

(Pg 324) 26) $-3c + 1$ 31) $4d^4 + 24d^2 + 36$ 36) $X - 4$

27) $4x^2 + 2ax - 34$ 34) $2x^3 + X - \frac{3}{x-3}$

29) $d^2 - 2d - 15$ 35) $10x^3 - 5x^2 + 9x - 9$

Pg 271

15) $2xy - 7x^2$

18) $2k^2 - 3p + 4p^2$

16) $2n^2 + \frac{4m}{n} - 9m^2$

17) $4s^2 + 3rs - 5r$

Factoring Review

1) $2, -1/2$

4) $0, -3$

2) $0, 1/2$

5) $-3/4, 4$

3) $4, -3$

6) $-4/3$

Pg 293

37) $48\sqrt{7}$

45) 34

51) $\frac{a^2\sqrt{b}}{b^2}$

40) $2\sqrt{2}$

47) $8 - 2\sqrt{5}$

Pg 325

52) $3\sqrt{5}$

57) $\frac{3-\sqrt{3}}{4}$

53) $-5\sqrt{3}$

58) $\frac{2\sqrt{10} - \sqrt{5}}{7}$

Solve

1) (81)

2) (100)

3) $(x=4)$

4) $9x+9=x+5$
8) $x=-4$ 5) $5x-2=4x+4 \rightarrow (x=6)$

Pg 401

31) $-1 \pm 9\sqrt{6}$

33) $\frac{5 \pm \sqrt{11}}{2}$

35) $-\frac{1}{6} \pm \frac{\sqrt{73}}{6}$

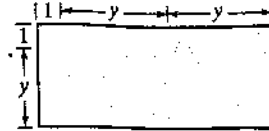
32) $-\frac{1}{2} \pm \frac{\sqrt{3}}{2}$

34) $3 \pm \frac{\sqrt{6}}{2}$

36) $\frac{1}{6} \pm \frac{\sqrt{481}}{16}$

30

Consider the rectangle shown to the right with the measurements given in feet.



- Write an expression for the width and length of the rectangle.
- Write an expression for the area of the rectangle.
- If the area of the rectangle is 25 sq ft, find the value of y to the nearest tenth of a foot.

31

The Standard and Poor's 500 Index is a measure of the value of 500 stocks that are traded on three major stock exchanges. The value of this index between 1994 and 2000 can be approximated by the polynomial $11.8n^2 + 83.2n + 432.9$, where n is the number of years after 1994. In what year was the value of the index approximately 1000? (Source: Standard and Poor's/DRI)

32

The equation $y = t^2 + 8.3t + 28$ models the number of cell phone subscribers for the years between 1995 and 2002, where t is the number of years since 1995 and y is the number of subscribers (in millions). Determine the year in which there were approximately 95 million cell phone subscribers. (Source: Cellular Telecommunications and Internet Association)

33

The formula $h = 147t - 4.9t^2$ can be used to predict the height in meters of a small rocket launched straight upward from the ground with an initial velocity of 147 m per sec. The number of seconds after launch is represented by t .

~~How long does it take to reach the maximum height?~~
 How long does it take to reach the maximum height?
 What is the maximum height?

34

You throw a ball straight upward from a height of 6 ft with an initial velocity of 80 ft per sec. The ball's height h above the ground after t sec is modeled by the equation

$$h = 6 + 80t - 16t^2$$

What is the maximum height of the ball?

Name: _____

Date: _____

Final Exam Review

Page 324 & 325

26, 27, 29, 31, 34, 35, 36

Page 271

15 - 18

Factoring Review: (Solve by factoring - find the zeros)

1.) $(x-2)(2x+1)=0$

2.) $3n(2n-1)=0$

3.) $x^2-x-12=0$

4.) $2n^2(x+3)=0$

5.) $4x^2-13x-12=0$

6.) $9y^2+24y+16$

Page 293

37, 40, 45, 47, 51,

Page 325

52, 53, 57, 58

Solve the following equations containing radicals

1.) $\sqrt{x}-4=5$

2.) $2\sqrt{x}+5=25$

3.) $\sqrt{3x-1}=\sqrt{2x+3}$

4.) $-3\sqrt{x+1}=\sqrt{x+5}$

5.) $\sqrt{5x-2}=2\sqrt{x+1}$

***Make sure you know how to find the vertex and axis of symmetry of a quadratic.

Solve using the quadratic formula.

Page 401

31 - 36



- ① The polynomial $72x + 2342$ approximates the world population (in millions), where x represents the number of years since 1950. According to this model, what was the world population in 2000? (Source: U.S. Bureau of the Census)

- ② The polynomial $x + \frac{x^2}{20}$ is the *stopping distance* of a car in feet after the brakes are applied, where the variable x is the speed of the car in miles per hour before braking. Find the stopping distance for a car that had been traveling at 40 mph.

- ③ There are n teams that compete in a sports league, where each team plays every other team once. The following polynomial gives the total number of games that must be played:

$$0.5n^2 - 0.5n$$

If the league has 20 teams, how many games are played?

- ④ The percent of U.S. households with Web access is approximated by $0.45x^2 + 6.75x + 26.2$, where x represents the number of years since 1998. Estimate the percent of U.S. households with Web access in 2003. (Source: U.S. Department of Commerce)

- ⑤ The number (in millions) of compact discs sold in a given year is approximated by $2x^3 - 27x^2 + 172x + 391$, where x represents the number of years since 1992. The corresponding polynomial for cassettes is $2x^3 - 22x^2 + 18x + 360$. Find the polynomial that represents how many more CDs than cassettes were sold in a given year. (Source: Recording Industry Association of America)

- ⑥ The total expenses (in billions of dollars) in federal U.S. hospitals can be modeled by the polynomial $0.8t + 4$, where t is the number of years since 1975. For nonfederal U.S. hospitals, the corresponding polynomial is $13t + 27$. Write a polynomial that represents the total expenses for all U.S. hospitals. (Source: U.S. National Center for Health Statistics)

7

A factory has been selling 1000 color laser printers per year for \$1500 each. The company's market research indicates that for each \$100 that the price is raised, sales will fall by 30 units. The expression $(1500 + 100x)(1000 - 30x)$ gives the estimated revenue that the company will take in if it adjusts the price of a printer, where x represents the number of \$100 increases in the price. Rewrite this expression, multiplying out the factors.

8

The formula $d = rt$ can be used to find the time t when given the distance d and the rate r .

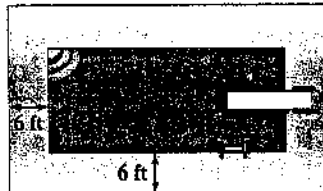
- Solve the equation $d = rt$ for t .
- Use the answer from part (a) to find an expression for the time it takes to travel a distance of $(t^3 - 6t^2 + 7t + 14)$ mi at a rate of $(t + 1)$ mph.

9

The United States is the world's leading producer of wheat. If x is the number of years since 1997, then the annual wheat production (in millions of bushels) of leading American states can be modeled by the polynomial $8x^3 - 150x^2 + 218x + 2520$ and the wheat acreage harvested annually (in millions of acres) by $-4x + 63$. Find a polynomial that represents the annual yield per acre of wheat harvested. (Ignore any remainder.)
(Source: U.S. Department of Agriculture)

10

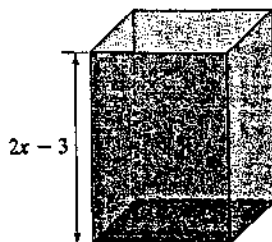
A rectangular swimming pool is surrounded by a 6-ft-wide concrete walk as shown in the figure.



- If the length of the pool is 10 feet less than three times the width w , find a polynomial that represents the area of the swimming pool.
- Write a polynomial that represents the area of the concrete walk.
- Use your expression from part (b) to find the area of the concrete walk if the width of the swimming pool is 12 ft.

11

The volume of a rectangular box can be found by multiplying the height of the box by the area of its base. If the volume of the box shown is given by the polynomial $2x^3 + 5x^2 - 4x - 12$, find the area of the square base.



12

An object is thrown upward so that its height in meters above the ground at time t seconds is represented by the expression $-5t^2 - 21t + 20$. Factor this expression.

13

A box with width w has a volume that can be expressed as $3w^3 - 2w^2 - w$. Rewrite this expression in factored form.

14

A child throws a stone downward with an initial velocity of 48 ft/sec from a height of 160 ft. One step in figuring out how long it takes for the stone to reach the ground is to factor the expression $16t^2 + 48t - 160$. What is its factorization?

15

A statistician found that the cost in dollars for a company to produce x units of a certain product can be approximated by $C = x^2 - 14x + 45$. Factor the expression on the right side of this equation.

16

A bedroom is rectangular in shape, with length 4 ft more than its width. The area of the bedroom is 192 sq ft. Find the width and length of the room.

17

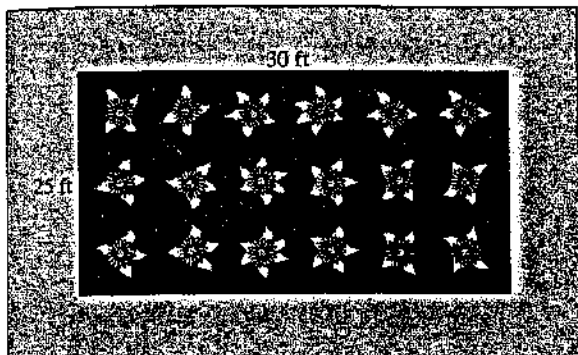
A diver jumps from a diving board 24 ft above a pool. After t sec, the diver's height h above the water (in feet) is given by the expression $-16t^2 + 8t + 24$. In how many seconds will the diver hit the water ($h = 0$)?

18

The formula $h = v_0t - 16t^2$ gives the height h in feet of an object after t sec. Here, v_0 is the initial velocity of the object expressed in feet per second. Suppose a toy rocket was launched from the ground straight up with an initial velocity of 64 ft/sec. How many seconds after launch was the rocket 48 ft above the ground?

19

A rectangular garden measures 25 ft by 30 ft. The gardener wishes to surround the garden with a border of mulch x feet wide, as shown.



Write an expression in factored form for the area of the mulch border in terms of x .

20

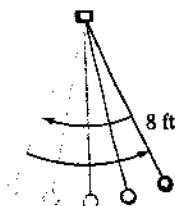
When an object is dropped from a height h (in meters), it takes approximately $\sqrt{\frac{h}{5}}$ sec to reach the ground.

- Find the time it takes for an object dropped from a height of 20 m to reach the ground.
- If the same object is dropped from double the height, will it take twice as long to reach the ground? Explain.

21

The expression $2\pi\sqrt{\frac{L}{32}}$ approximates the time (in seconds) that a pendulum of length L (in feet) takes to make one complete swing back and forth.

- How long does it take the pendulum shown to make one complete swing? Use 3.14 for π , and round to the nearest second.



- How long would it take a pendulum 4 times the length of that in part (a) to make a complete swing? Is this answer 4 times the answer to part (a)?

22

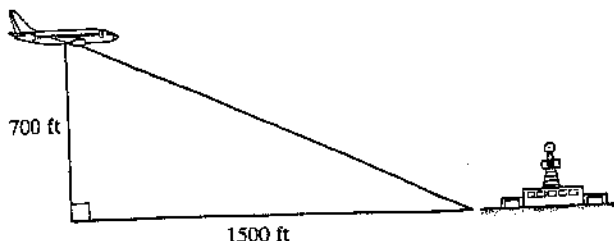
Firefighters can approximate the speed S at which water leaves a typical nozzle by using the formula

$$S = 12\sqrt{P},$$

where the pressure P is measured in pounds per square inch (psi) and the speed is in feet per second. Find the speed of the water if the pressure is 50 psi. Express your answer both as a simplified radical and as a decimal rounded to the nearest whole number. (Source: Jim Cottrell, "Fire Stream Physics," *Firefighter's News*, 1995)

23

A plane is about to land at an airport. The flight path of the plane's descent is shown in the following diagram. What is the distance from the plane to the airport? Express this distance both as a radical and as a decimal rounded to the nearest multiple of 100 ft.



24

A hailstone will take t sec to drop d ft, where

$$t = \sqrt{\frac{d}{16}}$$

How much time will it take a hailstone to drop 500 ft?

25

The expression $\sqrt{2gh}$ can be used to determine the velocity of a free-falling object in feet per second, where $g = 32$ ft/sec, and the object has fallen h ft. If a ball has fallen 60 ft, is the ball's velocity double that of a ball that has fallen 30 ft?

26

The period of a spring is the time it takes for the spring to stretch from one position, down, and then back again to its original position. The formula

$T = 2\pi\sqrt{\frac{m}{k}}$, known as Hooke's law, expresses the period T (in seconds) in terms of the mass m (in grams) bobbing on the spring, where k is a constant. If $k = 8$, what mass will produce a period of 2 sec?

27

When firefighters are putting out a fire, the rate at which they spray water on the fire is very important. For a hose with a nozzle 2 in. in diameter, the flow rate f in gallons/minute is modeled by the formula

$$f = 120\sqrt{p},$$

where p is the nozzle pressure in pounds per square inch. Solve this formula for p .

28

An electronic company's revenue R (in dollars) is the product of the number of machines n that it sells and the price of a machine $(100 - n)$. This relationship can be expressed as

$$R = n(100 - n)$$

How many machines must be sold for the revenue to be equal to \$1600?

29

If fireworks on the ground are shot straight upward at a speed of 32 ft per sec, then the height of the fireworks h (in feet) after t sec can be represented by the expression $-16t^2 + 32t$.

a. At what time will the fireworks be 16 ft above the ground?

b. At what time (to the nearest tenth of a second) will they be 8 ft above the ground?