The FUTURES Channel®

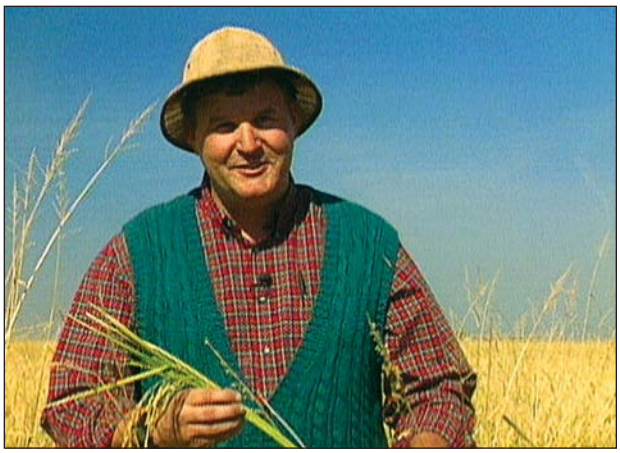
MOVIE GUIDE

MOVIE NUMBER 2005

The Lundberg Farms

The Movie:

Bryce Lundberg raises organic rice in central California. It's a satisfying job that requires an understanding of variables. Featured: Bryce Lundberg, Lundberg Farms. *(Movie length: 3:50)*



Background:

Rice is the main food source for almost one-half of the population of Earth, and California's Sacramento Valley has the highest rice yields per acre in the world. High yields, however, generally require the use of chemical pesticides and herbicides to control insects and weeds. Organic rice production is often more costly than chemical-based production, and so the farmer must be sure that people will be willing to pay a higher price for his product. Careful and expert management of every step of the production process is required to get the highest possible yields at the lowest possible costs.

Curriculum Connections:

Whole Number Operations 1

If a harvesting machine can harvest 10 acres a day, and there are 150 acres to harvest, what operation would you use to find out how many days it will take to complete the harvest? Explain your answer.

Decimals 2

A farmer plants 50 acres of corn and gets a yield of 125 bushels per acre. If he can sell the corn for $2.35 a bushel, and it costs him $252.50 per acre to grow the corn, how much profit does he make?

Percent 3

Last year, out of 85,000 tons of rice bought in an area, 5,000 tons were organic brown rice. What percent was brown rice? If 100,000 tons are bought next year and the same percentage applies, how many tons of organic brown rice will be bought?

Ratios 4

If 900 pounds of seed are used to plant 6 acres of rice, how much seed would be needed for 200 acres?

Ratios 5

Suppose you have completed the first day of your harvest of rice, which will take several days. What would you need to know to estimate the total amount of the harvest, and how would you make a good estimate?

Ratios 6

Because they don't use chemical fertilizers, organic farmers often enrich their soils with composted materials. These are materials which have been mixed together and are allowed to decay while being exposed to air. When composting, the farmer must be aware of the ratio of carbon to nitrogen in the material being composted; this ratio should start at around 30:1 (30 pounds of carbon for every pound of nitrogen).

Suppose you have 100 pounds of poultry manure that you want to compost. It contains 8 pounds of Nitrogen, with a C:N ratio of 6. How many pounds of carbon does it contain?

In order to get a 30:1 ratio, you have to mix this manure with another material that has a very high ratio of carbon to nitrogen. 100 pounds of corn cobs, for example, contain about 1/2 pound of nitrogen and have a C:N ratio of 100. How many pounds of carbon would there be?

If you chopped up the corn cobs and mixed it with the manure, how many pounds of carbon would the mixture contain? How many pounds of nitrogen? What would the C:N ratio be?

How many pounds of corn cobs would you have to mix with 100 pounds of manure to get a C:N ratio around 30?

Measurement (volume) 7

How many grains of rice would there be in a bushel? In a cylindrical silo 40 feet tall by 20 feet in diameter? (Begin by counting the grains of rice in 1/4 cup.)

1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 peck = 2 gallons
1 bushel = 4 pecks
1 bushel = 1.24 cu. ft.

Measurement (volume) 8

Irrigation water is measured in acre-feet; 1 acre-foot is the amount of water required to cover an acre of land, 1 foot deep.

Suppose 60 acres of rice fields are irrigated by covering them with 8 inches of water. How many acre-feet of water would be required? How many gallons is this?

Statistics (charts, graphs) 9

White rice is rice which has had its outer surface polished off; brown rice has not been polished. Since that outer surface contains vitamins and minerals, white rice is generally a poorer source of nutrition than brown rice. Create a chart that illustrates this data:

Nutrient	One cup brown rice	One cup white rice
Calories	232	223
Protein	4.88 g	4.10 g
Carbohydrate	49.7 g	49.6 g
Fat	1.17 g	0.205 g
Dietary Fiber	3.32 g	0.74 g
Thiamin (B1)	0.176 g	0.223 g
Riboflavin (B2)	0.039 mg	0.021 mg
Niacin (B3)	2.730 mg	2.050 mg
Vitamin B6	0.294 mg	0.103 mg
Folacin	10 mcg	4.1 mcg
Vitamin E	1.4 mg	0.462 mg
Magnesium	72.2 mg	22.6 mg
Phosphorus	142 mg	57.4 mg
Potassium	137 mg	57.4 mg
Selenium	26 mg	19 mg
Zinc	1.05 mg	0.841 mg

Geometry (perimeter, area) 10

A farmer has 9 rice fields arranged in a square. Each field is square with an area of 16 acres. Between the rice fields are raised areas of ground called levees, which hold the irrigation water in the fields when they are flooded, and all levees are 16 feet wide.

To keep weeds from growing on the levees (and then spreading to the fields), the farmer has decided to use sheep to graze the weeds on the levees. This requires fencing, however, to keep the sheep out of the fields.

What is the area of the levees that the sheep will be grazing? How much fencing is required to protect the fields?

Geometry 11

Which will hold more rice, a silo 50 feet tall and 40 feet in diameter, or a silo 100 feet tall and 20 feet in diameter? (Both are cylindrical.)

Geometry (circles, area), Percents 12

Some farmers water their crops with a rotating sprinkler in the center of a field. The area that is watered in this way is circular. In a square one-acre field, in which the circular area being watered has a diameter equal to the length and width of the field, how many square feet of the field would not be watered by such a system? What percent of the total area is this?

What percent of a square 16-acre field would not be watered by such a system?

Statistics, Probability 13

This chart shows the annual rainfall in the Sacramento area for the past thirty years.

a) Make a histogram in which the *y* axis is the "Number of years with rainfall in the given range" and the *x* axis has intervals of 0.00 to 4.00 inches, 4.00 to 8.00 inches, 8.00 to 12.00 inches, and so on.

b) What is the probability that rainfall in a year is greater than 16 inches? Is greater than 24 inches? Is less than 32 inches? Is less than 12 inches?

Sacramento Rainfall	
Year	**Rainfall (inches)**
1971	11.3
1972	14.37
1973	28.86
1974	17.5
1975	15.34
1976	6.67
1977	11.39
1978	23.58
1979	22.33
1980	20.57
1981	24.57
1982	32.22
1983	38.63
1984	13.01
1985	15.33
1986	23.16
1987	18.43
1988	12.73
1989	15.75
1990	15.65
1991	15.87
1992	20.89
1993	25
1994	15.77
1995	28.97
1996	23.91
1997	17.89
1998	28.9
1999	11.95
2000	25.88
2001	22.65

Algebra (patterns, functions) 14

The table below shows how much rice was produced in the United States from 1964 to 1999.

Year	Hundreds of pounds of rice produced
1964	73,166
1969	91,904
1974	112,386
1979	131,947
1984	138,810
1989	154,487
1994	197,779
1999	210,458

Can you use this data to predict how much rice might be produced in the years 2009 and 2014? Can you predict in what year rice production will reach 250,000?

Algebra (variables) 15

- Amount of rainfall
- Temperature range
- Amount of rice produced
- How much it costs to produce the rice
- How much the rice can be sold for
- How much rice of each type that people will want to buy

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Forest Rangers, #2010	Forest rangers describe some of the techniques used to keep hundreds of thousands of acres of trees healthy.
Tornado Chase, #3002	Tornado-chasing meteorologists do research in the path of the storm's edge as they strive to understand tornadoes better for more accurate, faster forecasting.