from the place the building strings crossed at one corner and tied a ribbon, and from the same corner, measured 8 ft on the string perpendicular to the first measurement and tied another ribbon.

Next, Dad measured the diagonal distance between the two ribbons on the strings, and it equaled 10 ft. (If the last measurement had not been 10 ft, adjustment would have had to be made to the position of the strings until the measurement between the markers equaled 10 ft. This would square one corner, and then the distances to the other corners would have to be checked to see if they were still accurate.)

Because the foundation measurements seemed to be accurate and the location strings were positioned exactly over the place the foundation was to be poured, the final check was made to be sure the foundation was square on all corners. Dad measured the diagonals of the rectangle formed by the construction strings. The lengths of the diagonal measurements were equal and all the corners were square.

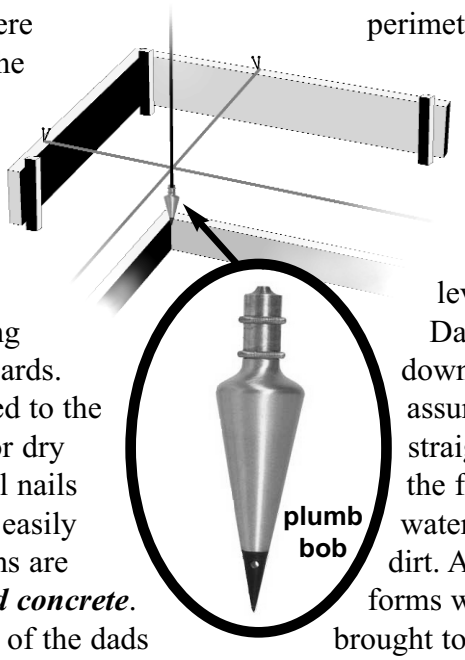


form nail with two heads

Dad stressed, "This is a very important part of the project, because everything else in the building project

depends on the accuracy of the placement of the construction strings!"

While this was being done, some other dads were measuring and cutting the 2" x 4"s to be used for the foundation forms on each side. The forms were then set in place ,with the inside edge of the form boards exactly ***plumb*** with the construction strings attached to the batter boards; then wooden stakes were driven every two ft along the sides of the form boards. These were then fastened to the stakes with form nails or dry wall screws. The special nails are used so they can be easily extracted when the forms are removed from the ***cured concrete***.



After that, some of the dads used shovels to dig a 12" x 12" trough around the inside of the form to create a wide footing that would prevent the concrete slab from moving or cracking. Next, Dad gave instructions for everyone who had wheelbarrows and shovels to begin moving the fill dirt that Mr. Ray had donated and delivered for the project. The dirt was soon moved and leveled to within 4 in of the top of the form boards in all of the slab area except the outer foundation area (12" x 12" trough) that had been deepened. Some fill dirt was placed around the outside of the forms to stabilize them and to keep them from pushing out when the concrete was poured.

A roll of reinforcement wire mesh was then cut to proper length and laid inside the forms. The wire mesh was overlapped twelve inches and tied with pieces of wire, forming a solid carpet of wire mesh. Two steel reinforcing rods, called "rebars", one half inch in diameter, were put into the deepened foundation area around the perimeter of the building and tied to the steel mesh. These "rebars" formed two continuous steel rods around the perimeter of the foundation to give it rigidity and strength. A 4 ft long carpenter's level, provided by Mr. Hurley (Jake's dad) was used to make sure that the 2" x 4" forms were perfectly level.



Dad then stretched a string down each side of the forms to assure that the form boards were straight. The dirt inside and outside of the forms was then wetted down with a water hose to settle and compact the dirt. At last, everyone felt sure that the forms were ready for the concrete to be brought to the site.

Fred Locke, Tim's dad, reported, "Coach Hernandez says that the concrete cannot be delivered until Monday, but I will come back Monday afternoon to help pour and finish the slab."

All of the dads who were present said that they, too, could be at the park by 6:00 P.M. on Monday to meet the concrete truck.

With a broad smile on his face, Coach Hernandez remarked, "I never dreamed that we would get this far with the forms so soon, so I hadn't even thought about contacting the ready mix concrete company."

Mr. Locke spoke up, "I work for Lone Star Ready Mix Company. If you want to use them, I can make sure that we have the proper amount of concrete on the site Monday afternoon, because I drive the truck for them....I thought of something—I'll also talk to the manager and see if he might be willing to donate the concrete.

"That will be fantastic!" Dad

exclaimed. He also thanked all the men and boys who had contributed their time to the project. As all of the adults stood around admiring their work, Mrs. Coleman pulled up with boxes full of fried chicken and an ice chest filled with bottles of water. She had brought enough refreshments for all of the workers and the ball players! Everyone gave her a big cheer of thanks, and David ask the group if he could give thanks to God for the food. No one objected. Afterwards they had a fantastic feast. They went home satisfied that they had performed a needed community service.

Life Principle



"No plan is worth the paper it is written on unless it starts you doing something."

—William H. Danforth



Lesson 4

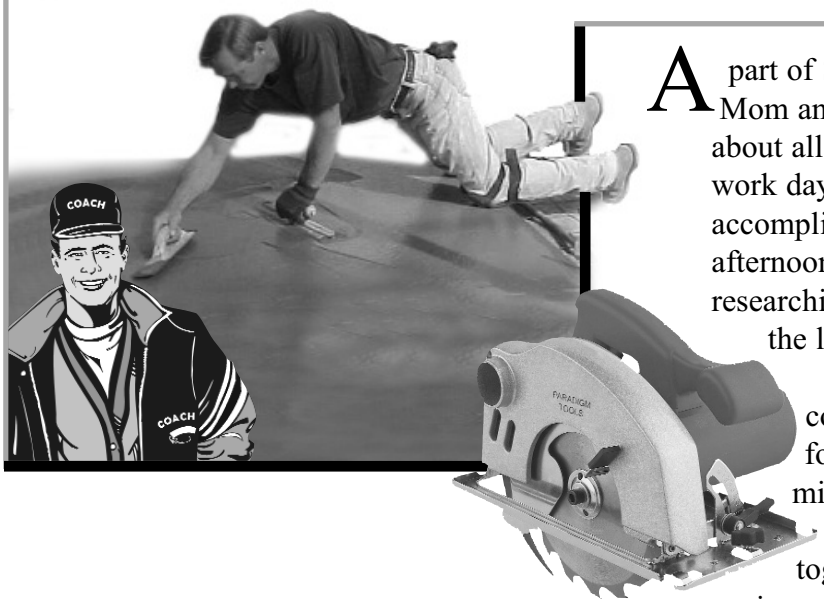
Chapter 2

Construction

THE SLAB

Section 1

Lessons 1-5



A part of Saturday afternoon was spent telling Mom and anybody else who would listen about all the help that had shown up for the work day and how much had been accomplished as a result. Another part of the afternoon was spent by Coach Hernandez researching the information that he found at the library about concrete**.**

He explained to David that concrete was made out of the following materials: *cement*, a mineral mined from rock; *aggregate*, rock and sand; and *water* mixed together in the proper proportions, causing a ***chemical reaction*** to take place that brings about heat and hardening.

Dad also discovered that the hardness of the concrete is determined by the amount of cement, aggregate, and water added to the mixture. The more cement that is added, the harder the mixture is when set up, but the quicker it sets up, the harder it is to ***work***. The aggregate should be clean with no soil particles or large rocks, and it should include some clean sand. The water must also be clean and algae free. All of this mixture must be turned and mixed together so that it has a uniform texture throughout.

Dad wondered about the amount of concrete that would be needed to complete the storage shed floor. He found that large volumes of concrete were measured in cubic yards. A cubic yard of concrete contains twenty-seven cubic ft of material. He also discovered this formula which could be used for figuring the amount of concrete needed for the shed floor:

Width (ft) x Length (ft) x Thickness of slab and footing (ft)

divided by 27 = Cubic Yards of concrete needed.

Dad sat down with a pencil and paper and explained, “In order to figure the amount of concrete needed for the shed, the formula would look like this:

VOCABULARY

Chemical reaction: when two elements or compounds are united, forming new compounds; gives off light and/or heat

***Work*:** smoothing wet concrete before it hardens.

Screed board: a long board used for smoothing and leveling freshly poured cement

Churn: to mix all materials well

Beveled: an angle other than a right angle

J-bolts: used for attaching the bottom 2” x 4” or *bottom plate* of the framing wall to the concrete

12 ft x 15 ft x $^{1}/_{3}$ ft

$\div$ 27 = $^{59.4}/_{27}$ = 2.2 cu yards

This much concrete will cover the entire area of the ***slab,*** 4 inches thick."

"The amount of concrete for the footing (the 12" by 12" border around the perimeter of the slab) is figured as follows:

12 ft + 15 ft + 12 ft + 15 ft = 54 ft around the perimeter of the slab.

The formula would look like this:

1 ft x 54 ft x $^{2}/_{3}$ ft. $\div$ 27 = $^{36}/_{27}$ = 1.3 cubic yards."

He continued, "We use $^{2}/_{3}$ here for the thickness because the top $^{1}/_{3}$ was figured in with the amount of concrete for the slab so the slab on top is 4 inches thick and the rest of the footing is 8 inches thick."

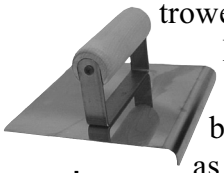
"Therefore, the total amount of concrete needed for the storage shed would be 2.2 cubic yards + 1.3 cubic yards = 3.5 cubic yards."

Dad had found out from Mr. Locke that concrete would cost $62.00 a cubic yard; so Dad calculated that 3.5 times $62.00 would come to $217.00 for the concrete.

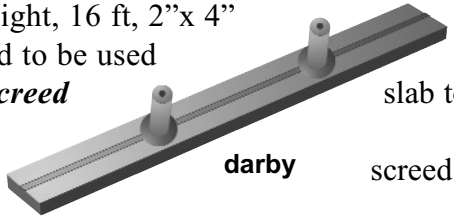
Next, Dad began to list all the tools and equipment that would be needed for finishing the concrete work. Immediately, Mr. Locke's name came to mind. A quick telephone call confirmed that Mr. Locke did have a set of concrete tools that he would be willing to bring to the storage shed site on Monday. Mr. Locke indicated that he had a bull float, a darby, an edger, a groover and a steel trowel. Dad also asked if Mr. Locke could provide a straight, 16 ft, 2"x 4" board to be used as a ***screed board***.



bull float



edger



darby

Mr. Locke said a 16 ft board was already at the site. Dad thanked Mr. Locke for his help and hung up the phone, saying, "It looks like we are all set for the concrete pouring!"

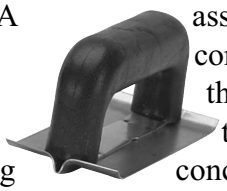
Monday at school was filled with excitement because all of the team members knew that they would be involved with the construction project at the ball park. After school, the boys went to the field to meet their dads. Coach Hernandez and the concrete truck were already at the site! Mr. Locke stepped out of the concrete truck to greet everyone, and then he began to ***churn*** the concrete in the large tank on the truck.

Coach asked Mr. Locke, "Would you be willing to supervise the pouring and finishing of the concrete?"

"No problem. I'll help out with the final finishing of the slab too," he replied.

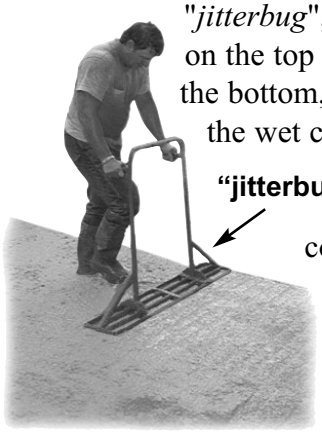
That was a relief to Coach. Even though he had read about how to finish concrete, he was still a little hesitant about doing it for the first time.

When Mr. Locke said that the concrete was ready, he unfolded a long metal trough that was stored on the side of the truck. He explained that the concrete would move through the trough and pour out at the far end of the slab. All of the fathers were assigned different jobs to do on the concrete crew. Two of the dads moved the trough as the concrete came down the slide. Two other men pulled the concrete out into the forms with shovels and hoes. When all of the concrete was poured inside of the forms, two men used the *screed board* to smooth the concrete by sliding the screed back and forth as it rested on the top of the forms. As they did so, they also applied force to move the screed board from one end of the slab toward the other end of the slab.

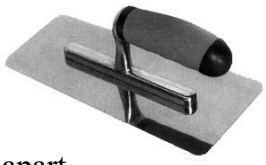


groover

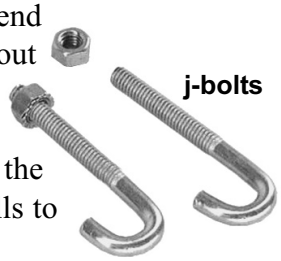
As soon as the men finished with the screed board, one of them picked up the



"*jitterbug*", a device with handles on the top and a flat screen area on the bottom, and began to go across the wet concrete, bouncing the jitterbug up and down in the concrete in order to move the gravel aggregate down in the concrete and move the sand aggregate to the top. This process allows the finishers to get a smoother finish on the concrete surface. Then the *bull float* was used to even out any remaining ridges and voids. Next, a *standard hand trowel* was used to give the slab a smooth finish. Finally, the *edger trowel* was used around the edge of the slab against the forms to create a ***beveled*** or rounded edge.



Finally, Mr. Locke placed anchor bolts, called ***j-bolts***, four ft apart and two inches in from the forms around the perimeter of the slab. The j-bolts were six inches long so, Mr. Locke placed them with 4 inches of the bolt down in the concrete and 2 inches of the threaded end of the bolt sticking up out of the concrete. He said these bolts would be used later to anchor the *bottom plate* of the walls to the concrete. Then Mr. Locke put the final touches on the slab with a steel trowel.



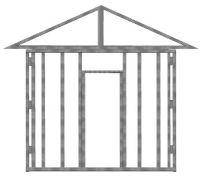
As they cleaned up around the site, the men realized that they had just completed a permanent part of the storage shed as well as having made a permanent contribution to the community. The team members admired their work and gave their hard working dads a big round of enthusiastic applause.

LIFE PRINCIPLE



"The best preparation for tomorrow is to do today's work extremely well."

—Sir William Osler



Lesson 5

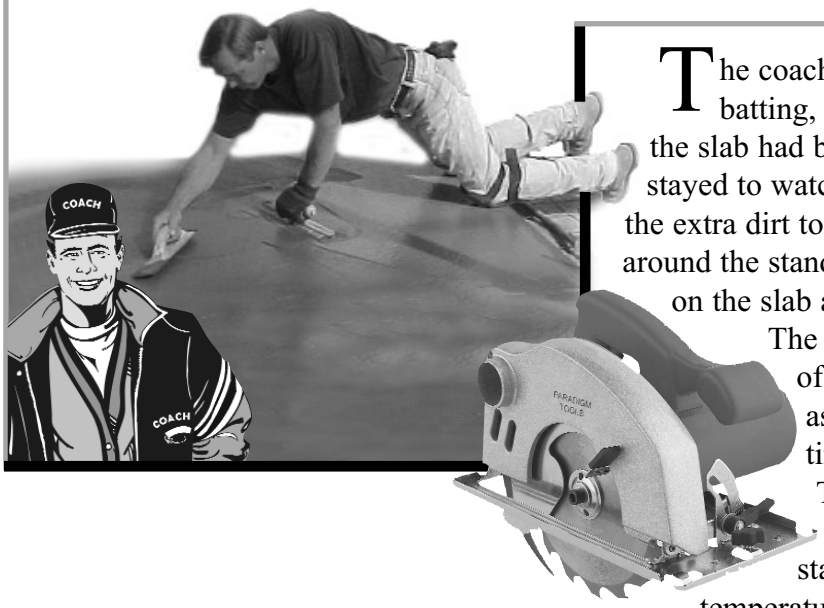
Chapter 2

Construction

PLANNING THE WALLS

Section 1

Lessons 1-5



The coaches and players practiced batting, pitching and catching baseballs after the slab had been poured. Many of the fathers stayed to watch the practice and to use some of the extra dirt to fill in low spots on the field and around the stands. Several dads kept a watchful eye on the slab as it began to "set up" or *harden*. The slab needed to be kept wet and free of foreign objects or vandalism such as name carving until the slab had time to cure or finish hardening. The practice was halted at dusk, and Coach Tucker said that he would stay and watch the slab until the air temperature dropped and he felt assured that the slab was hard enough to withstand any pressure put on it.

Coach Hernandez and David went home to a warm shower and a hot dinner before retiring for the night. The next morning Coach Hernandez remarked to his son, "Man! I'm sore all over from working on that slab yesterday, but I still feel good about accomplishing something worthwhile!"

That afternoon following baseball practice, Coaches Hernandez and Tucker supervised several boys as they removed the forms and smoothed the dirt around the slab. The players tromped all around the edges of the slab, packing down the dirt. After that, they were allowed to walk on the slab for the first time.

Coach Hernandez then started to plan construction of the shed walls. He realized that he would again need a complete plan in order to know how to construct walls and how much material would be needed. He found in a book an example of a wall showing the *bottom plate*, ***top plate***, ***studs***, and ***headers***.

Mr. Hernandez used the picture to draw his own plan for the walls. Two walls were to be 15 ft long by 8 ft high; the other pair was to be 11 ft 5 inches long by 8 ft high. The walls for the 12 ft sides of the building had to be 7 inches shorter than 12 ft because the 15 ft wall would overlap at each corner, therefore Dad

VOCABULARY

Top plate: a horizontal 2” x 4” board nailed on top of studs to support walls and rafters

Studs: vertical 2” x 4” lumber used to form walls and partitions; actual measurement of a 2” x 4” is 1½” x 3½”

Headers: 2 horizontal 2” x 6”s to form the top of an opening such as a window or door

Centers: the distance between the center of a stud and the center of the next stud in a wall

Plywood: thin layers of wood that are aligned and pressed together with glue in 4' by 8' sheets

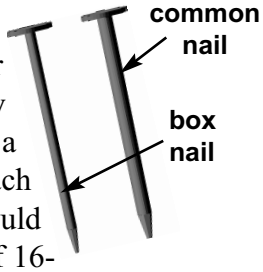
had to subtract $3\frac{1}{2}$ inches off the 12 ft wall for each corner. He knew that the 2" x 4" studs should be placed on 16-inch ***centers*** so that the center of every fourth stud would be at 4 ft (the width of a piece of ***plywood***).

After drawing a 15 ft by 8 ft wall and an 11 ft 5 inch by 8 ft wall, Coach Hernandez began to figure the amount of material needed for the walls, a process referred to as *figuring a bill of materials.*

Coach discovered that four, 2” x 4” x 16 ft and four, 2” x 4” x 12 ft boards would be needed. These eight boards would be either southern yellow pine or white pine and would be used for the top plate of the wall and the doubled top plate. He would also need two, 2” x 4” x 16 ft and two, 2” x 4” x 12 ft boards that had been pressure treated to use as a bottom plate for the walls. Coach also discovered that any wood that is placed against concrete should be pressure treated to protect it from termites, moisture and decay.

He also noticed from the drawing that fifteen studs were needed for each fifteen ft wall and that twelve studs were needed for the twelve ft wall. A good standard to use when figuring the materials for a wood frame building is that you will need one stud for every foot of wall length.

Coach’s plans required 16 pennyweight common nails for putting the frame together. Furthermore, he found that the two most popular types of general construction nails were common and box nails. The common nail has a thicker shank than the box nail and therefore provides more strength; however, the thicker shank on the common nail tends to split the wood, so a good compromise is a box nail that is cement coated. Cement coated nails typically are stronger and have a thinner shank to prevent splitting the wood. The term "penny" or “pennyweight” designates the total size of the nail by pennyweight (an English weight measurement). In other words, there would be fewer nails in a pound of 16-penny nails than there would be in a pound of 8-penny nails. Coach Hernandez found that he would need at least three pounds of 16-penny nails to complete the job of framing the walls.



After the materials were calculated and a list made, Coach called the lumberyard to get a quote on the price of materials. The materials list for the walls looked like this:

4	2” x 4” x 16’	syp (southern yellow pine)
4	2” x 4” x 12’	syp
2	2” x 4” x 16’	pt (pressure treated)
2	2” x 4” x 12’	pt
54	2” x 4”	precut studs ($91\frac{1}{8}$")
1	2” x 6” x 8’	syp
3 lbs.		16-pennyweight nails

After reading the list to the salesman at the lumber company, Coach was given the following prices for the items.

2” x 4” x 16’	syp	$4.95 each x 4 = $19.80
2” x 4” x 12’	syp	$3.95 each x 4 = $15.80
2” x 4” x 16’	pt	$5.50 each x 2 = $11.00
2” x 4” x 12’	pt	$4.50 each x 2 = $9.00
2” x 6”	header	$8.00= $8.00
2” x 4”	studs	$3.25 each x 54 = $183.50
16 penny nails		$1.55 per pound x 3 = $4.65

The list of materials plus tax was priced at a total of $225.75.

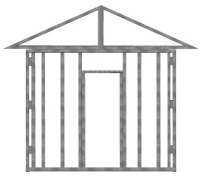
Coach Hernandez went to bed that night with confidence that he knew exactly how much lumber and nails would be needed for framing the walls and what the materials would cost.

LIFE PRINCIPLE



"The road to success is always under construction."

—Anthony Robbins



Lesson 6

Construction

Chapter 2

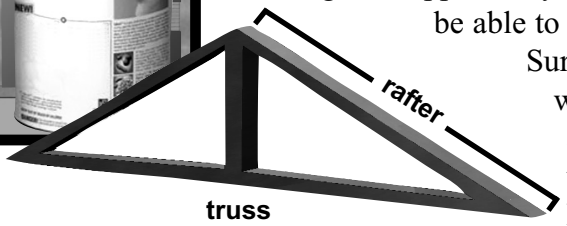
Section 2

Lessons 6-10

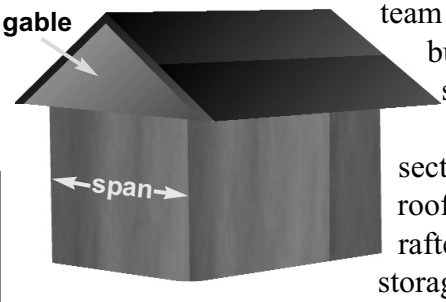
BRIDGING THE SPAN



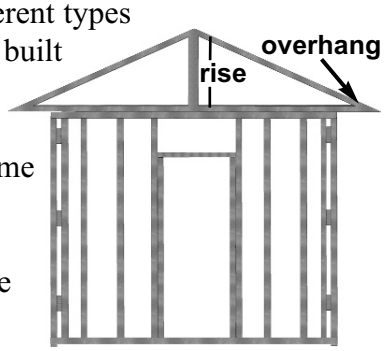
The Cardinal team members were all buzzing with excitement because they knew that they had their first ***scrimmage*** of the season in the afternoon! The boys would be playing the Royals, and the Cardinals were confident that they could beat their opponent. The game was to start at 5:30 P.M., and it would continue until sunset (approximately 7:00 P.M.). All of the team members would get an opportunity to play, and some would be able to play several positions.



Sure enough, the scrimmage was conducted as planned, and the Cardinals earned their first victory! Coach Hernandez met with some of the dads after the game to schedule another work session for Saturday. On the way home, Coach stopped at the local book store to pick up a "How to Build it Yourself" book so that he and the team could determine how to design and build the ***rafters*** for the storage shed.



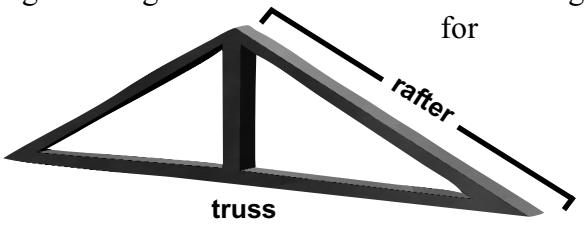
After dinner, Coach found the section on rafters and learned that the roof type would be ***gable*** and the rafters would ***span*** the 12-ft side of the storage shed. The ***overhang*** needed to be 1 ft, and the ***rise,*** 2 ft. Coach continued to study the book and found a section which explained different types of ***trusses*** as opposed to a roof being built in place. He decided that trusses would be the best design for rafters for the shed. He could cut cost and time by building the trusses at home and asking the team to install the rafters. Coach Hernandez's design looked like this:



VOCABULARY

Scrimmage: a practice game
Rafters: boards that support the roof
Gable: a type of roof, forming a triangle above the wall line
Span: the distance between opposite exterior walls
Overhang: the length between the exterior wall and the end of the rafter
Rise: vertical distance from top of walls to point of roof
Trusses: boards fastened together in a pattern to cross a span

Coach also figured that the length of the shed was fifteen ft, and if the trusses were placed on 2 ft centers, he would need to construct nine trusses, plus four 2” x 4”s eight ft long and two 1” x 4”s sixteen ft long for



perimeter boards. He calculated that one 2” x 4” x 12 ft long, one 2” x 4” x 8 ft long, one 2” x 4” x 10 ft long, and ⅓ sheet of ½ inch plywood would be needed to stabilize each truss.

Coach Hernandez called the lumberyard to get a quote on the price of the 2” x 4”s, the ½ inch plywood and the nails. Coach found out when the materials would be ready for pickup as well as the total cost of the materials.

The next day Coach Hernandez stopped by the city manager’s office to discuss funds to build the storage shed. After visiting a while about the baseball team, Coach discussed the storage shed and its importance and the need for $1000.00 for materials. In a few minutes, the city manager smiled and said politely, "Coach, I'm sorry to have to tell you this, but the city does not have any funds for the materials.”

"Oh," was all Coach could say in his disappointment.

"But a local bank president, Mr. Holt, wants to take the storage shed on as part of the bank's community improvement project," the city manager explained. "All you have to do is provide to the bank the calculated bill of materials, and the bank will issue a check to the lumber company for that amount."

Coach Hernandez brightened and said, “Hey, that’s great. May I use the phone?” He called the lumberyard to get the cost of materials for the walls and rafters. Coach was told that the cost of materials for the walls would be $180.43 and that rafters would be $199.95. Coach informed the city manager of the amount and he called the local bank president. Later that day, Coach Hernandez picked up the check and thanked the bank president for his financial gift.

As soon as Coach arrived home, he drew out the pattern for the trusses on the driveway with a piece of chalk. Then he went to the lumberyard to purchase truss materials as well as the materials that he had calculated for the walls.

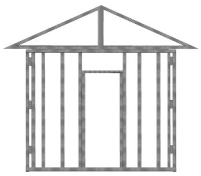
These materials were loaded into Coach Hernandez's pick-up truck. They were tied down, and a red flag was placed on the longer pieces so that they would be visible to other motorists. When Coach arrived home, he and David unloaded the materials and placed them alongside the driveway.

LIFE PRINCIPLE



"Success is a journey, not a destination."

—Ben Sweetland



Lesson 7

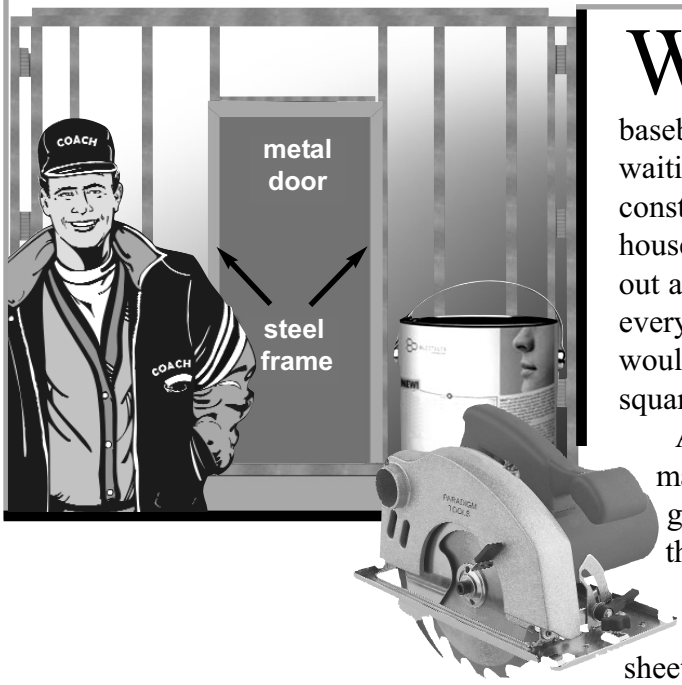
Construction

Chapter 2

RAISING THE WALLS

Section 2

Lessons 6-10



When Coach Hernandez returned home from the lumberyard, he found four of the baseball players' dads, as well as Coach Hunter, waiting for him. They had found out about the construction of the trusses at Coach Hernandez's house and had come to help. Coach Hernandez drew out another ***template*** on the driveway and showed everyone how the cuts needed to be made. The men would need a portable circular saw, a carpenter's square, and a 25-ft tape measure.

After determining the cuts that needed to be made, the men divided into two teams under the guidance of Coach Hernandez. With team effort, they completed the nine trusses in short order.

The work teams also discussed a Saturday work day and that the shed required several sheets of 4' x 8' ***siding*** and 4' x 8' ***decking***. Coach Hunter said, " I'll provide a 16 ft trailer for hauling the trusses to the park. Would a couple of you guys volunteer to come help me load them early Saturday morning?"

On Friday, Coach Hernandez called the lumberyard and was informed that the 4' x 8' siding cost $12.95 a sheet and that the 4' x 8' decking cost $7.95 a sheet. He also knew that more 6-pennyweight, galvanized nails were needed to attach the decking and siding to the 2" x 4" studs. Coach Hernandez computed the quantity of sheets of siding which would be needed. Since the shed had two sides twelve ft long and two sides fifteen ft long, the total number of sheets of siding would be fourteen. He also figured that since one side of the roof would be 16 ft by $7\frac{1}{2}$ ft, that 4 sheets of decking would be needed to complete one side of the gabled roof. Coach planned on using eight sheets of decking to cover the roof of the building. The bill of materials was:

14	4' x 8' grooved siding @ $12.95/sheet	= $181.30
8	4' x 8'x$\frac{1}{2}$ in. plywood decking @ $7.95/sheet	= $63.60
3 lbs.	#6 pennyweight, galvanized nails @ $.97/lb.	= $2.91
	Total	$247.31

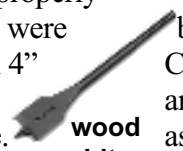
VOCABULARY

Template: a pattern or mold used as a design
Siding: wooden material used to cover the exterior walls
Decking: material used to cover the roof
Tie downs: nylon straps with a metal fastener for securing materials
Wood bit: a metal, cutting attachment for a drill especially for drilling wood

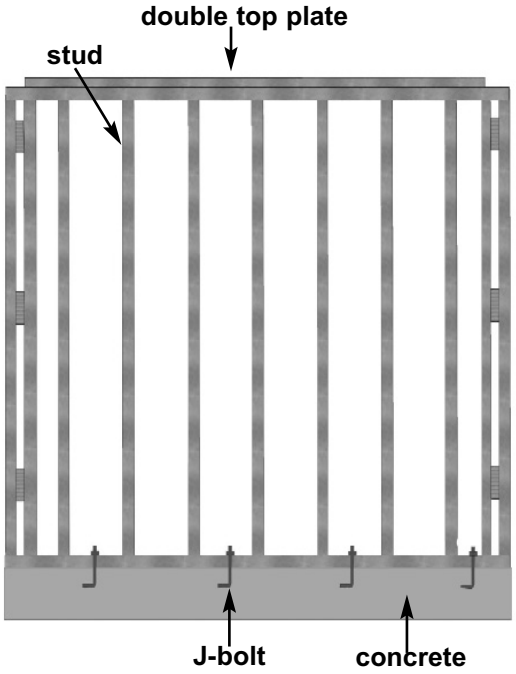
Coach Hernandez went by the bank where he was issued a check for the amount of the order and then drove to the lumberyard to pick up the supplies. The materials were loaded in the back of his pickup so that he would be ready to drive to the baseball field on Saturday.

After working hard all week, Coach was glad when Saturday finally arrived. With great anticipation, he and David woke up early and ate a hearty breakfast. Soon Coach Hunter arrived with the 16-ft trailer; and shortly thereafter, several dads arrived to load the trusses. The remaining material was loaded and secured with ***tie downs***. After that, everyone climbed into their respective vehicles and caravaned over to the baseball field. Once they were on site at the storage shed location, all the volunteers unloaded the trailer and the pickup.

The first thing that needed to be done was to construct the walls. The men decided that the fifteen ft wall for the back of the shed would be constructed first, so a top and bottom plate were cut to 15 ft. The men used a portable circular saw. The wall was then laid out on the slab, using the entire fifteen ft length of the slab. The top and bottom plates were marked off at 16-in intervals by one of the dads, using a carpenter's square. The wall was also marked to accommodate a corner post on each end of the wall, because the 15 ft walls would overlap the end of the 12 ft walls at the corners. Studs were then placed at each mark on the fifteen ft top and bottom plates. Next, several of the dads used their 16 ounce claw hammers and the 16-pennyweight nails to assemble the wall. The men drove two nails through the top and bottom plates and into the ends of the properly positioned studs. When all of the studs were nailed in place, a second top plate 2" x 4" was cut 3½ inches shorter on each end and nailed on top of the other top plate. After the wall was assembled, Mr. Locke drilled holes through the bottom plate, using an electric drill and a ¾ inch ***wood bit***, to correspond with locations of the j-bolts that were sticking up out of the concrete along the edge of the slab.



The fifteen ft wall was then raised to an upright position along one fifteen-ft side of the slab. The wall was lifted just enough for the holes in the bottom plate to slide over the j-bolts; and as two men stabilized the wall, others installed washers and nuts loosely on the j-bolts to anchor the wall to the concrete, but still give the wall adjustment space. A 12 ft brace made of 2" x 4" lumber was nailed in place temporarily to hold the wall upright until another wall could be constructed. The brace was nailed to the outside of the double top plate near the middle

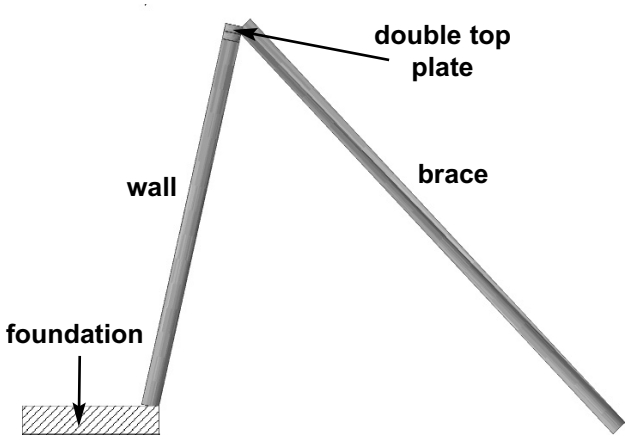


of the wall and the other end of the brace was left to rest on the ground. The wall was allowed to lean out from the slab slightly to allow the other walls to be lifted up with no restrictions.

The fifteen ft wall for the front of the building was the next part to be constructed. Coach Hernandez's plans indicated that the top and bottom plates would be cut almost exactly as the ones for the back wall. Everything would be the same as the construction of the first wall with the exception of a door frame in the center of the wall. The wall was constructed, and an opening 38 inches wide and 82 inches high was left in the center of the wall so that a door could be installed later. Holes were drilled to

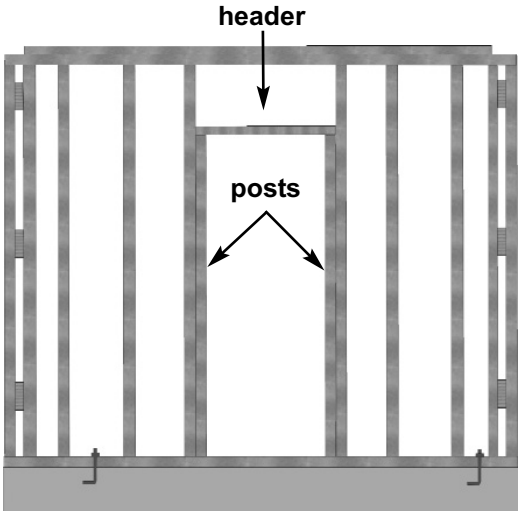
accommodate the j-bolts and the double top plate was installed as it had been on the back wall. The door opening was framed to use a header across the opening and a header post on each side of the opening to support the header. The inside measurement between these header posts was 38 inches to accommodate a 3 ft wide door. The front wall was then lifted up, set on the j-bolts and braced similar to the back wall.

Side View of Wall With Brace



One end wall was laid out between the two side walls that were already standing and braced. The end wall was soon constructed and attached to the slab in the same manner as the front and back walls. This end wall was also attached to the front and back walls, forming right angles at the corners. The double top plate for the end wall was cut 7 inches longer than the wall so it would overlap the front and back wall at each corner, filling the void left by the shorter double top plate on the front and back walls.

The other end wall was then built and anchored to the slab and also to the front and back walls in the same manner as the first end wall. After all four walls were standing, the corners were all nailed together. The corners of the building were checked to be sure they were plumb (standing straight vertically). As the corners were checked for plumb with a level, the braces were taken off the outside of the walls and put on the inside of each wall as an angle brace.



Coach Hernandez said, "These interior angle braces must be nailed to the top plate on one end and to the bottom plate on the opposite end, forming a big "X" in the middle of the shed and must remain in place until the building is finished on the outside. This is to insure that the building remains plumb and square."

Coach continued, "Now is the time to tighten the nuts on the j-bolts!" With that, he instructed David and three of his friends, "Grab either a socket wrench or a cresent wrench and tighten all of the j-bolt nuts in each wall."

The framing work was completed about lunch time. All the workers were happy to see Mr. Jackson arrive with pizza and bottled water for the hungry crew!

LIFE PRINCIPLE



"Leadership is action, not position."

—Anonymous



Lesson 8

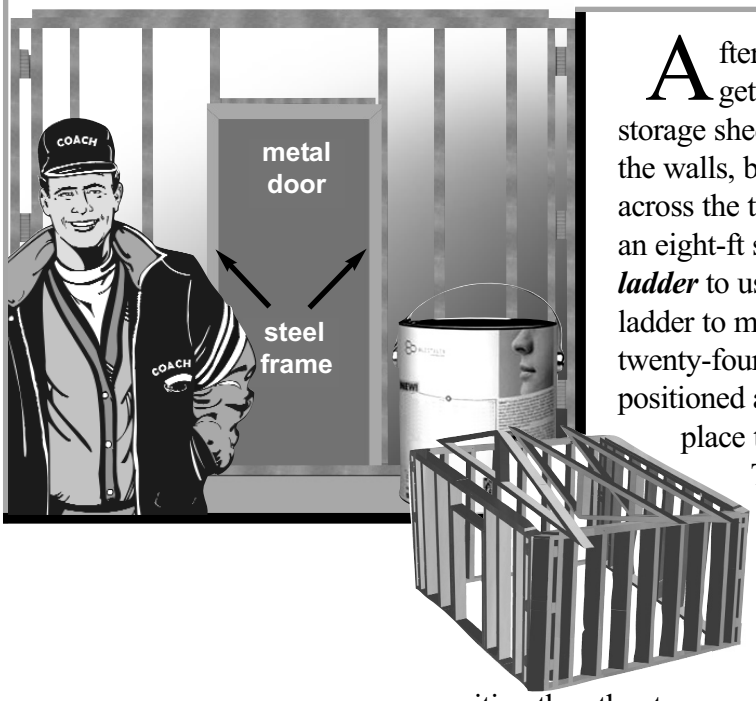
Construction

Chapter 2

Section 2

Lessons 6-10

TOPPING IT OFF



After lunch, Coach Hernandez was anxious to get the crew ready to place the trusses on the storage shed. He knew that this would help to stabilize the walls, because the trusses would connect the walls across the twelve-ft span. One of the men had brought an eight-ft step ladder and a sixteen-ft ***extension ladder*** to use on the job. Another man climbed the step ladder to mark both of the fifteen-ft top plates with twenty-four inch centers so the trusses could be positioned and nailed quickly. The men decided to place the first truss on one end of the building. This first truss would be secured to the building, then braced firmly in a plumb position so the remainder of the trusses could be put in place and held plumb until the decking could be added. With the first truss installed and braced, the men could position the other trusses, one at a time, and fasten the tops of the trusses together to keep them in place.

Coach Hernandez suggested, "Bring the trusses in through the door opening and place one end up on the back wall with the point of the truss pointing down. That way, the other end of the truss can then be placed on the front wall with little or no effort. The truss could then be flipped to an upright position and nailed in place.

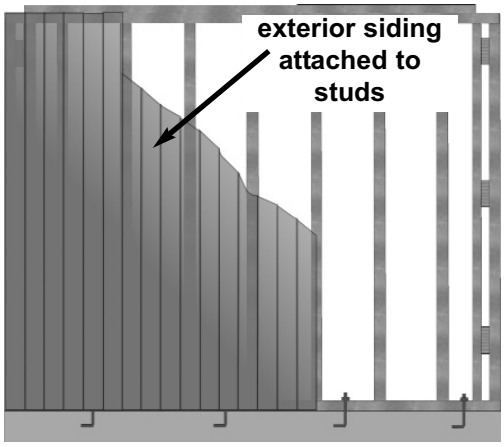
The trusses were installed using the end truss as an ***alignment*** guide. Pieces of scrap 2" x 4" boards, left over from the concrete construction job, were cut to fit and nailed between the trusses along the top plate. This helped secure the trusses in place and closed the gaps between them. The 1" x 4"s were nailed in place along the ends of the rafters to close the end of the rafters. The overhang rafters were placed at each end of the roof structure six inches out from the last trusses, giving a six inch overhang on the ends of the shed roof. (The overhang rafters for a six inch overhang would be installed after the plywood decking is in place on the roof and the rafter is supported by nailing the decking to the overhang rafter.

VOCABULARY

Extension ladder: a ladder, normally eight ft in length, that can be pulled out to sixteen ft long
Alignment: to become straightened or arranged in a line
Grooves: cuts made in material to enhance the design
Technique: a method of doing something that is proven to be the best way
Roofing felt: material made of asphalt and fiberglass cloth that is used to waterproof roofs
Interior: the space inside a room or building

After that, the 4’ x 8’ decking was lifted up onto the roof, and one sheet was placed at one corner of the building to square the roof line. Two of the men then climbed up on the roof and secured the piece of decking by nailing it down using, #6 nails. Eight sheets of the plywood were used to cover the roof with the decking out far enough to cover the overhang rafters on both ends of the building.

Cut-away View



The next step in the construction process was to place the 4’ x 8’ sheets of siding in an upright position along the sides of the building. This caused the ***grooves*** in the siding to run up and down. Using a carpenter's level, the first sheet of siding was leveled vertically (plumbed). The number of sheets required for each wall were placed in the proper positions, and the sheets were then nailed into place with #6 nails. After one wall was completed, the dads used the same ***technique*** to complete the remaining walls. After two sheets of siding had been trimmed using the portable circular saw to create the door opening on one wall, the storage shed was completely enclosed.

Mr. Jackson had brought a roll of ***roofing felt*** that had been left over from the construction of his new house, along with some roofing nails that were designed for holding down the felt.

Coach Hernandez said, "Wow! This stuff is really going to come in handy."

Two men climbed on the roof and rolled the felt out on the decking. They started at the bottom of the roof and overlapped each piece six inch, as each was nailed down. Soon the roof was covered, and the workers were delighted that the storage shed was finally "dried in," meaning that wet weather would not affect the building.

The men then gathered at the coach's truck for refreshing drinks, which had been provided by the local bank. As the men stood looking at the shed, they began to discuss the things that still needed to be done before the job could be considered finished. They decided that dark brown shingles, tan paint, and dark brown trim would help to give the building a more attractive appearance. They also planned to close in the roof overhang using ⅜-inch plywood sheets. Furthermore, they were in agreement about closing in the ***interior*** of the building with ½-inch plywood. The idea of putting lights in the building was discussed, as well as the type of door that should be used. They concluded that a metal door with a steel framework would be the most secure.

Even though several finishing jobs had to be completed, the fathers were very proud of all the work that had been done in such a short period of time. Before leaving, they also agreed that most of the remaining work on the building could be done in the afternoons while their sons practiced for their games. After picking up tools and scrap lumber pieces around the site, the workers went home to their respective families, content in knowing that they had accomplished something of lasting value for their sons and for the community.

LIFE PRINCIPLE



"Man's mind stretched to a new idea never goes back to its original dimension."

—Oliver Wendell Holmes



Construction

Lesson 9

Chapter 2

Section 2

Lessons 6-10

SHOPPING FOR SUPPLIES





Coach Hernandez was very excited about the progress that had been made on the storage building. He discussed the project with his wife, Emily.

Emily's enthusiastic response was "Oh! Let's go see it before dark!"

"That sounds great!" Coach responded. "Let David and me shower first. After we drive by the shed we can go on over to Central City for dinner, then go to that new Super Building Supplies Store that just opened.

"That sounds like a plan to me!" David interjected.

Mrs. Hernandez was impressed with the work that had been done on the storage shed, and she freely offered her assistance. "I'll help in selecting the paint and shingles, and surely that metal door is going to need a woman's touch with a paint brush," she said.

After a few minutes spent walking around the shed site at the park, the Hernandez family got back into their truck and headed for Central City. After dinner at a nice Mexican restaurant, the family's next stop was at the Super Building Supplies store. Mr. Hernandez was amazed by the huge size of the store as well as by the variety of building supplies available all under one roof.

The aisles in the store were ***categorized*** by item, such as electrical, appliances, doors, windows, etc. One of the first places that the Hernandez family visited was the section of the store where doors were displayed. A solid metal door with a steel frame was selected. Other doors constructed of glass and wood were considered; however, because of ***security*** and durability, the solid metal door was everyone's choice. Once the choice was made, David headed back to the front of the store to get a cart large enough to hold the door and other supplies. In the meantime, Coach Hernandez spoke with a salesmen and found out that the store had a slightly damaged 3 ft by 6 ft 8 inch steel door on sale

VOCABULARY

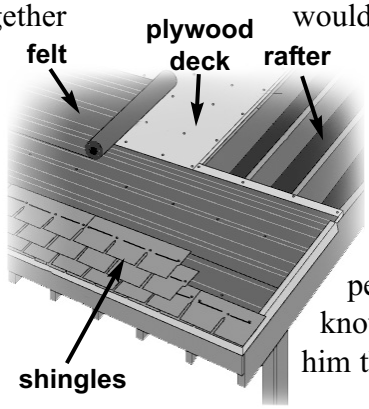
Categorized: a way of classifying materials according to a certain system
Security: anything that gives or assures safety or confidence
Composition: the putting together of parts to form a whole
Bundles: a number of objects bound or wrapped together
Oil base: using petroleum products as a carrier for paint pigment
Latex base: using water products as a carrier for paint pigment

for $59.00. The door would be perfect because the small dent would be located on the inside of the storage shed.

When the door had been loaded onto the cart, Coach said, "Now, let's go to the roofing area, so that we can pick out the shingles."

Coach and his family followed the overhead signs to the roofing area, where the three of them noticed a large variety of materials used for roofing as well as shingles in numerous colors. Coach Hernandez decided to use a regular ***composition*** shingle made of asphalt, fiberglass, and colored rock granules. He explained to David that the most common types of asphalt shingles were made with T-locks or square tabs. That design determined how the shingles stayed in place and what the design pattern looked like.

While talking with a salesperson, David discovered that the shingles came in ***bundles***, each bundle representing $33\frac{1}{3}$ square ft. Therefore, three bundles were equal to one hundred square ft. Coach Hernandez remembered that the size of one side of the roof was 16 ft by $7\frac{1}{2}$ ft which would equal 120 square ft. The two sides added together would then be 120 + 120 = 240 square ft. Since each bundle contained $33\frac{1}{3}$ square ft of material, Coach divided the $33\frac{1}{3}$ into 240. This calculation produced a figure of 8. With the quantity of bundles decided, Mrs. Hernandez then recommended a dark brown shingle with ripple aggregate valued at $28.95 per bundle. This would make the total cost for the eight bundles $231.60. David then loaded the eight bundles on the cart.



The family moved on to the paint section. Once there, a decision had to be made whether to use ***oil base*** or ***latex base*** paint. The decision was to use latex base paint for the exterior walls, because it would go on smoother, and cleanup would also be easier since water could be used to wash out the rollers, pans, and brushes. Mrs. Hernandez suggested a paint color called "chamois" (a light tan) for the building sides and "chocolate" for the trim. The spread rate on the gallon can indicated that the paint would cover 600 square ft in one coverage. The building walls included fifteen, 4'x8' sheets of siding; therefore, 480 square ft of coverage was needed. David quickly calculated that two coats of paint would be needed to assure good coverage on the building; consequently, two gallons of chamois paint and one gallon of chocolate paint would be needed for the project. The paint, which carried a twenty-year guarantee, sold for $15.75 a gallon. The cost of the three gallons of paint came to $47.25.



The last items needed were trim boards for the corners and the door. Eleven boards, 8 ft by 1 inch by 4 inch would be needed to dress up the outside of the building. They could be purchased for $2.59 per board. The cost of the boards totaled $28.49.

All the supplies were then taken to a check-out counter. The total bill came to $366.34. Coach Hernandez wrote a personal check to cover the supplies, knowing that the bank would reimburse him the next day.

The trip back home was pleasant, because the conversation focused on working together for the benefit of others.

LIFE PRINCIPLE



"Money is a terrible master but an excellent servant."

—P.T. Barnum



Lesson 10

Chapter 2

Construction

Section 2

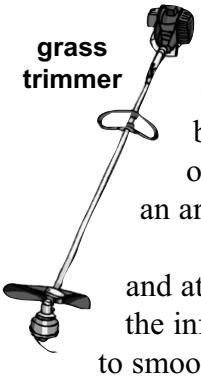
Lessons 6-10

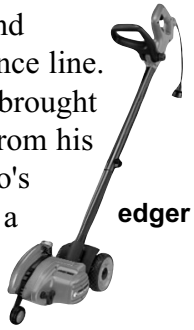
TAKE ME OUT TO THE BALL PARK



On Monday of the following week, the Cardinal team members practiced their very hardest in preparation for their first big game against the Warriors. All of the positions had been assigned, and the ***pool*** of pitchers had been chosen. The practice went well, and the team felt that they were ready to take on their opponent.

The game was scheduled to begin at 6:30 P.M.; however, Coaches Hernandez and Hunter, plus some of the dads, arrived early to begin preparing the field for play. The field had already been mowed by the Parks and Recreation Department, but their workers had not cleared the grass and weeds out of the fence line. Mr. Garcia, Joe's dad, had brought a ***grass trimmer***, an ***edger*** and riding lawn mower from his lawn and landscaping company. Mr. Sanchez, Arturo's father and an employee of Mr. Garcia, began to use a grass trimmer along the ***chain-link fence*** that surrounded the baseball field. Mr. Garcia edged around the base lines. He then raked that grass into a container on wheels and hauled it to the nearby ***compost pile***, an area designated to deposit grass clippings.





Next, Mr. Garcia unloaded his riding lawn mower and attached a metal drag. He then proceeded to smooth the infield portion of the playing field. The objective was to smooth out bumps and to remove rocks on the field.

As soon as that task was done, Coach Tucker placed the bases in their proper positions. Finally, the balls and the bats were unloaded from the back of a pickup. Again, everyone talked about how much of a contribution the storage shed would make to the community Baseball League program.

The Cardinals took the field first for warm-ups. When they

VOCABULARY

Pool: a group of individuals put into groups for a specific purpose

Grass trimmer: a machine designed to cut weeds and grass using a nylon string

Edger: a machine designed to trim along sidewalks, pavement, etc. to remove grass

Chain-link fence: a type of fence with interlocking wire forming $1\frac{1}{2}$ inch by $1\frac{1}{2}$ inch squares

Compost pile: a pile of organic matter that is designed to rot, making a good organic fertilizer

Inning: a division of a baseball game in which each team has a turn at bat, each of which ends with the third out

had finished, the Warriors had their practice time. The announcer asked everyone to stand while the national anthem was sung by a local pastor, who also led in a prayer for safety. Then the umpire shouted, “Play Ball!” to start the game.

The Cardinals were up to bat first and were quickly retired 1, 2, 3 by the Warriors' ace pitcher. Then the Warriors came to bat. The first two batters hit singles. With two players on base, Matt walked the third batter. The bases were loaded, and it was obvious that the Cardinals were a little nervous. The fourth man to the plate hit a high outfield fly that was dropped by Joe, allowing the Warriors to score two runs. The Cardinal pitcher then settled down and struck out the next three players.

The next ***inning*** was uneventful with no one scoring. With the score 2-0 in favor of the Warriors, the third inning was begun. Jake got things under way by hitting a fly ball to center field where it was caught by the Warrior center fielder. Matt was up to bat next, and he hit a single to right field. After that, Tim hit a single to left field. Arturo was up next and doubled. The two base runners crossed home plate, scoring two points.

The score was now tied with one base runner on second. It seemed as though the Warriors’ ace pitcher was tiring as he walked the next two batters, thereby loading the bases. Joe was the next batter at the plate and delivered a mighty swing. Lo and behold! He knocked a homer over the right field fence. The Cardinals were leading by four runs. The Warriors' coach pulled the pitcher out and replaced him with another player.

After the new pitcher warmed up, he walked the first two batters. Then Jose was up to bat. He hit a line drive to the right field fence and just kept running. The Warrior right fielder chased the ball off the fence, and then made a poor throw to second base, missing the second baseman. The ball rolled across the field, and Jose jumped over the ball at the third base line, scoring at home plate. That gave the Cardinals nine runs, and a seven run lead. The game was then called because of the seven run rule, and the Cardinals celebrated their first official win of the season.

As the Hernandez family drove away from the baseball field, their thoughts were focused on their victory and how the fans, parents and community had supported the young players in their first game.

LIFE PRINCIPLE



"Life is either a daring adventure or nothing."

—Helen Keller



Lesson 11

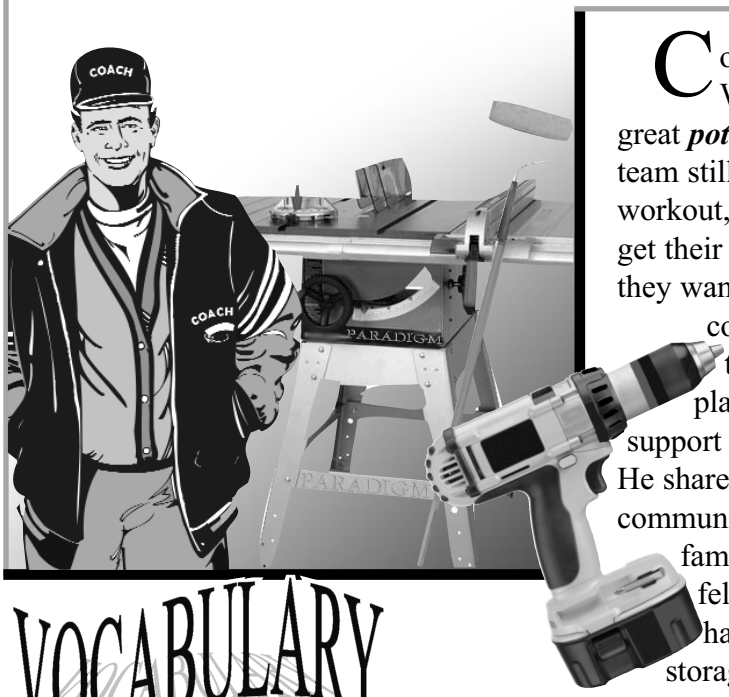
Construction

Chapter 2

Section 3

Lessons 11-15

CLOSING THE DOOR



Coach Hernandez thought the win against the Warriors showed that the Cardinal team had great ***potential***, but the game also revealed that the team still had many weaknesses as well. At the next workout, Coach Hernandez met with the players to get their thinking on just how much time and effort they wanted to devote to baseball training. The team committed to work harder and schedule more time in training to become better baseball players. Coach also reminded the team of support being shown by their parents and friends. He shared his belief that as the team got better, the community would become a better place for families. Coach closed by saying, "By the way, fellows, be sure to tell your dads that we still have some unfinished work to do on the storage shed."

The next afternoon Coach Hernandez stopped by the Parks and Recreation Department office at Mrs. Coleman's request. Earlier, she had talked with Coach about the possibility of getting a ***dead-bolt*** lock and several keys for the new door. Smiling, she said, "Here is the dead-bolt lock and seven keys. That should be just enough to furnish you with a key and one for the six coaches of the other teams. "Mrs. Coleman also gave Coach Hernandez a metal handle to put on the outside of the door.

"Thanks, Mrs. Coleman. I'm glad you thought about getting keys for all of the coaches. I want this building to benefit all of the teams in the league," Coach said.

Coach Hernandez then went by his house and picked up the metal door. His plan was to install it that afternoon while Coach Hunter worked with the team. Coach Hernandez also picked up his cordless drill and four, 3 inch by $^{5}/_{16}$ inch ***lag bolts*** to secure the door frame to the shed door casing.

When he arrived at the field, he unloaded the door and set it in place with the help of three of the team members. The door just fit into the opening created in the framing wall. Coach

VOCABULARY

Potential: something that can develop
Dead bolt: a security bolt on a door that extends into the door frame
Lag bolt: a bolt with a special nut that flares, gives extra strength
Alignment: the proper positioning or adjustment of parts
Threshold: bottom plate at base of door opening, may be metal or wood
Rubber seal: rubber weather stripping built into the threshold to keep out water and insects
Binding: a fitting that is so tight that it rubs

Hernandez proceeded to align the door by suspending a plumb line nylon cord with a plumb bob (weight) tied to it, along the top edge of the door frame.

He used the plumb bob to make sure that the door was perfectly upright and that it would swing open evenly. He then used a $\frac{3}{8}$ inch bit to drill four holes into the metal side plate of the door. Holding the door in ***alignment***, he screwed the lag bolts into the inner casing of the door, securing the door frame to the 2"x4" studs. The ***threshold*** was then installed. He was careful to make sure the ***rubber seal*** just barely touched the bottom of the door. After the threshold was secured with the #2 by $1\frac{1}{2}$ inch screws (provided with the door assembly), the lock could be installed.

Coach Hernandez was glad the lock contained instructions on proper installation, because the package contained numerous parts that need to be assembled properly in order for the lock to function effectively. Experience caused him to read the instructions first before beginning the installation process. He found that he needed to make sure that the key side of the dead bolt lock was on the outside of the door and that the thumb latch was on the inside. He also discovered that the dead bolt was installed first and should extend into the door facing at least an inch. After installing the dead bolt, Coach Hernandez checked it for clearance and ***binding***.

Coach followed the directions which stated that the dead bolt should be in an extended position when installing the lock face plates. The lock face plate was installed first, and then the thumb latch part of the lock was carefully placed into the lock hole. The front and back plates were then aligned, and two screws were placed through the back plate and into the front plate, securing the two plates together. Next, the key was inserted into the lock and was turned in a clockwise motion. The dead-bolt lock was turned into the face plate cavity, securing the door. The key was then turned counter clockwise to the 12:00 clock position and removed. The mechanism seemed to work fine. Coach Hernandez tried the lock with several keys and was satisfied the lock would function properly for each team.

dead - bolt lock



Pride in a job well done filled Coach, and he was confident that the building was now secure enough to be used for the storage of the baseball supplies and equipment. After he, Coach Hunter, and the players had put the equipment into the shed, a duplicate key was given to Coach Hunter.

Just then, Mr. Hurley and Mr. Locke drove up. Getting out of their cars, they admired the shed with its new dead-bolt lock. Mr. Locke remarked, "It looks great, guys! We'll be by early tomorrow to begin the painting process, and we'll bring the brushes and rollers with us. Coach Hernandez, could you have the paint here and ready to go?"

"I sure will, men!" he replied.

Finally, the storage shed was locked, and everyone went home for the night.



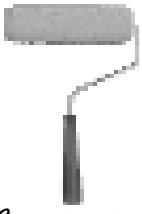
plumb bob

LIFE PRINCIPLE

"To love what you do and feel that it matters—How could anything be more fun?"

—Katherine Graham





Construction

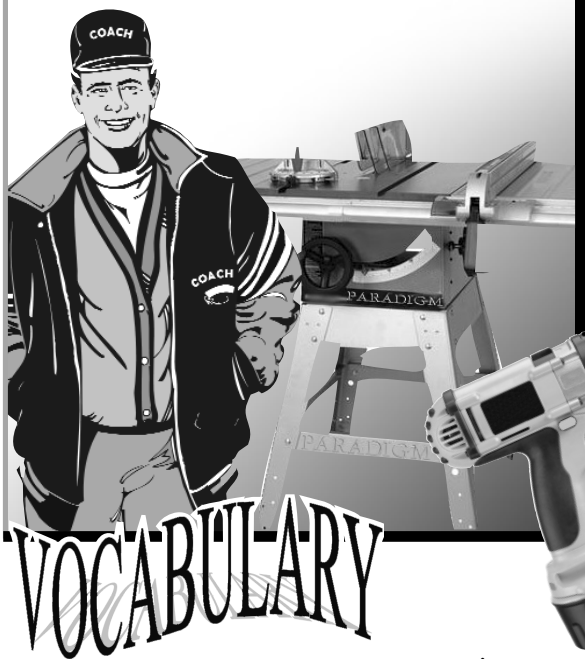
Lesson 12

Chapter 2

Section 3

Lessons 11-15

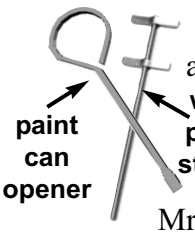
PUTTING ON THE PAINT



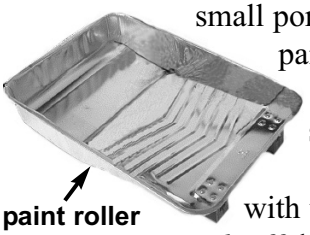
The next afternoon, Coach Hernandez stopped by his house to get the paint and trim boards for the storage shed.

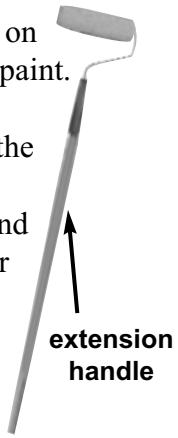
Mrs. Hernandez reminded her husband, "Honey, remember that I'll be going with you to the baseball field today. I promised to be responsible for painting the shed door."

"I haven't forgotten about the door needing 'a woman's touch'," he assured her with a smile. They loaded the supplies into the pickup and started off for the day's work. On the way to the field, they stopped by the lumberyard to purchase three cans of tan spray paint and some ***masking tape***. When they reached the ballpark, they found Mr. Locke and Mr. Hurley already there and in the process of setting up their painting equipment. As soon as the paint was unloaded from Coach Hernandez's pickup, Mr. Hurley used a paint can opener to open a gallon of the chamois-colored paint. He then took a ***wire paint stirrer*** and inserted it into the ***chuck*** of a cordless electric drill. The drill was turned on and run slowly so as not to spill any of the paint. After the paint had been thoroughly mixed, it was ready to be applied to the walls.



Mr. Locke had been getting the ***paint roller*** and its extension handle ready. He cleaned the roller tray for use with the chamois paint. After applying paint to a small portion of the wall and checking the paint color for acceptability, the men began to apply the paint smoothly and rapidly.





While Mr. Hurley and Mr. Locke were busy with their painting, Emily Hernandez began to ***mask off*** the metal door frame. She used masking tape

Masking tape: paper tape that will keep paint from an object, yet will not remove cured paint

Wire paint stirrer: a paint stirring device on a long shaft that attaches to a drill chuck

Chuck: the part of a drill that clamps and holds the bit in place

Paint roller: a device used to apply large amounts of paint to flat surfaces

Mask off: to apply masking tape to a surface

Strike plate: a small metal plate, attached to the door frame, through which the dead bolt slides

Fascia: the boards located under the eaves of a building

to attach newspaper sheets to the wall around the door frame so that the overspray from the spray cans would not get on any other material. She also carefully spread newspapers on the floor and across the threshold of the door to keep the overspray from staining the concrete. The hinges were masked off, and a utility knife was used to trim the masking tape so that a clean paint line would be established. The dead-bolt lock and ***strike plate*** were masked off; and a clean paint line was established. She knew that careful and patient preparation would assure a quality job and prevent a lot of extra work later.

Once preparation was complete, one of the cans of paint was shaken until the ball inside the can rattled freely, indicating that the mixing process was complete. Donning a painting mask to protect herself from the paint fumes, Mrs. Hernandez began to make smooth, parallel strokes with the spray paint can, applying paint from a distance of about eight inches from the surface of the door. She made sure that the paint line would overlap the newly painted line, as she continued to use smooth strokes, being careful not to vary her distance from the painted surface. After the entire door surface was painted, the door frame was covered with paint, using the same technique.

About that time, Mr. Hurley and Mr. Locke finished painting the outside walls of the building. Mr. Hurley had used the roller, and Mr. Locke had touched up thin spots with a three-in bristle brush. While they all waited for the first coat of paint to dry on walls and the door, the men cut, and Mrs. Hernandez painted, the 1” x 4”s for the facia, corners and door trim, using the chocolate brown paint she had previously selected.

The men applied a second coat of paint to the walls and trim while Mrs. Hernandez spray painted a second coat on the door and frame, giving them a glossy appearance. Mr. Locke, Mr. Hurley, and Mrs. Hernandez went to sit in the stands to watch the boys practice while the paint dried.

After the designated time had passed, the three workers went back to the shed.The men quickly nailed in place the ***facia*** boards, corners and door trim. Mrs. Hernandez carefully removed the masking tape, and picked up all of the protective newspaper. As she cleaned up the inside of the storage building, she said, "I think some lockers would sure be handy in here. That way everything could be kept off the floor."

Mr. Hurley smiled as Mr. Locke laughed and said, "Your wish is our command."

Taking a measuring tape, the two men began measuring and designing storage bins for each team.

Coach Hernandez called an end to the practice, and all of the team members hurried over to the shed to admire the handiwork of Mr. Hurley, Mr. Locke, and Mrs. Hernandez. They received many thanks from the boys before everyone left for home.

LIFE PRINCIPLE



"Every man with an idea has at least one or two followers."

—Brooks Atkinson



Lesson 13

Construction

Chapter 2

A PLACE FOR EVERYTHING

Section 3

Lessons 11-15



Mr. Locke and Mr. Hurley cleaned their paint brushes and rollers by spraying water through them at Mr. Locke's house using water from the outside hose with a pressured nozzle attached. When the water ran clear, the brushes and rollers were clean. During this process, the men decided to build the team lockers out of $^{3}/_{4}$ inch plywood. This would provide enough thickness in the material to allow screws to secure the pieces together. The plywood was to be cut to size using Mr. Hurley's ***table saw,*** and the pieces were to be assembled at Mr. Hurley's shop.

The two men decided that eight lockers would be sufficient to accommodate all of the teams in the baseball league. The dimension of each locker would be six ft high, two ft wide, and two ft deep. A shelf would be installed four ft up from the bottom board of each locker. Each locker would also have its own six ft by two ft door. The men figured that a single 4' x 8' sheet of plywood could form the back of two lockers, thereby simplifying the cutting plan.The men calculated that $3^{1}/_{2}$ sheets of plywood would be needed for every two lockers. That meant the men would have to purchase fourteen sheets of 4' x 8' plywood for the project. Mr. Hurley called Mr. Jackson at the bank.

Mr. Jackson said that the bank would ***underwrite*** the cost of the lockers. Each sheet of plywood would cost $25.00 for a total of $350.00. A pair of ***hinges*** and a lockable ***hasp*** would also be needed for each locker. Eight pairs of hinges at $2.59 per pair cost a total of $20.72. Eight hasps, costing $1.59 each, amounted to $12.72. Two pounds of #2 $1^{1}/_{2}$ inch screws would cost $4.25. The total cost of the locker project came to $387.69. This relatively small sum assured that each baseball team would have a secure area in which to store game supplies.


hasp

hinge

Mr. Hurley and Mr. Locke met at Mr. Hurley's shop the next afternoon where the materials had been delivered by the

VOCABULARY

Table saw: an electric saw that is mounted with the circular blade protruding through a table

Underwrite: cover the cost; provide the money needed

Hinges: devices designed to hold two pieces of material together yet allowing them to open and close

Hasp: a two-piece metal device that allows doors to be locked

Rip fence: an adjustable metal guide for cutting wood in straight lines

lumberyard. The men then adjusted Mr. Hurley's table saw. The ***rip fence*** was set at 24 inches, and all fourteen sheets of plywood were cut in six ft lengths. Ten sheets were sawed 24 inches lengthwise for the locker sides and doors. After that, the 2' x 4' pieces were cut to form the bottom and top of each locker.

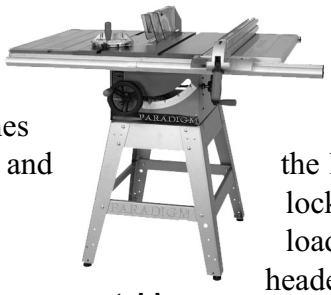


table saw

With cutting completed, the lockers were ready for assembly. A 4' x 6' sheet of plywood was placed upright as backing, then one 2' x 6' piece was screwed on the surface at each edge, and another 2' x 6' piece was screwed down the middle of the 4' x 6' back piece, forming two lockers. The top and bottom pieces of each locker were then screwed into place. The shelves were subsequently cut and screwed into place in each locker. The men used a cordless screwdriver to install the door's metal hinges. Each hasp was then put into place and screwed down tightly.


cordless drill

Working diligently, the two men were able to assemble all four sets of the lockers that afternoon and had them ready for delivery to the storage shed the next day. Mr. Hurley made arrangements for Coach Hunter to bring his sixteen ft trailer by the shop the next afternoon so that the lockers could be transported to the ball field.

Mr. Locke said goodbye to his friend and headed for home. Mr. Hurley picked up scrap wood in the shop and then went into the house for supper.

As agreed upon, Coach Hunter stopped by the next day to pick up the lockers. He and Mr. Hurley stacked the lockers in order to haul all of them in one load. With this completed, Coach Hunter headed to the field.

When he arrived, several players and parents were willing to help unload the lockers. As they were removed, Mr. Hurley and Mr. Locke screwed the lockers together and to the walls. Four lockers were placed on one wall with four on the opposite wall, leaving ample room between for storage of other items. As the men surveyed the shed, they realized that only a few more pieces of 4' x 8' material would be needed to close in the walls and ceiling.



Life Principle

"Don't agonize....organize."

—Florence R. Kennedy



Lesson 14

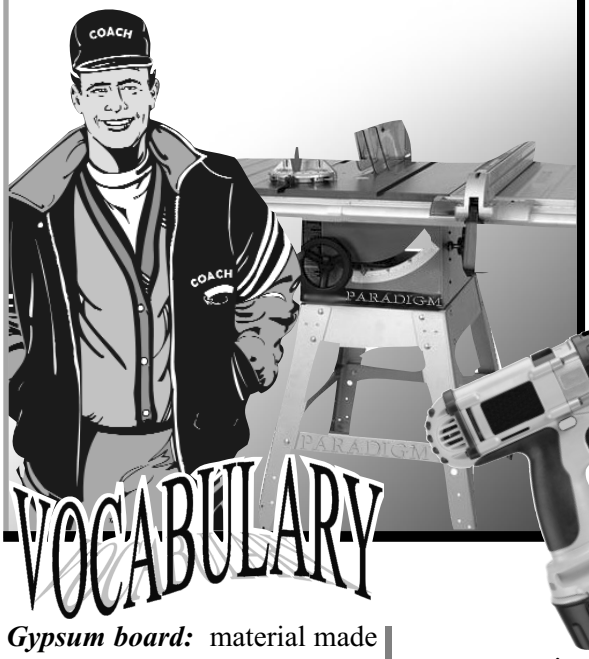
Chapter 2

Construction

Section 3

Lessons 11-15

ADDING BEAUTY



VOCABULARY

Gypsum board: material made of gypsum (a chalk-like substance) covered in heavy, protective paper to hold it together

Nursery: a place where plants are grown from seeds until they are ready to be marketed

Landscape: the placing of rocks, plants and soil to create an attractive outdoor area

Greenhouse: a structure made of opaque building material, designed for growth and protection of young plants; also called a hot house

***Mulch*:** a material used to control weeds and to hold moisture around plants

Fertilizer: organic material which provides proper nourishment for plant growth

Mr. Hurley looked around his shop after returning from the storage building and soon realized that he had enough 4' x 8' pieces of ***gypsum board*** (Sheetrock) to cover the remainder of the inside walls and ceiling of the storage shed. The next afternoon he and Mr. Locke loaded up the gypsum board in Mr. Hurley's pickup and drove to the baseball field.

Once there, they began to measure and cut pieces of the board to enclose the inside of the building. With both of them working hard, they quickly finished the interior of the shed.

About the time they finished, Mr. Garcia arrived at the field to pick up his son. He walked to where Mr. Hurley and Mr. Locke were standing. He began the conversation by saying, "Hey, did you know that the ***Nursery*** is trying to give away a lot of extra plants and flowers? They overstocked, and many of the plants are suffering from the heat. The nurseryman said they need to get rid of the plants before they die."

"Is that so?" commented Mr. Hurley.

"We need to talk to Coach Hernandez. If he's interested, we could use a lot of the plants to ***landscape*** the park," said Mr. Locke.

When practice was over, Coach Hernandez went over to visit with the men. He was informed about the availability of the plants, and he gave the landscaping plan his hearty approval. Matt, Coach Hunter's son, overheard the conversation and shared it with the other players who were discussing putting up the gear and getting the sprinklers started on the field. Everyone was interested in what Matt had to say about the plants; in fact, they were unanimous in their desire to help landscape the grounds with shrubs. They went to Coach Hunter and suggested that a work day be scheduled for next Saturday morning. After checking out the

time with Coach Hernandez, the workday was set for 8:00 A.M. the next Saturday. Coach Hunter volunteered to haul his trailer by the nursery to pick up the plants and flowers.

On Friday afternoon, Coach Hunter hitched up his trailer and drove to the nursery. He located Mr. Royer, the man who had been contacted earlier about the plants. Mr. Royer instructed, "Just pull around to the side of the ***greenhouse***. I've put all of the available plants in one spot."

When he got out of his truck, Coach Hunter was amazed at the number and variety of plants and flowers which had been set aside.

"Just pick out what you want," said Mr. Royer.

Before long, Coach Hunter had almost filled the trailer with various types of plants.

Mr. Royer came by the trailer and added, "By the way, we also have some broken sacks of potting soil, bark ***mulch***, and ***fertilizer*** that you probably can use. Also, I have about thirty stepping stones that have been discontinued. It's all yours at no cost if you'll just haul it away."

"Thanks! I'll take them," exclaimed Coach Hunter, gratefully.

After rearranging the plants to make room for all the other items, Coach Hunter loaded the donated stones and other materials, then headed home.

Early Saturday morning Coach Hunter arrived at the field with his trailer full of landscape items. He was pleased to discover that a crowd of baseball players and parents were already on the scene. They had brought with them landscaping tools and an ice chest full of fruit juice and bottled water. The first thing Coach Hunter did was to locate Mr. Garcia and ask him to head up the landscaping project.

Mr. Garcia surveyed the plants and supplies and then removed some string, stakes, and color ties from his pickup truck. He began to lay out straight lines and curves to create a landscaping plan. Next, he notified players and parents who were present where the different types of *foliage* were to be planted. He instructed the helpers to set the plants in designated places so that everyone could get an idea of how the scene would look before the shrubs were planted.

The stepping stones were placed in a trail from the storage building to the bleachers and to the players' dugout. The various types of foliage were then planted in their proper places. The soil was smoothed around the plants and the new greenery was carefully watered. Finally, the wood bark mulch was placed to create a natural effect.

The project was completed by noon, and everyone walked out to the road to admire their handiwork. They could say at last that the storage shed was completed! What a wonderful sense of accomplishment all felt who had helped to make the project a reality!

LIFE PRINCIPLE



"Take time to stop and smell the flowers."

—Walter C. Hagen



Lesson 15

Construction

Chapter 2

Section 3

Lessons 11-15

THE CELEBRATION



The following week was filled with excitement as the Cardinals continued their winning season. Coach Hernandez and Coach Hunter were also busy contacting parents of the players about a special barbecue dinner and father-son or ***mentor***-boy baseball game scheduled for Saturday. Coach Hernandez planned to invite all of the companies and individuals who had helped in any way with the storage shed or the landscaping project. The invitation list included: Mr. Ray of the R & G Gravel Company, who had donated the sand; Mr. Jackson at the local bank, who had underwritten the cost of the building; Mr. Royer at the nursery, who had donated plants; Mrs. Coleman of the Parks and Recreation Department; City Manager, Mr. Choate; members of the city council who had approved the project; the Concrete Company, which donated concrete; Mr. Locke, who had provided the use of his concrete tools and ladder; Mr. Hurley, who had provided the use of his shop and the gypsum board; Emily Hernandez, who assisted with painting and Coach Hunter, who had volunteered the use of his trailer. Coach Hernandez felt strongly that these businesses and individuals needed to be recognized in some way at the upcoming ***function***; however, he was unsure of what form that recognition should take.

While talking with Sam May's mother about the function, Coach Hernandez was surprised when Mrs. May said she had just opened a trophy and engraving shop downtown. She was anxious to help, so she suggested creating small plastic plaques with the names of the businesses and individuals who had provided help. These could be attached to the shed and would provide a perfect form of recognition. As a way of promoting her new business, Mrs. May said that she would donate the plaques.

When Coaches Hernandez and Hunter arrived at their work locations on Tuesday, they were surprised to see a message beside

VOCABULARY

Mentor: a trusted adult guidance counselor who serves as a good role model
Function: a gathering of people for a specific purpose
Organization: a group of people united for a particular purpose
Cater: to bring specific foods; provide service for a special event
Dedication: to commit one's self to a cause; to present something to an individual or group

their names requesting them to report to Ralph Mosser's office. The two men looked at one another strangely because neither of them had ever before been summoned to the office of the company president. The men immediately went upstairs to Mr. Mosser's office, where they were greeted by his secretary.

She said, "Good morning, gentlemen; Mr. Mosser is expecting you. He's on the phone right now, but he will see you in just a minute. Please be seated."

In a few minutes, Mr. Mosser stepped into the outer office and greeted Misters Hernandez and Hunter with a warm handshake. "Please, come into my office."

After the three men were seated, Mr. Mosser began, "I've been hearing great things about you and the success of your team as well as about your construction of the storage building and landscaping of the baseball field. That has been a great thing for the community, and in this meeting, I want to determine how Mosser Construction Company can become involved in supporting the Cardinals and the baseball league ***organization***."

Coach Hernandez immediately recognized the opportunity for the Cardinals to have a sponsor, and who would be better than the coaches' own employer?

Mr. Hernandez said, "We really appreciate that, Mr. Mosser. Would you consider being the Cardinals' sponsor? We also have a big barbecue dinner planned for Saturday as a form of celebration, and we'd be honored if you would attend."

"How many players do you have on your team?" inquired Mr. Mosser.
"Eleven," stated Coach Hunter.

"Great! I'll get on the phone this morning and order the jerseys and caps so that they'll be ready for Saturday. By the way, Mosser Construction will also underwrite the cost of the entire meal for whoever shows up on Saturday and we will send out our barbecue crew to ***cater*** the meal. That is, unless you already have made other arrangements."

"Oh, no, we certainly haven't. That is most generous of you, Mr. Mosser," Coach Hernandez assured him. Then the three gentlemen shook hands. Mr. Hunter and Mr. Hernandez returned to work with gratitude and a renowned sense of commitment to their generous employer.

When Saturday arrived, each team in the league was lined up and introduced before a huge crowd of supporters. A two-inning game was then played in which legs of two players were tied together at their ankles. Fathers and sons or mentors and boys were paired together, and the game provided quite a few laughs and good, clean entertainment for the spectators.

After the game, everyone gathered for the barbecue dinner. Mosser Construction workers served food to more than three hundred people in a short period of time. When everyone had finished eating, they

barbecue grill



gathered around the shed to admire the new plaques. Mosser Construction had been added as a donor. Coach Hernandez read aloud the names of the contributors, and each received a big round of applause from the crowd. Mrs. Coleman, representing the Parks and Recreation Department, then announced that the city Park Department would be providing bases and a new pitching machine which could be used for practice by

all of the teams. Mr. Jackson from the local bank delighted everyone present with the news that his bank was donating a brand new scoreboard for the facility.

Then Coach Hernandez was called forward to receive the Human Service award from the city council, but the most emotional part of the ceremony was when he was presented a plaque by the players on the Cardinal team. They presented him a baseball, which had been signed by all of the players, and had been mounted on a beautiful wooden plaque with the following ***dedication***:

> Coach Hernandez
>
> ***In appreciation of your dedication and example as a great community leader***
>
> The 2005 Cardinals

Glancing at the completed storage building and at the beautifully landscaped field, Coach Hernandez wiped a tear from his eye and accepted the plaque. A wild cheer went up from the crowd!

LIFE PRINCIPLE



"The reward of a thing well done is to have it done."

—Ralph Waldo Emerson