Friendship Junior High School
Accelerated Math Program
Mr. Lavine (Room 102A)

# A.T.I.M.

## Advanced Topics In Mathematics

ATIM
End Of The Year Review

1. *Polynomials*
2. *Systems*
   *Problem Solving*
4. *Inequalities & Coordinate Graphing*
   *Linear Programming*
6. *Roots & Radicals*
7. *Rat. Expon. & Complex Numbers*
8. *Quadratics*
9. *Rational Expressions*
   *Problem Solving*
   *Plane Geometry*
   *Solid Geometry*
   *Introduction to Two-Column Proofs*
   *Triangle Trigonometry*
   *Law of Sines & Cosines*
   *Trigonometric Functions*
17. *Sequence & Series*
    *Combinations & Permutations*
    *Mathematics of Chance*
20. *Matrices*
21. *Logarithms*
22. *Conics*


"Mr. Lavine, may I be excused?
My brain is full."

# *Polynomials*

## UNIT 1 DEMONSTRATION

Simplify:

① $ab^{-2}(a^2b+a^{-1}b^3-a^3b^{-1})$

② $\dfrac{-18a^{-2}b^3c^{-4}}{12ab^{-2}c^{-3}}$

③ $(5n^{3x}-2m^{x+2})^2$

Factor completely:

④ $54a^3b-2b^4$

⑤ $5ab+b^2+5ac-c^2$

⑥ $m^3-3m^2a+3ma^2-a^3$

Polynomial division:

⑦ $(x^4+4)(x+2)^{-1}$

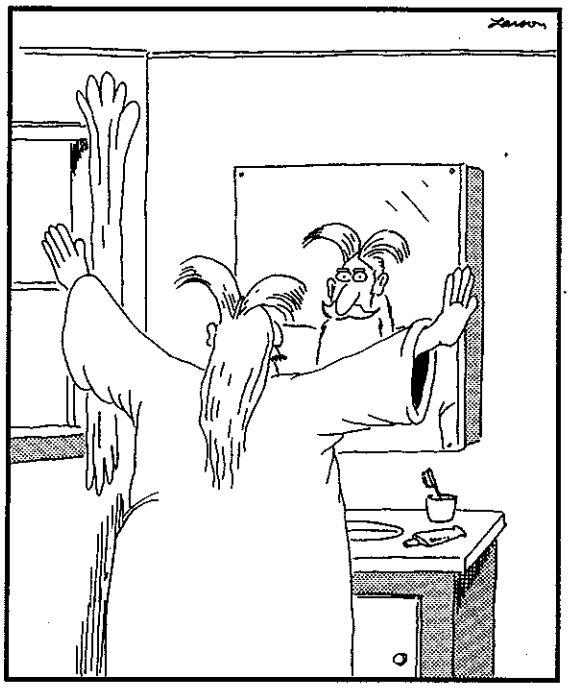
Synthetic division:

⑧ $(2a^4-5a^3+2a-3)(a-1)^{-1}$

⑨ $(12x^4+7x^2-9x+11)(2x-3)^{-1}$

Simplify:

⑩ $\left(\dfrac{-a^{-2}b^3c^{-1}}{3a^{-4}b^{-1}c^3}\right)^{-2}$



Moses parting his hair


Eskimo rescue units

# *Polynomials*

## UNIT 1 REVIEW

Simplify:

① $(5a)(6a^2b)(3ab^3)+(2a)^2(3b^3)(2a^2b)$

② $\dfrac{-9x^{-2}y^3z^{-1}}{3x^{-4}yz^2}$

③ $\left(\dfrac{2y^{-2}}{-2}\right)^{-1}\left(\dfrac{m^2n}{y}\right)^{-2}$

④ $\dfrac{6n^{2x+3}}{3n^{x-4}}$

⑤ $x^{-1}y^2(x^{-3}y-xy^{-3}+x^2y^{-4})$

⑥ $(4x^{a+2}-3y^{3a})^2$

⑦ $(x^{n+1}+y^{2n-1})(x^{n+1}-y^{2n-1})$

Factor completely:

⑧ $12n^2-7n-10$

⑨ $(3a-4b)^2-(a+3b)^2$

⑩ $5x^3y+40y^4$

⑪ $x^5-x^3y^2+27y^5-27x^2y^3$

⑫ $x^2-9-6xy+9y^2$

⑬ $m^4n+m^2n-mn^4-mn^2$

⑭ $3x^3+9x^2+9x+3$

Polynomial division:

⑮ $(4n^4-3)(n+2)^{-1}$

Synthetic division:

⑯ $(x^6-9x^4+2x^3-18x+12)(x+3)^{-1}$

⑰ $(4x^3+x-3)(2x-1)^{-1}$

When cliff divers belly flop

# *Systems*

## UNIT 2 DEMONSTRATION

Solve using substitution:

① $x - 3y = -3$
$4x + 9y = 2$

Solve using elimination:

② $2x + 3y = 5$
$-3x + 6y = 12$

Solve using elimination and substitution:

③ $4x + 3y + z = -10$
$x - 12y + 2z = -5$
$x + 18y + z = 4$

Determine the value:

④ $\begin{vmatrix} -3 & 7 \\ 4 & 9 \end{vmatrix}$ ⑤ $\begin{vmatrix} -2 & 0 \\ 6 & 5 \end{vmatrix}$

Solve using Cramer's Rule:

⑥ $3x + 2y = 40$
$x - 7y = -2$

Determine the value of a third order determinant using expansion of minors:

⑦ $\begin{vmatrix} 4 & -5 & 3 \\ -3 & 2 & 0 \\ 2 & -1 & 4 \end{vmatrix}$

Determine the value using diagonals:

⑧ $\begin{vmatrix} 6 & 3 & 1 \\ -1 & 1 & -4 \\ -2 & 4 & 2 \end{vmatrix}$

Use expansion of minors to determine if a unique solution exists for this system:

⑨ $2a - b + 3c = 5$
$3a + 2b - 5c = 7$
$a - 4b + 11c = 3$

Use diagonals to solve for x in this system:

⑩ $3x + 4y + z = 10$
$6x - 2y - z = 6$
$3x + 6y - 2z = 2$

# *Systems*

## UNIT 2 REVIEW

Solve using substitution:

① $4x + y = 9$
$3x - 2y = 4$

Solve using elimination:

② $3x - 4y = 23$
$9x + 2y = -15$

Determine the value:

③ $\begin{vmatrix} -8 & -1 \\ 2 & -3 \end{vmatrix}$

Solve using Cramer's Rule:

④ $2x - 3y = 8$
$5x + 6y = 11$

Solve using elimination and substitution:

⑤ $a + b + c = 0$
$3a - 2b + 5c = 1$
$2a + b + 2c = -1$

Determine the value using expansion of minors:

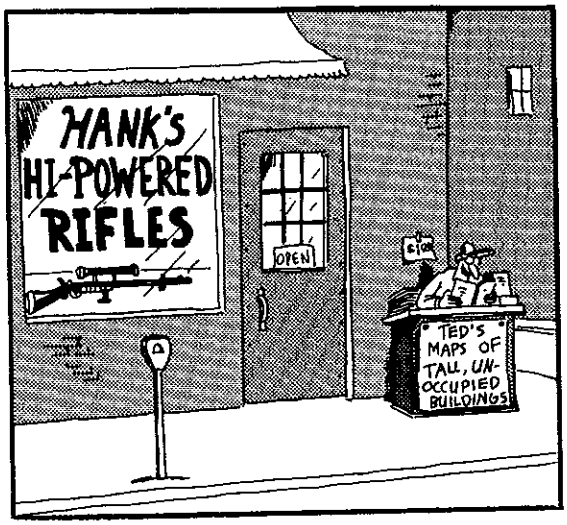
⑥ $\begin{vmatrix} -4 & 0 & 1 \\ 2 & -3 & 4 \\ 5 & 2 & 3 \end{vmatrix}$

Determine the value using diagonals:

⑦ $\begin{vmatrix} -3 & 2 & 4 \\ -2 & -1 & 2 \\ 4 & 3 & 6 \end{vmatrix}$

Determine z using diagonals or expansion:

⑧ $x + 5y + 3z = 0$
$2x - 5y + 3z = 11$
$x + 10y - 6z = -7$



# *Problem Solving*

## UNIT 3 DEMONSTRATION

① Mr. Davis made a trip to the lake in 3 hours. The return trip took 3½ hours. He drove 5 mph faster on his way out to the lake. How many miles was the round trip?

② The sum of the digits of a three digit number is 10. When the digits are reversed, the new number is 99 less than the original. The hundreds digit equals the sum of the tens and units digits. Find the number.

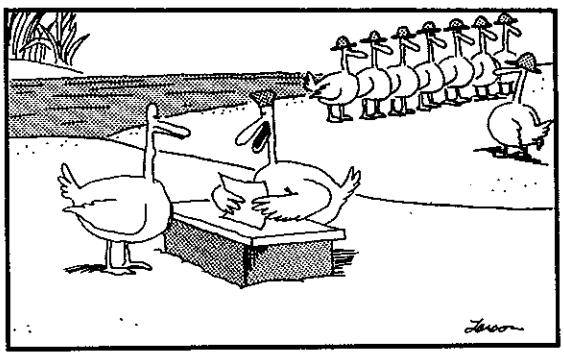
③ How many liters of a 70% salt solution should be mixed with 60 liters of a 20% solution to produce a 40% solution?

④ Bud invested $7000, part at 8% and part at 10%, his total interest for the year was $650. How much was invested at 8%

⑤ Maria rode her bike 6 miles into town with the wind at her back in 18 min. On her way home against the wind she traveled only 4 miles in 30 min. What is the speed of the wind?

⑥ Stacy bought a clock on sale and paid $11.55. It was on sale for 25% off. After the discount was deducted, she had a coupon for an additional $2.50 off. After the coupon, she had to pay a 5% sales tax. Determine the original price.

⑦ At what time between 8:00 and 9:00 will the hands on a clock coincide? (Answer to the nearest sec.)



"Can't use you, son ... says your feet aren't flat."

# *Problem Solving*

## UNIT 3 REVIEW

① Two cars start driving toward each other at 1:30 PM from a distance of 162 miles apart. If one car goes 5mph faster than the other and they meet at 3:30 PM, what are their rates?

② The sum of the digits of a three digit number is 11. The hundreds digit is twice as large as the units digit. If the digits are reversed, the new number is 198 less than the original. Find the original number.

③ In a triangle, the largest angle is 10° less than 3 times the smallest. The middle angle is 10° greater than twice the smallest. Find the measures of all three angles.

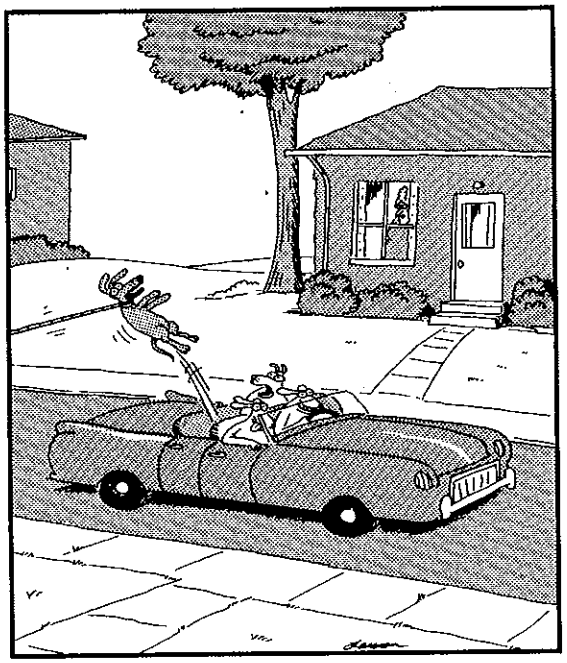
④ Lisa rowed her boat 3 miles downstream in 10 minutes. Rowing upstream, the same distance took 3 times as long. Find the rate of the current.

⑤ Kevin paid $4.77 for a book on sale for 25% off after a 6% sales tax was added on. How much was the original price?

⑥ How many liters of water must be added to 15 liters of a 90% salt solution to bring the concentration of salt down to 27%?

"Clock" Problem

⑦ At what time between 6:00 and 7:00 will the hands of a clock coincide? (Answer to the nearest second)



Careening through the neighborhood with reckless abandon, none of them suspected that Tuffy was still tied up.

# *Inequalities & Coordinate Graphing*

## UNIT 4 DEMONSTRATION

Solve and graph on a number line:

① $4n + 3 \geq 2(2n-2) - 3$

② $-4 \leq 2n+4 \leq 12$

③ $|x-5| > 3$

④ $|n+2| > 4$ and $|n| < 9$

Understanding linear equations:

⑤ Write an equation in slope-intercept form for a line parallel to $3x-2y=5$ passing through the point $(6,2)$. Then identify the intercepts.

⑥ Write an equation in point-slope form (not slope-intercept form) for a line passing through $(-2,5)$ and $(-6,8)$.

Graph the inequality:

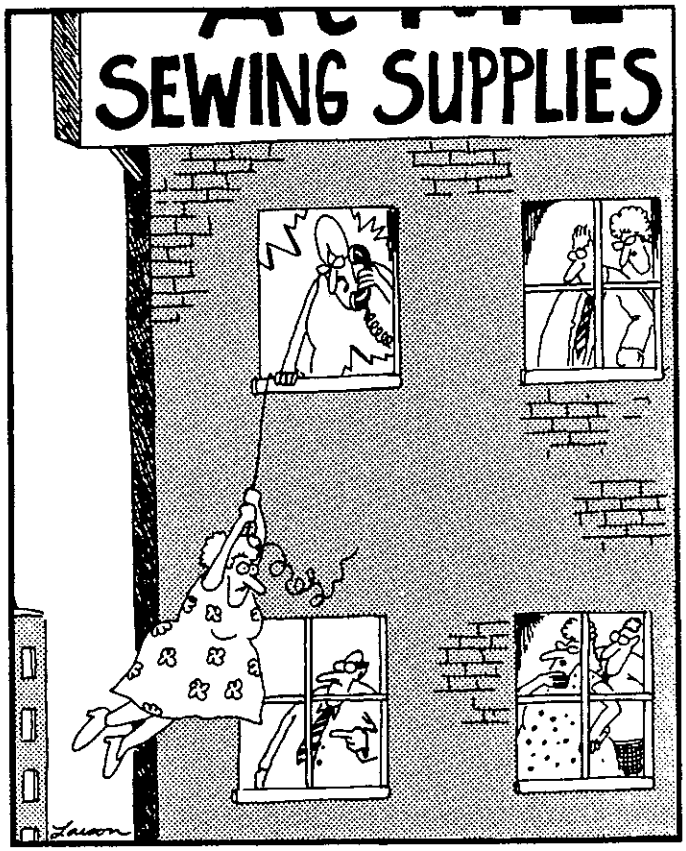
⑦ $y \leq x-2$

Graph the system:

⑧ $|x+y| > 6$

Graph the system:

⑨ $|x-2| \geq 5$
$y \leq \frac{1}{2}x+2$




"That's right, the forty-ninth floor. ... And you better hurry—she's hanging by a thread."

# *Inequalities & Coordinate Graphing*

## UNIT 4 REVIEW

Solve and graph on a number line:

① $2(x+4)+\frac{x}{3} < 4x-1$

② $\frac{x+3}{4} \geq \frac{2(x-3)}{3}$

③ $3(2x-3) \geq 2(3x+2)$

④ $4(x-1) < 4x+5$

⑤ $-1 < n+4 < 9$

⑥ $|3x+6| > 12$

⑦ $3 \leq |n-4| \leq 10$

⑧ $|2x+1| > 5$ and $|x| < 10$

Linear equations:

⑨ Write an equation in slope-intercept form for a line parallel to $5x-3y=4$ through $(6,-2)$. Identify the intercepts.

⑩ Write an equation in standard form for a line perpendicular to $y=-\frac{3}{4}x+7$ through $(2,5)$. Identify the intercepts.

⑪ Write an equation in point-slope form for a line through $(-2,6)$ and $(10,-1)$.

⑫ Change $2x+3y=-4$ to slope-intercept form

Graph the inequality:

⑬ $3x-y < 8$

Graph the system:

⑭ $2x-y > 6$
$y > -2x$

⑮ $|3x-y| \leq 4$

⑯ $|x-y| > 5$

⑰ $|x| \leq 4$
$x-2y \leq 6$

⑱ $|y-2| > 8$
$2x+y < 6$

⑲ $|x+1| > 14$
$|y-2| > 10$

# *Linear Programming*

## UNIT 5 DEMONSTRATION

Graph the system and determine the maximum and minimum values:

① Function:
$f(x,y) = -2x+2y$

Conditions:
$y \leq 2$
$2x-y \leq 4$
$-2x-y \leq 4$

② Function:
$f(x,y) = 3x-y$

Conditions:
$y \leq x$
$y \leq -5x+18$
$y \geq -2$

Define variables and graph a system of inequalities based on stated conditions:

③ A manufacturer makes 2 kinds of televisions - portables and consoles. He has equipment to manufacture up to 500 portables and up to 300 consoles. Time permits him to manufacture no more than 600 television sets in all. Customer advance orders require him to make at least 100 portables. If he realizes a profit of $60 on each portable and $70 on each console, how many of each should he manufacture to maximize his profit?

Scene from *Insurance Salesman of the Opera*

# *Linear Programming*

## UNIT 5 REVIEW

Graph each system of inequalities. Identify the vertices. Find the max. and min. values:

① Function: $f(x,y) = 5x - 3y$

Conditions:
$y \geq 0$
$0 \leq x \leq 5$
$-x + y \leq 2$
$x + y \leq 6$

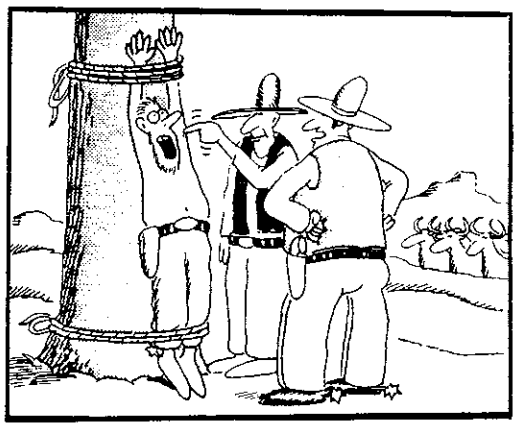
② Function: $f(x,y) = 2x + 4y$

Conditions:
$x \geq 0$
$y \geq 0$
$x + y \leq 3$
$3x + y \leq 6$

Solve each problem by establishing a graph based on a system of inequalities subject to conditions. Use a function to evaluate:

③ A carpenter makes bookcases in 2 sizes: large and small. It takes 4 hrs. to make a large one and 2 hrs. for a small one. The carpenter can spend up to 24 hours per week working on them. He makes a profit of $50 on a large bookcase and $20 on a small one. To satisfy customers, he must make at least 2 of each size per week. How many of each size per week should be made to maximize profit?

④ A tire manufacturer has 800 units of rubber to use in producing radial tires and tractor tires. Each radial tire requires 5 units of rubber while each tractor tire requires 20 units. Labor costs are $12 for a radial and $12 for a tractor tire. The company budgets a maximum of $1200 for labor. Customer needs require the company to make at least 40 radial tires. If each radial results in a $10 profit and each tractor tire results in a $25 profit, how many of each should the company make to maximize profit?



Sorry, Mister...

But this is how we handle cattle rustlers in these parts.

# *Roots & Radicals*

## UNIT 6 DEMONSTRATION

Simplify:

① $\sqrt[4]{81x^6y^5z^{10}}$

② $\sqrt[3]{(3n-2)^3}$

Compute and simplify:

③ $\sqrt[4]{18a^3bc^5} \cdot \sqrt[4]{27a^2b^6c}$

④ $(4-2\sqrt{2})(\sqrt{2}-4)$

Rationalize and simplify:

⑤ $\dfrac{3-2\sqrt{3}}{2\sqrt{3}+3}$

⑥ $\sqrt{\frac{1}{5}} - 2\sqrt{20} + 3\sqrt{5}$

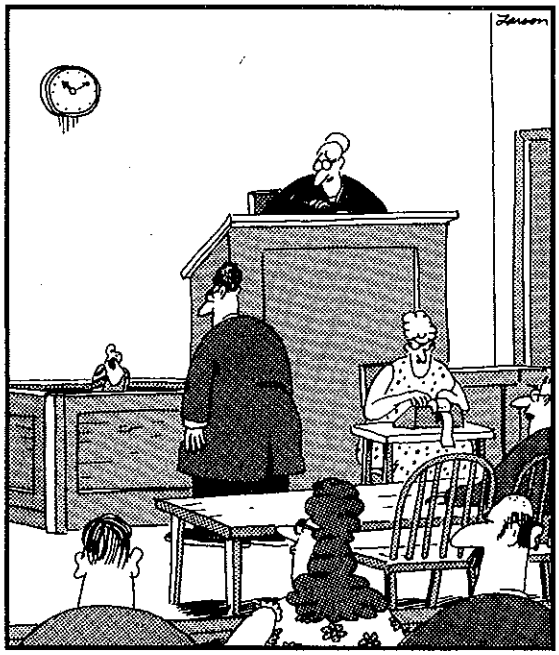
Solve:

⑦ $\sqrt{3x+1} + 2 = 7$

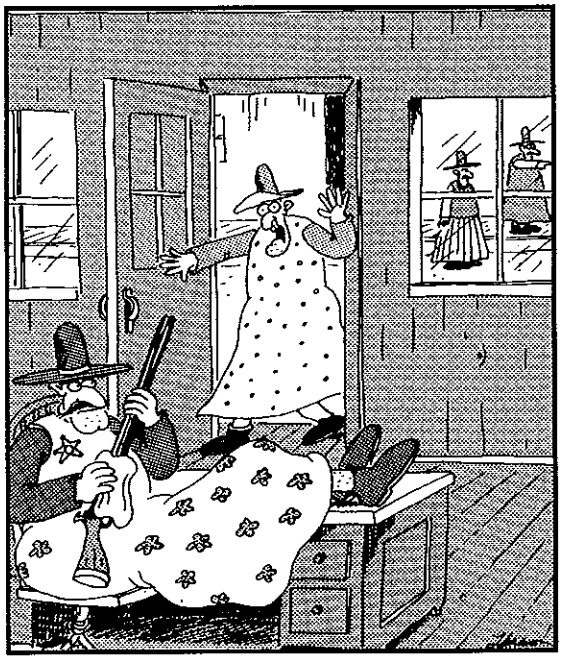
⑧ $\sqrt{2x+1} - 2 = \sqrt{2x-7}$

Solve:

⑨ $\sqrt{4x+29} = (x+6)$



"No, I never said that. ... Well, I actually *did* say it, but *after* he said it. He said it, *then* I said it. I'm a mimic—that's what I do."



"Sheriff! Ben Wiggins is ridin' into town, and he's wearin' that same little chiffon number that he wore when he shot Jake Sutton!"

# *Roots & Radicals*

## UNIT 6 REVIEW

Simplify:

① $\sqrt[4]{64x^5y^6z^9}$

② $\sqrt{72a^5b^7c^6}$

③ $\sqrt[3]{-40n^7m^4}$

④ $\sqrt{n^2-10n+25}$

⑤ $\sqrt[3]{(3x-y)^5}$

Compute and simplify:

⑥ $\sqrt[4]{24a^2b^3c^5} \cdot \sqrt[4]{48a^3b^3c^6}$

⑦ $\sqrt{3mn} + \sqrt{27m^3n}$

⑧ $(4-\sqrt{3})(6-\sqrt{3})$

Rationalize and simplify:

⑨ $\sqrt[3]{\frac{2}{5n}}$

⑩ $\frac{2-\sqrt{2}}{4+2\sqrt{2}}$

⑪ $\sqrt{\frac{1}{3}} + \sqrt{75} - 2\sqrt{3}$

Solve each equation:

⑫ $\sqrt[3]{y+1} = 3$

⑬ $\sqrt{y+12} + 1 = \sqrt{y+21}$

⑭ $\sqrt{5+2x} = x-5$

⑮ $\sqrt{x+11} - x = -9$

Solve for c:

⑯ $r = \sqrt[3]{\frac{2mM}{c}}$

Origin of the expression, "Putting on the dog."

# *Rational Exponents & Complex Numbers*

## UNIT 7 DEMONSTRATION

Express in rational form:

① $\sqrt{8x^3y^4}$

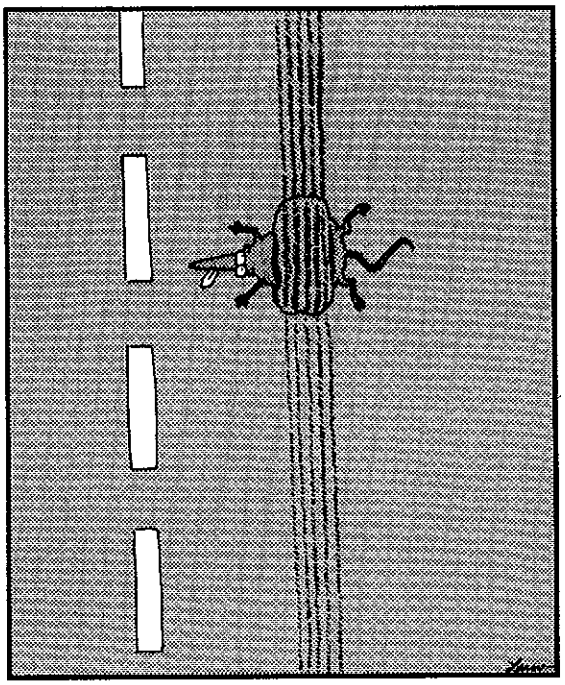
Express in radical form:

② $x^{1/3}y^{1/2}z^{3/2}$

③ $\sqrt[6]{8n^9}$

Simplify in rational form:

④ $\dfrac{x^{5/2}}{x^{1/2}+y^{1/2}}$



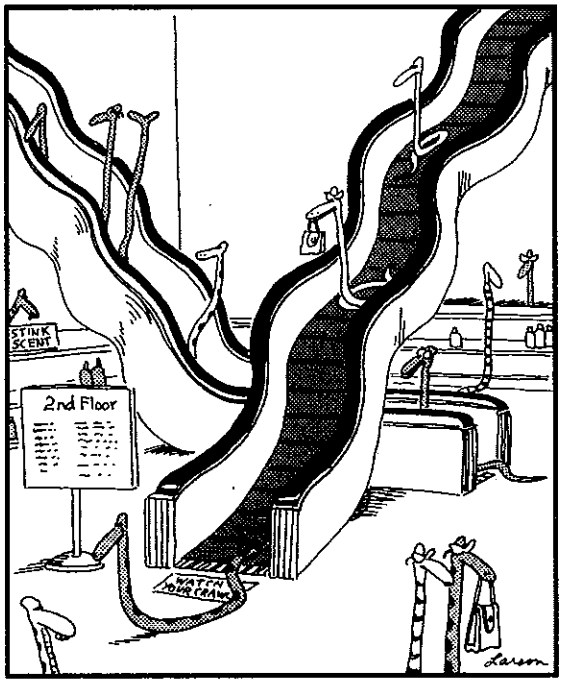
Scenes that make a crow smile

Simplify:

⑤ $(\sqrt{-8})(\sqrt{-6})$

⑥ $(3i^3)(-4i)^2$

⑦ $2n^2+18=0$




Snake department stores

Simplify:

⑧ $\dfrac{3+3i}{1-2i}$

⑨ $\left(\dfrac{a^{-3/2}}{3^6 b^{-2/3}}\right)^{-1/2}$

# *Rational Exponents & Complex Numbers*

## UNIT 7 REVIEW

Express in rational form:

① $\sqrt[3]{16x^5y^6z^8}$

② $\sqrt[4]{96a^5b^7c^8}$

Express in radical form:

③ $r^2s^{\frac{1}{3}}y^{\frac{1}{2}}$

④ $(3x)^{\frac{1}{2}}x^{\frac{1}{4}}$

⑤ $\sqrt[6]{27}$

⑥ $\sqrt[4]{64x^{10}}$

Evaluate:

⑦ $(25^{3/4})^{2/3}$

⑧ $(8^{\frac{2}{3}})(16^{\frac{-3}{4}})$

Simplify in rational form:

⑨ $\dfrac{x^{2/3}}{x^{2/3}-x^{-1/3}}$

⑩ $\dfrac{x^{1/2}-y^{1/2}}{x^{1/2}+y^{1/2}}$

⑪ $\left(\dfrac{a^{-2/3}}{2^{1/2}a^2}\right)^{-1/2}$

⑫ $\left(\dfrac{2^4a}{a^2b^{-1}}\right)^{-1/2}$

Simplify:

⑬ $(\sqrt{-8})(\sqrt{-12})$

⑭ $(\sqrt{-6})(\sqrt{-4})(\sqrt{-3})$

⑮ $(3i^3)(2i)^2$

⑯ $(-2i)^4(-4i^3)$

Solve:

⑰ $2n^2 = {}^{-27}/_{8}$

⑱ $4x^2 + 75 = 0$

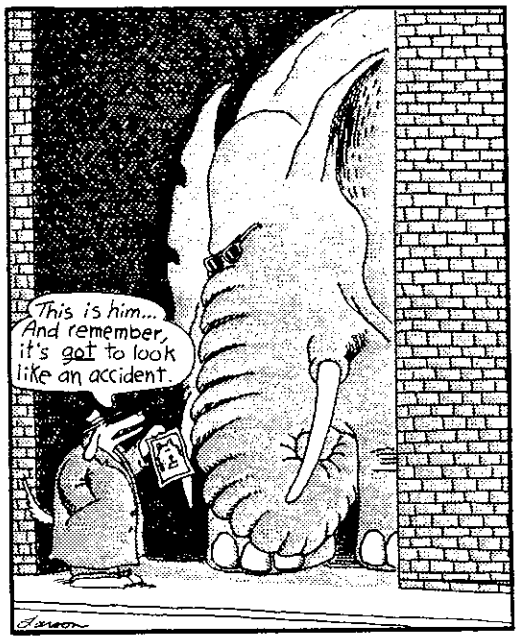
Simplify:

⑲ $(7+2i)(5-3i)$

⑳ $(3+8i)(3-8i)$

㉑ $\dfrac{4+3i}{1-2i}$

㉒ $\dfrac{2-2i}{2+2i}$




Hit elephants

# *Quadratics*

## UNIT 8 DEMONSTRATION

Complete the square:

① $2x^2+3x+2=0$

Quadratic formula:

② $2x^2+2x+3=0$

Use the discriminant to determine the nature of the roots:

③ $4x^2-8x+13=0$

Write an equation with the given roots:

④ $-3/5, \ 1/2$

⑤ $4 \pm \sqrt{3}$

Solve equations in the quadratic form:

⑥ $x^4-9=0$

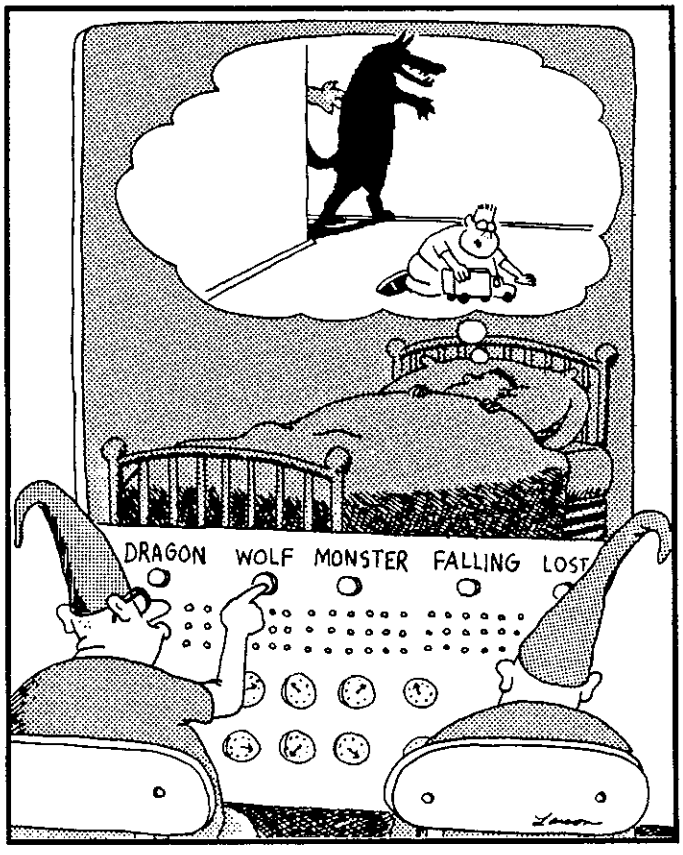
⑦ $x-4\sqrt{x}-45=0$

Indicate the axis, the turning point (vertex), draw the graph, and indicate the algebraic solution:

⑧ $y \geq -x^2+10x-21$

Solve (any method):

⑨ $bx^2+cx+a=0$




The nightmare makers

# *Quadratics*

## UNIT 8 REVIEW

Use factoring:

① $6x^2+7x-3=0$

Complete the square:

② $2n^2+n-21=0$

③ $3x^2+4x+2=0$

Quadratic formula:

④ $2a^2-5a+4=0$

Any method:

⑤ $ax^2+bx+3b=0$

⑥ $bx^2+acx+c=0$

Use the discriminant to determine the nature of the roots:

⑦ $4x^2-40x+25=0$

⑧ $2y^2+6y+5=0$

Determine an equation with the given roots:

⑨ $\frac{3}{4}, \frac{1}{3}$ ⑩ $2\pm\sqrt{3}$ ⑪ $5\pm3i$

Quadratic form:

⑫ $x-4\sqrt{x}-32=0$

⑬ $x^4-12x^2+27=0$

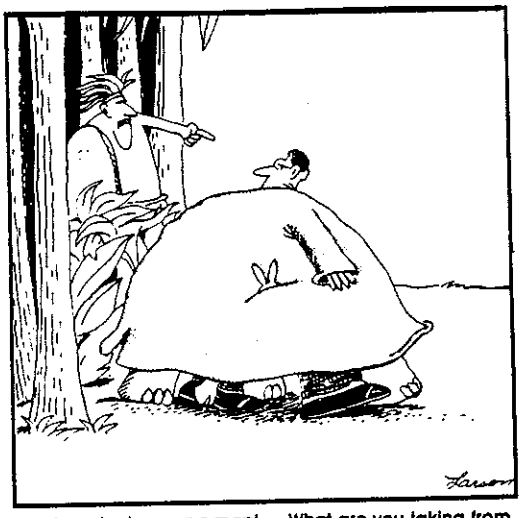
⑭ $x^{2/3}-9x^{1/3}+20=0$

⑮ $n^6+9n^3+8=0$

Indicate the axis and vertex, draw the graph, and determine the solution (as a union or intersection):

⑯ $y \le x^2+4x+3$

⑰ $y \le -x^2+6x+5$



"Just a minute, young man! ... What are you taking from the jungle?"

# *Rational Expressions*

## UNIT 9 DEMONSTRATION

Divide and simplify:

① $\dfrac{x^2+7x+10}{x+2} \div \dfrac{x^2+2x-15}{x^2-5x+6}$

Add and simplify:

② $3n+1+\dfrac{1}{3n-1}$

Simplify:

③ $\dfrac{\dfrac{x+y}{x}}{\dfrac{1}{x}+\dfrac{1}{y}}$

Solve:

④ $\dfrac{y}{y-3}+\dfrac{6}{y+3}=1$

Simplify:

⑤ $\dfrac{n+5+\dfrac{3}{n+1}}{n-1-\dfrac{3}{n+1}}$

Solve:

⑥ If $y$ varies directly as $x$, and $x=7$ when $y=21$, find $x$ when $y=-5$

⑦ If two boxes have the same depth and capacity, the length is inversely proportional to the width. One box is 60 cm long and 40 cm wide. A second box (same depth and capacity) is 5 cm long. How wide is it?

⑧ $\dfrac{1}{n-2}=\dfrac{2n+1}{n^2+2n-8}+\dfrac{2}{n+4}$

"Don't touch it, honey... it's just a face in the crowd."

# *Rational Expressions*

## UNIT 9 REVIEW

Multiply / Divide and simplify:

① $\frac{a^3-b^3}{b^2-a^2} \cdot \frac{a+b}{a^2+ab+b^2}$

② $\frac{x^2-11x+24}{x^2-18x+80} \div \frac{x^2-9x+20}{x^2-15x+50}$

③ $\frac{x^2-2x+1}{y-5} \div \frac{(x-1)^2}{y^2-25}$

Add/Subtract and simplify:

④ $\frac{3}{m-2} + \frac{2}{2-m}$

⑤ $\frac{3x+2}{3x-6} - \frac{x+2}{x^2-4}$

⑥ $\frac{2n}{n^2-5n} - \frac{-3n}{n-5}$

Simplify complex fractions:

⑦ $\dfrac{\frac{x}{y} - \frac{y}{x}}{\frac{1}{x} + \frac{1}{y}}$

⑧ $\dfrac{\frac{m+4}{m} - \frac{3}{m+5}}{\frac{m-1}{m^2+5m} + \frac{3}{m+5}}$

⑨ $\dfrac{n+5+\frac{4}{n+1}}{n+3}$

Solve:

⑩ $\frac{3x}{2x-5} + \frac{2x}{5-2x} = \frac{x-1}{2x+5}$

⑪ $\frac{3}{x+2} + \frac{12}{x^2-4} = \frac{-1}{x-2}$

⑫ $\frac{x+3}{x+2} = 2 - \frac{3}{x^2+5x+6}$

Variation:

⑬ If $y$ varies inversely as $x$, and $y = 9$ when $x = 5/2$, find $y$ when $x = -3/5$.

⑭ If $y$ varies directly as $x$, and $y = -8$ when $x = -3$, find $x$ when $y = 6$.

⑮ If area remains constant, a triangle's base and height vary inversely. If the height is 6 and the base is 10, find the height when the base is 12.

# *Problem Solving*

## UNIT 10 DEMONSTRATION

① Two numbers are in the ratio 6:11. If the first number is decreased by 4 and the second increased by 6, the resulting numbers are in the ratio 4:9. Find the original numbers.

② The sum of a number's reciprocal and twice the square of the reciprocal is 15. Find the original number.

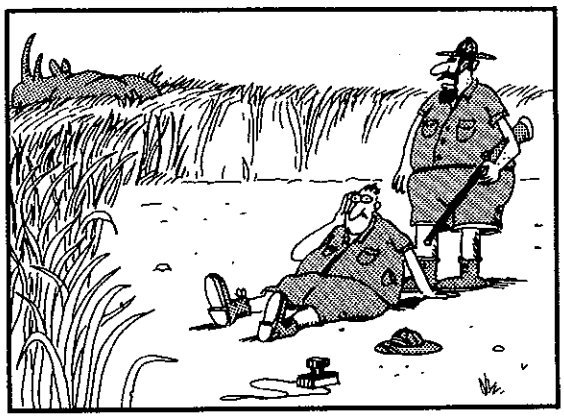
③ Jean has a rug that is 9 by 12 ft. Along the outside of the rug is a uniform strip of uncovered floor with an area of 270 $ft.^2$ How wide is the strip?

④ A trip of 500 miles would take 2½ hours less if the speed is increased by 10 mph. Find the original speed.

⑤ Andrea drives to the campground at 48 mph. She drove 60 mph on the return trip. What was her average speed?

⑥ If 8 adults can set up the campsite in 6 hours and 6 children can do the same job in 10 hours, how long would it take a crew of 2 adults and 3 children?

⑦ The fulcrum of a 16-foot seesaw is placed in the middle. Jason, who weighs 108 pounds, is seated 8 feet from the fulcrum. How far from the fulcrum should Laura sit if she weighs 132 pounds?



"You're darn lucky, Saunders. ... If that rhino had really respected you as an enemy, he'd have done a heck of a lot more than just slap your face."

# *Problem Solving*

## UNIT 10 REVIEW

① Two numbers are in a ratio of 3 to 5. If the first is increased by 3 and the second decreased by 2, the resulting numbers are in a ratio of 5 to 6. Find the original numbers.

② The sum of twice the reciprocal and twice the square of the reciprocal is $5/8$. Find two solutions.

③ An 8 by 12 ft. garden is surrounded by a sidewalk of uniform width. The sidewalk has an area of 125 $ft.^2$ What is the uniform width?

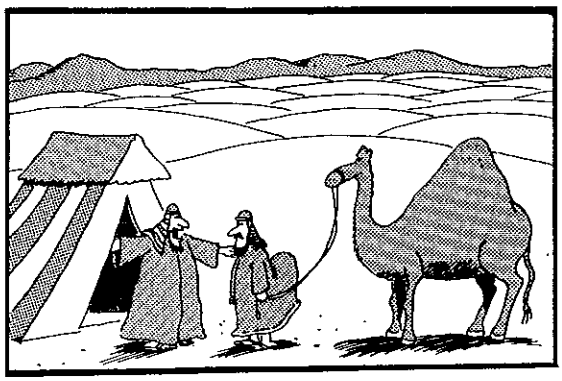
④ Increasing the speed by 9 mph allowed Robyn to cut 1 hour off her 180-mile trip. What was her original speed?

⑤ A carpenter can build a cabinet in 6 hours. His assistant can do the job in 10 hours. How long would it take for them to build a cabinet together if the assistant works on it twice as long as the carpenter? Indicate the time spent by each.

⑥ If 6 volunteers can do the job in 12 hours, and 4 hired workers can do the job in 6 hours, how long would it take for 3 volunteers and 2 hired workers to do the job together?

⑦ Allisyn drives to her aunt's house at 42 mph. She makes the return trip at 54 mph. What was her average speed for the round trip?

⑧ An 8-ounce weight is placed at one end of a yardstick and a 10-ounce weight is placed at the other end. If the yardstick is balanced, how far is the fulcrum from the 8-ounce weight?



"Abdul, my old friend! Come in, come in! Have you traveled far?!"

# *Plane Geometry*

## REFERENCE PAGE

① Parallelogram — $A = (\text{base})(\text{ht})$

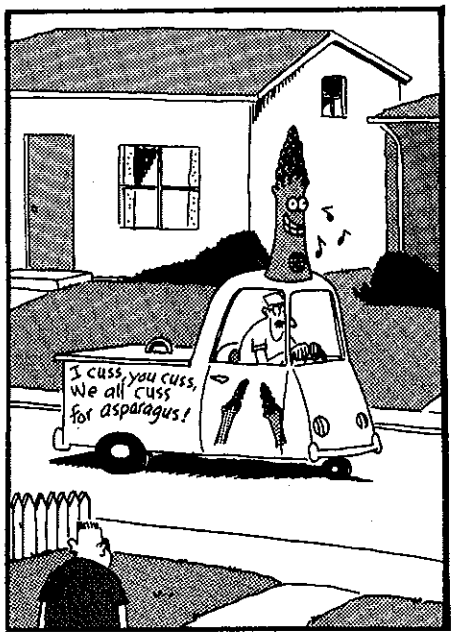
② Rhombus, Kite — $A = \frac{1}{2}(\text{prod. of diagonals})$

③ Triangle — $A = \frac{1}{2}(\text{base})(\text{ht})$

④ Trapezoid — $A = \frac{1}{2}(\text{sum of bases})(\text{ht})$
$A = (\text{median})(\text{ht})$

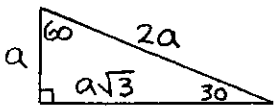
⑤ Circle — $A = \pi r^2$ $C = 2\pi r$

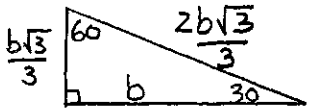
⑥ Pythagorean Theorem & Triples — $a^2 + b^2 = c^2$
3-4-5 7-24-25
5-12-13 8-15-17



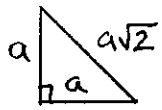
Failed marketing ploys

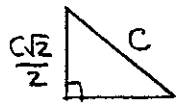
⑦ 30-60-90 Triangle



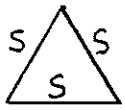




⑧ 45-45-90 Triangle



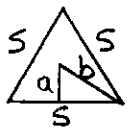




⑨ Equilateral Triangle




$A = \frac{s^2\sqrt{3}}{4}$

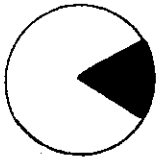
⑩ Regular Polygon




$a \rightarrow$ apothem
$b \rightarrow$ radius

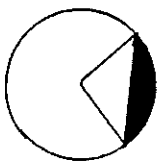
$A = \frac{1}{2}(\text{apoth})(\text{per})$

⑪ Sector of a Circle



$A = \frac{\text{central angle}}{360}(\pi r^2)$

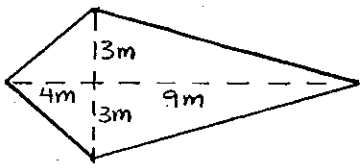
⑫ Segment of a Circle



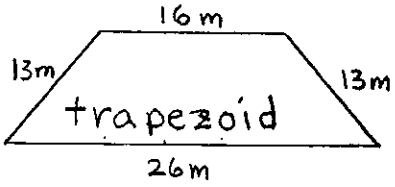
$A = \begin{pmatrix}\text{area of}\\ \text{sector}\end{pmatrix} - \begin{pmatrix}\text{area of}\\ \text{triangle}\end{pmatrix}$

# *Plane Geometry*

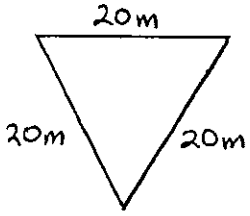
## UNIT 11 DEMONSTRATION

① 

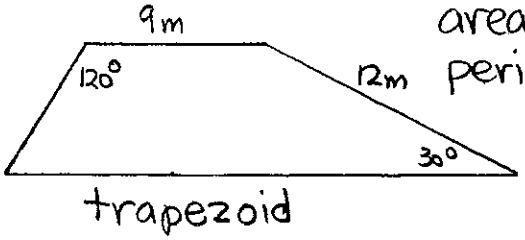

area and perimeter

② 

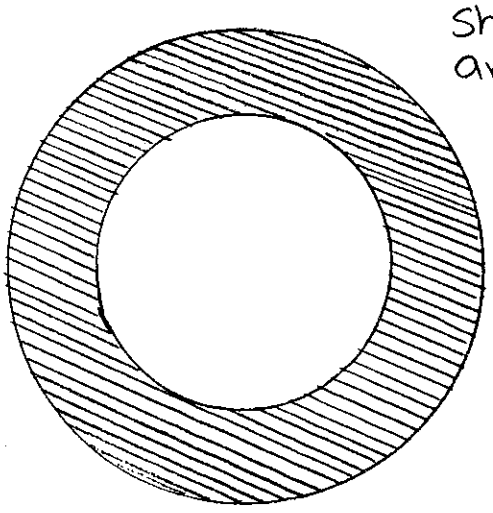

area and perimeter

③ 


area and perimeter

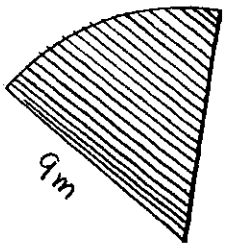
④ 


area and perimeter

⑤ 

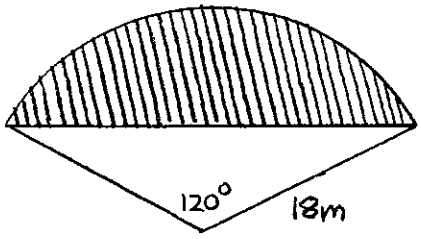
shaded area

Inner r = 10 m  outer r = 16m

⑥ 

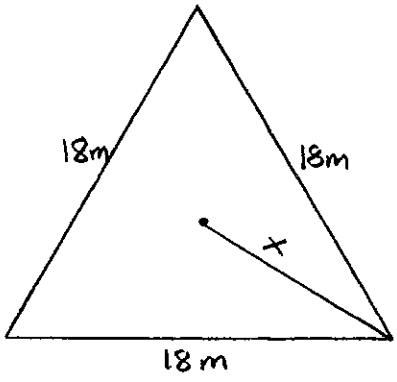

Central angle = 60°

shaded area

⑦ 


shaded area

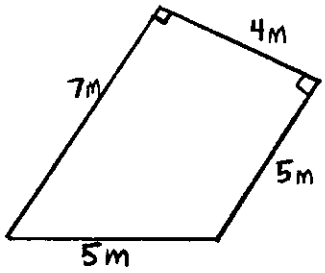
Solve for x :

⑧ 

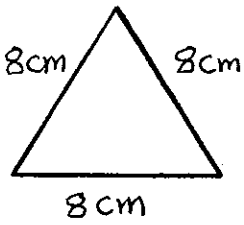
# *Plane Geometry*

## UNIT 11 REVIEW

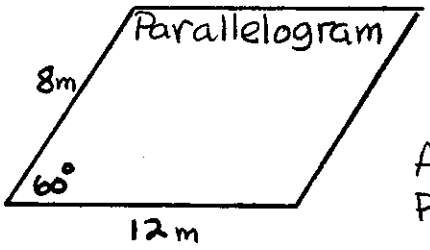
Determine the area (and the perimeter/circumference for selected problems):

① 

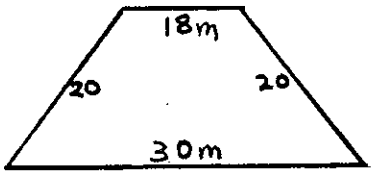

Area
Perimeter

② 


Area
Perimeter

③ 

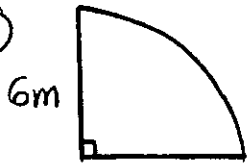

Area
Perimeter

④ 

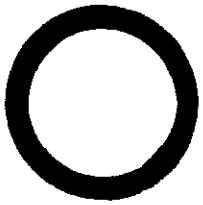

Isosceles Trapezoid

Area
Perimeter

⑤ Find the area of a circle if the circumference is $16\pi$ cm

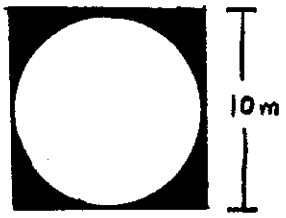
⑥ 


Area
Circumference

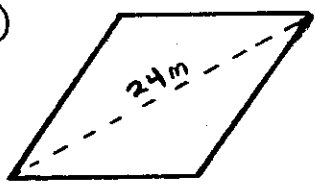
⑦ 

Area (only) of the shaded region

inside $r = 6$m  outside $r = 8$m

⑧ 

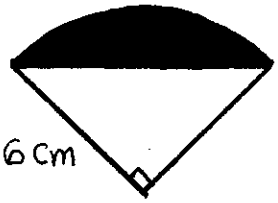

Area (only) of the shaded region

⑨ 


Area (only)

perimeter = 52 m (rhombus)

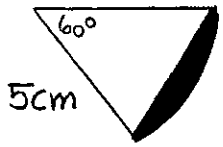
⑩ Find the area of an equilateral triangle whose perimeter is 21 cm.

⑪ 

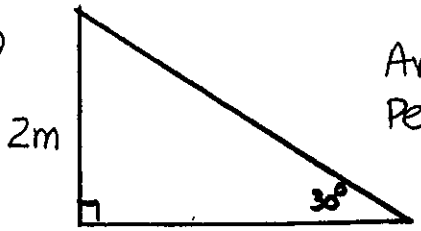

Area (only)

# *Plane Geometry*

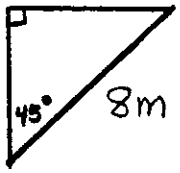
## UNIT 11 REVIEW

(12) 

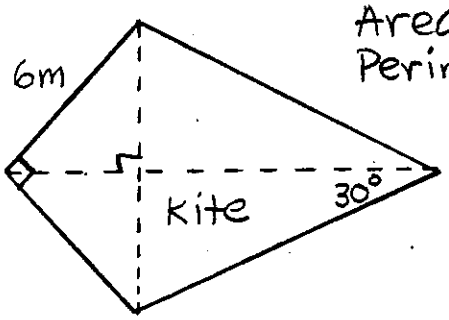
Area (only)

(13) 

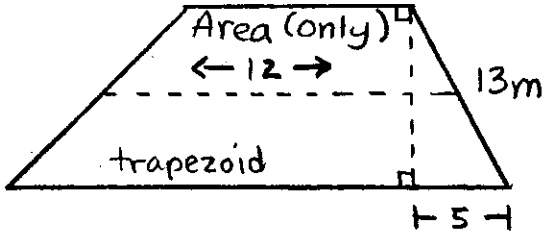
Area
Perimeter

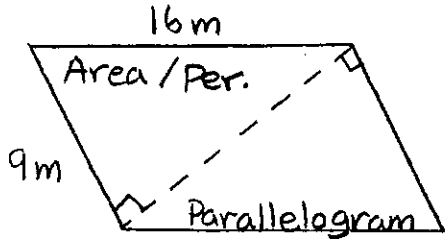
(14) 

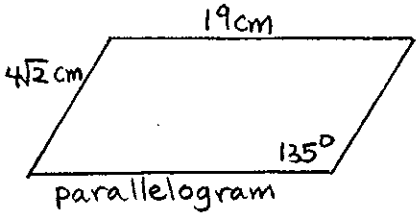
Area
Perimeter

(15) 

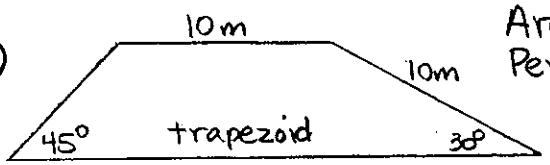
Area
Perimeter

(16) 

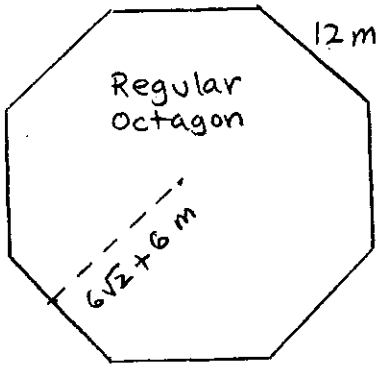

(17) 


(18) 

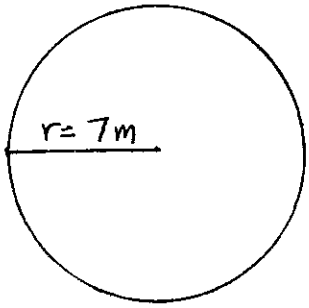
Area
Perimeter

(19) 

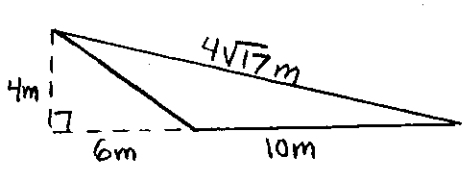
Area
Perimeter

(20) 

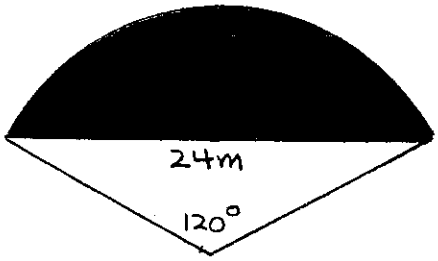
Area
Perimeter

(21) 

Area
Circumference

(22) 

Area
Perimeter

(23) 

Area (only)
of the
shaded region

# *Solid Geometry*

## REFERENCE PAGE

① Prism

$V = (\text{base area})(\text{height})$

$SA = 2(\text{base area}) + (\text{perimeter})(\text{height})$

② Cylinder

$V = (\text{base area})(\text{height})$ $\quad V = (\pi r^2)(ht)$

$SA = 2(\text{base area}) + (\text{cir.})(ht)$ $\quad SA = 2(\pi r^2) + (2\pi r)(ht)$

③ Pyramid

$V = \frac{1}{3}(\text{base area})(\text{height})$

$SA = (\text{base area}) + \frac{1}{2}(\text{perimeter})(\text{slant height})$

④ Cone

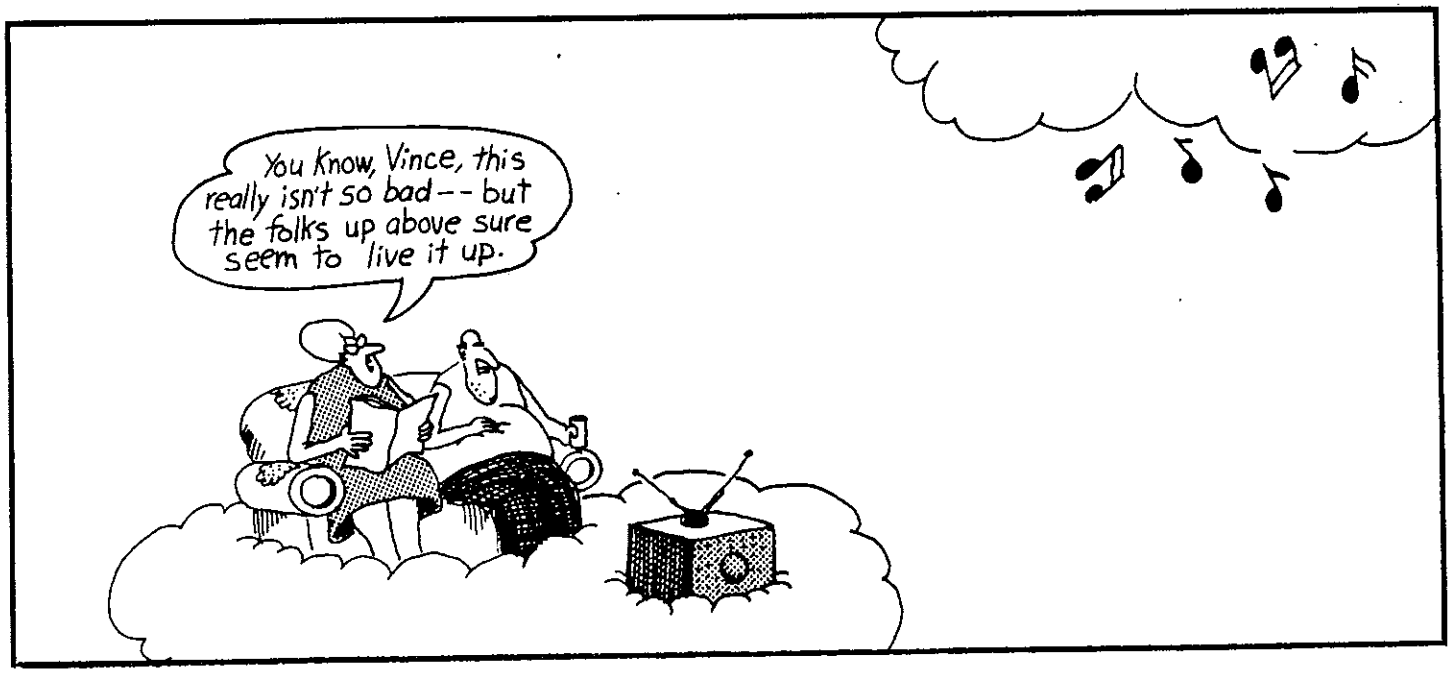
$V = \frac{1}{3}(\text{base area})(\text{height})$ $\quad V = \frac{1}{3}(\pi r^2)(ht)$

$SA = (\text{base area}) + \frac{1}{2}(\text{cir.})(\text{slant ht})$ $\quad SA = (\pi r^2) + \frac{1}{2}(2\pi r)(\text{slant ht})$

⑤ Sphere

$V = \frac{4}{3}\pi r^3$

$SA = 4\pi r^2$

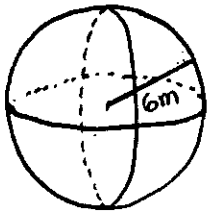


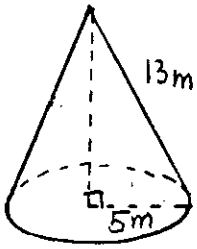

Life on Cloud 8

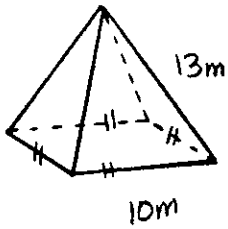
# *Solid Geometry*

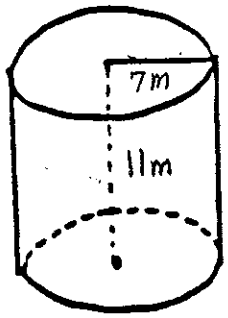
## UNIT 12 DEMONSTRATION

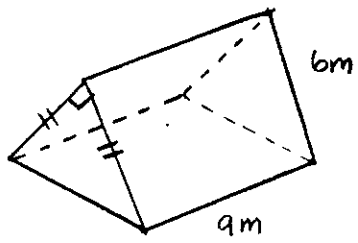
Volume and surface area:

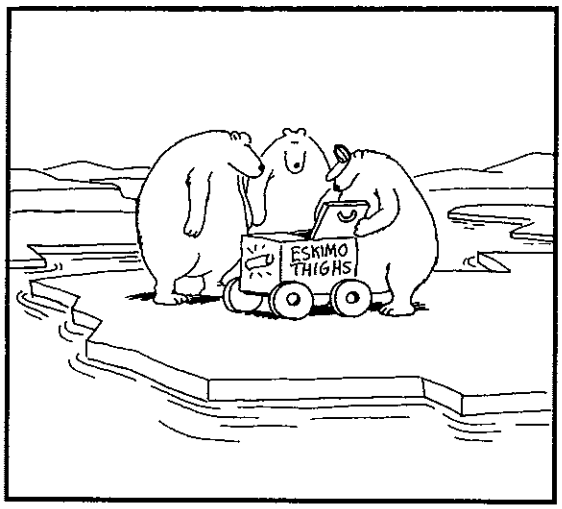
① 

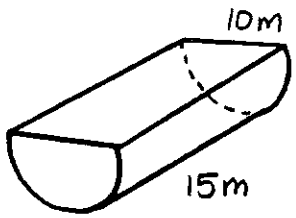

② 


③ 

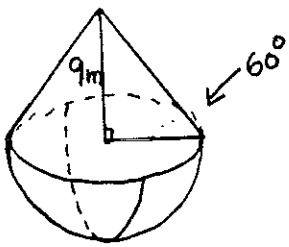

④ 


⑤ 


⑥ 


⑦ Volume (below)

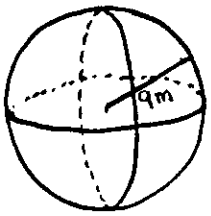


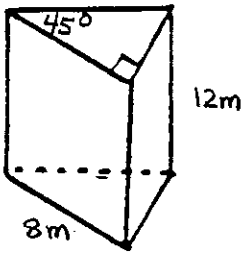

⑧ Surface area (above)

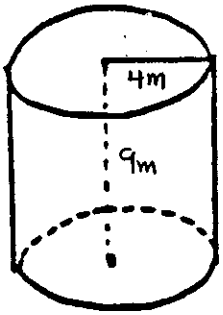
# *Solid Geometry*

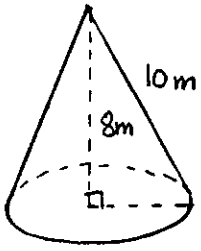
## UNIT 12 REVIEW

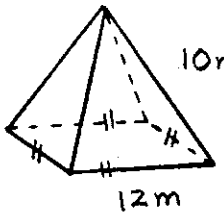
Determine volume and surface area:

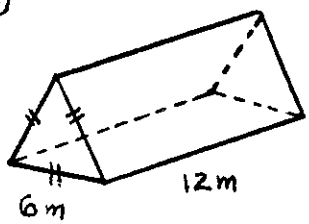
① 

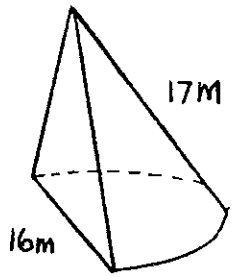

② 

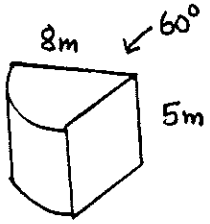

③ 


④ 

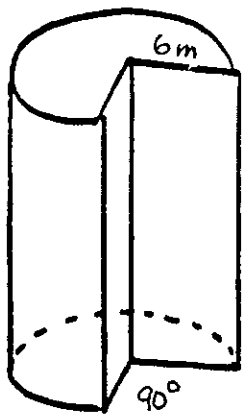

⑤ 


⑥ 

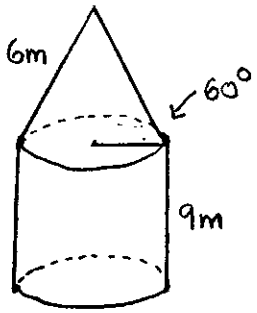

⑦ 

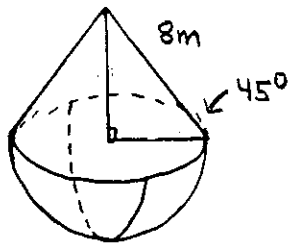

⑧ 


Volume only

⑨ 


Volume only

⑩ 


⑪ 

# *Introduction to Two-Column Proofs*

## REFERENCE PAGE

### DEFINITIONS

| | |
|---|---|
| 1. SEGMENT MIDPOINT | Midpoint separates a segment into two congruent parts |
| 2. SEGMENT BISECTOR | Segment, line, or plane intersecting at segment midpoint |
| 3. RIGHT ANGLE | 90 degree angle |
| 4. LINEAR PAIR | Adjacent angles whose noncommon sides form a straight angle |
| 5. CONGRUENT ANGLES | Angles are congruent iff their measures are exactly equal |
| 6. CONGRUENT SEGMENTS | Segments are congruent iff their lengths are exactly equal |
| 7. COMPLEMENTARY ANGLES | Angles are complementary iff their measures sum to 90° |
| 8. SUPPLEMENTARY ANGLES | Angles are supplementary iff their measures sum to 180° |
| 9. VERTICAL ANGLES | Angles formed on opposite sides of intersecting lines |
| 10. PERPENDICULAR LINES | Lines intersecting at right angles |
| 11. ISOSCELES TRIANGLE | Triangle with two sides congruent |
| 12. RIGHT TRIANGLE | Triangle with one right angle |
| 13. CPCTC | Corresponding Parts of Congruent Triangles are Congruent |

### POSTULATES

1. IDENTITY (Reflexive Property)
2. Two points form a line
3. Three noncollinear points form a plane
4. A line segment has exactly one midpoint
5. If two angles form a linear pair, then they are supplementary
6. SSS proves congruent triangles
7. SAS proves congruent triangles
8. ASA proves congruent triangles

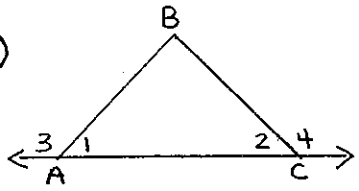
Definition: Explanation of terms
Postulate: Statement accepted as true
Theorem: Statement proven to be true

### THEOREMS

1. Vertical angles are equal
2. Complements of equal angles are equal
3. Supplements of equal angles are equal
4. If two equal angles form a linear pair, then they are right angles
5. All right angles are equal
6. Perpendicular lines form congruent adjacent angles
7. The acute angles of a right triangle are complementary
8. AAS proves congruent triangles
9. In a triangle, sides opposite equal angles are equal
10. In a triangle, angles opposite equal sides are equal

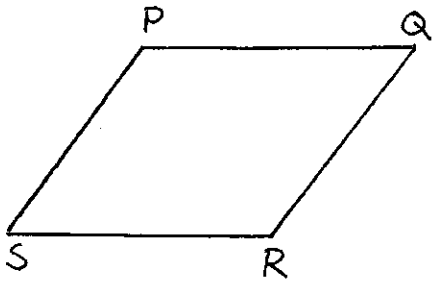
# *Introduction to Two-Column Proofs*

## UNIT 13 DEMONSTRATION

① 

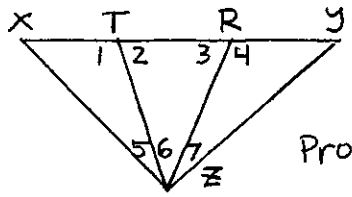

Given: $\overline{AB} \cong \overline{CB}$
Prove: $\angle 3 \cong \angle 4$

| Statements | |
|---|---|
| 1. $\overline{AB} \cong \overline{CB}$ | 1. |
| 2. $\angle 1 \cong \angle 2$ | 2. |
| 3. $\angle 1$ and $\angle 3$, $\angle 2$ and $\angle 4$ are linear pairs | 3. |
| 4. $\angle 1$ and $\angle 3$, $\angle 2$ and $\angle 4$ are supplementary | 4. |
| 5. $\angle 3 \cong \angle 4$ | 5. |

② 

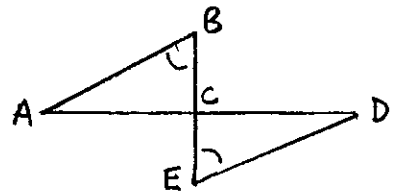

Given: $\overline{PQ} \cong \overline{RS}$, $\overline{PS} \cong \overline{RQ}$
Prove: $\angle P \cong \angle R$

| Statements | |
|---|---|
| 1. $\overline{PQ} \cong \overline{RS}$, $\overline{PS} \cong \overline{RQ}$ | 1. |
| 2. Draw $\overline{SQ}$ | 2. |
| 3. $\overline{SQ} \cong \overline{QS}$ | 3. |
| 4. $\triangle QSP \cong \triangle SQR$ | 4. |
| 5. $\angle P \cong \angle R$ | 5. |

③ 


Given: $\overline{ZT} \cong \overline{ZR}$, $\overline{TX} \cong \overline{RY}$
Prove: $\angle 5 \cong \angle 7$

| Statements | |
|---|---|
| 1. $\overline{ZT} \cong \overline{ZR}$, $\overline{TX} \cong \overline{RY}$ | 1. |
| 2. $\angle 2 \cong \angle 3$ | 2. |
| 3. $\angle 1$ and $\angle 2$, $\angle 3$ and $\angle 4$ are linear pairs | 3. |
| 4. $\angle 1$ and $\angle 2$, $\angle 3$ and $\angle 4$ are supplementary | 4. |
| 5. $\angle 1 \cong \angle 4$ | 5. |
| 6. $\triangle XTZ \cong \triangle YRZ$ | 6. |
| 7. $\angle 5 \cong \angle 7$ | 7. |

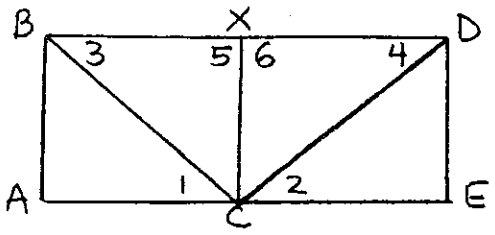
④ 


Given: $\overline{BE} \perp \overline{AD}$, C is midpoint of $\overline{AD}$, $\angle B \cong \angle E$
Prove: $\overline{AB} \cong \overline{DE}$

| Statements | |
|---|---|
| 1. $\overline{BE} \perp \overline{AD}$, C is midpoint of $\overline{AD}$, $\angle B \cong \angle E$ | 1. |
| 2. $\angle BCA$ and $\angle ECD$ are rt. $\angle$s | 2. |
| 3. $\angle BCA \cong \angle ECD$ | 3. |
| 4. $\overline{AC} \cong \overline{DC}$ | 4. |
| 5. $\triangle ABC \cong \triangle DEC$ | 5. |
| 6. $\overline{AB} \cong \overline{DE}$ | 6. |

# *Introduction to Two-Column Proofs*

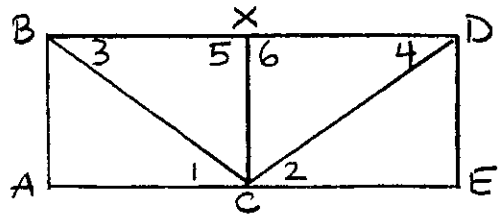
## UNIT 13 DEMONSTRATION

⑤ 


Given: $\overline{BA} \perp \overline{AE}$, $\overline{DE} \perp \overline{AE}$, C is midpoint of $\overline{AE}$, $\angle ABC \cong \angle EDC$

Prove: $\angle 1 \cong \angle 2$

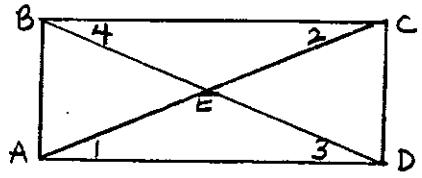
| Statements | |
|---|---|
| 1. $\overline{BA} \perp \overline{AE}$, $\overline{DE} \perp \overline{AE}$, C is midpoint of $\overline{AE}$, $\angle ABC \cong \angle EDC$ | 1. |
| 2. $\overline{AC} \cong \overline{EC}$ | 2. |
| 3. $\angle A$ and $\angle E$ are rt. $\angle$'s | 3. |
| 4. $\angle A \cong \angle E$ | 4. |
| 5. $\triangle BAC \cong \triangle DEC$ | 5. |
| 6. $\angle 1 \cong \angle 2$ | 6. |

⑥ 


Given: $\overline{CB} \cong \overline{CD}$, $\angle 5 \cong \angle 6$

Prove: $\triangle CBX \cong \triangle CDX$

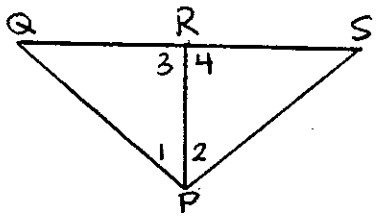
| Statements | |
|---|---|
| 1. $\overline{CB} \cong \overline{CD}$, $\angle 5 \cong \angle 6$ | 1. |
| 2. $\angle 3 \cong \angle 4$ | 2. |
| 3. $\triangle CBX \cong \triangle CDX$ | 3. |

⑦ 


Given: E is midpoint of $\overline{AC}$

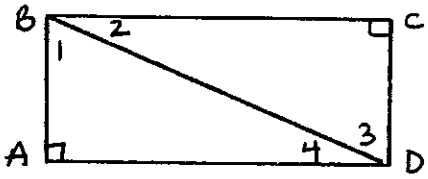
$\angle 1 \cong \angle 2$

Prove: $\angle 3 \cong \angle 4$

⑧ 


Given: $\overline{PR} \perp \overline{QS}$, $\angle Q \cong \angle S$

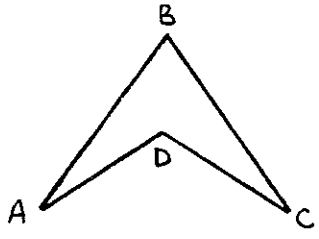
Prove: R is the midpoint of $\overline{QS}$

⑨ 


Given: $\angle A$ and $\angle C$ are rt. $\angle$'s

$\angle 2 \cong \angle 4$

Prove: $\overline{AB} \cong \overline{CD}$

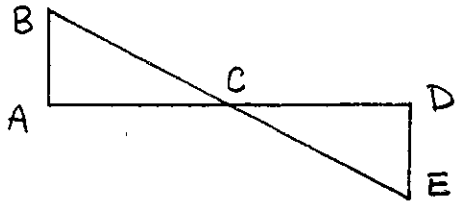
⑩ 


Given: $\overline{AB} \cong \overline{CB}$, $\overline{AD} \cong \overline{CD}$

Prove: $\angle A \cong \angle C$

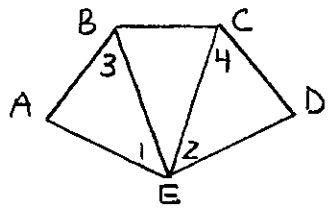
# *Introduction to Two-Column Proofs*

## UNIT 13 REVIEW

① 

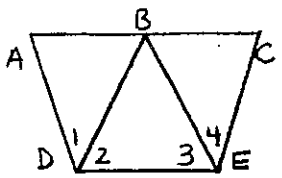

Given: $\angle A \cong \angle D$ are rt. $\angle$s, $\overline{AC} \cong \overline{DC}$
Prove: $\angle B \cong \angle E$

| Statements | |
|---|---|
| 1. $\angle A \cong \angle D$ are rt $\angle$s, $\overline{AC} \cong \overline{DC}$ | 1. |
| 2. $\angle A \cong \angle D$ | 2. |
| 3. $\angle ACB$ and $\angle DCE$ are vertical angles | 3. |
| 4. $\angle ACB \cong \angle DCE$ | 4. |
| 5. $\triangle ACB \cong \triangle DCE$ | 5. |
| 6. $\angle B \cong \angle E$ | 6. |

② 

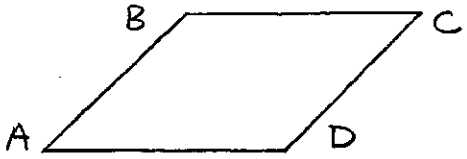

Given: $\overline{BE} \perp \overline{AB}$, $\overline{CE} \perp \overline{DC}$, $\angle 1 \cong \angle 2$, $\overline{AE} \cong \overline{DE}$
Prove: $\triangle BEC$ is isosceles

| Statements | |
|---|---|
| 1. $\overline{BE} \perp \overline{AB}$, $\overline{CE} \perp \overline{DC}$, $\angle 1 \cong \angle 2$, $\overline{AE} \cong \overline{DE}$ | 1. |
| 2. $\angle 3$ and $\angle 4$ are rt. $\angle$s | 2. |
| 3. $\angle 3 \cong \angle 4$ | 3. |
| 4. $\triangle ABE \cong \triangle DCE$ | 4. |
| 5. $\overline{BE} \cong \overline{CE}$ | 5. |
| 6. $\triangle BEC$ is isosceles | 6. |

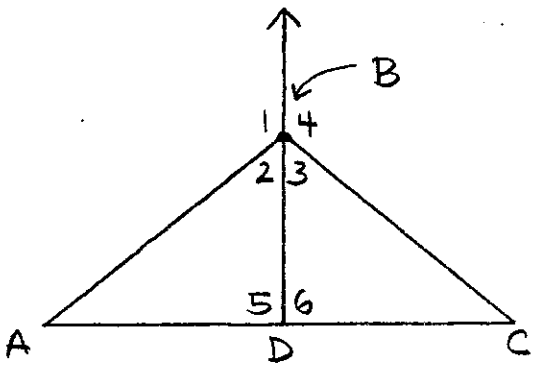
③ 


Given: $\angle A \cong \angle C$, $\overline{AD} \cong \overline{CE}$, B is midpoint of $\overline{AC}$
Prove: $\angle 2 \cong \angle 3$

| Statements | |
|---|---|
| 1. $\angle A \cong \angle C$, $\overline{AD} \cong \overline{CE}$, B is midpoint of $\overline{AC}$ | 1. |
| 2. $\overline{AB} \cong \overline{CB}$ | 2. |
| 3. $\triangle ABD \cong \triangle CBE$ | 3. |
| 4. $\overline{BD} \cong \overline{BE}$ | 4. |
| 5. $\angle 2 \cong \angle 3$ | 5. |

④ 


Given: $\overline{BC} \cong \overline{DA}$, $\overline{BA} \cong \overline{DC}$
Prove: $\angle B \cong \angle D$

⑤ 

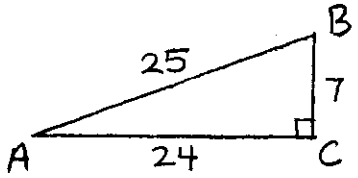

Given: $\angle 1 \cong \angle 4$, $\overline{BD} \perp \overline{AC}$
Prove: D is the midpoint of $\overline{AC}$

# *Triangle Trigonometry*

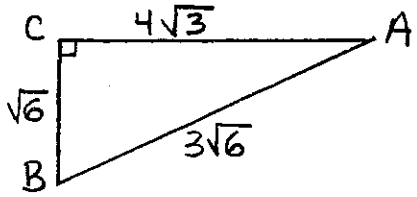
## UNIT 14 DEMONSTRATION

① Find each value in fraction form:

a) Cos B
b) Sec A




② Find each value in fraction form (rationalize as needed):



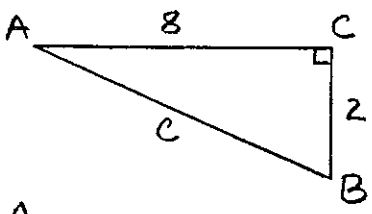

a) Tan A
b) Sin B

③ Interpolate to the nearest minute:

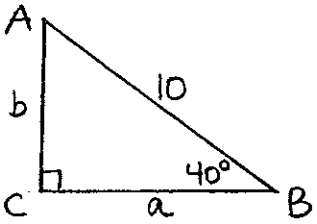
Tan A = 2.166

In problems 4 and 5, solve each triangle. Round sides to 2 decimal places and angles to the nearest min.

④ ∠A =
∠B =
c =




⑤ ∠A =
a =
b =




Determine the value of each expression in fraction form. Rationalize if needed.

⑥ $(\sin^2 45°)(\cot^2 30°)$

⑦ $3 \sec 60° - 2 \tan 45°$

Determine the value:

⑧ $$\frac{4 \sin^2 60° - \tan 45°}{3 \sin 45°}$$

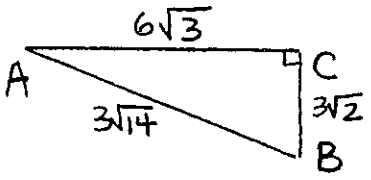

"Excuse me, sir, but could your entire family please step out of the car? ...Your faces are not in order."

# *Triangle Trigonometry*

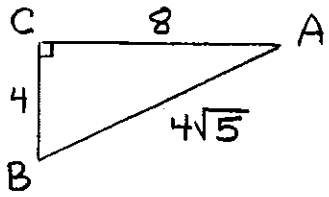
## UNIT 14 REVIEW

Find each value in fraction form (rationalize as needed):

① a) tan A
b) csc B
c) sin A
d) cot A




② a) cos B
b) tan A
c) sec B
d) sin A



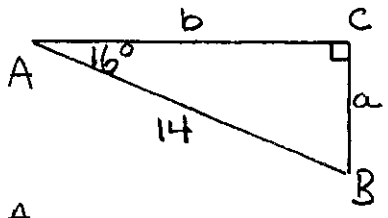

Interpolate to the nearest minute:

③ $\tan A = .4497$

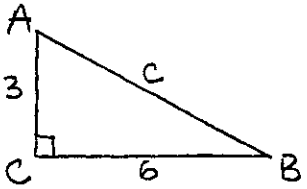
④ $\sin A = .7478$

Solve each triangle. Round side measures to 2 decimal places and angles to the nearest minute:

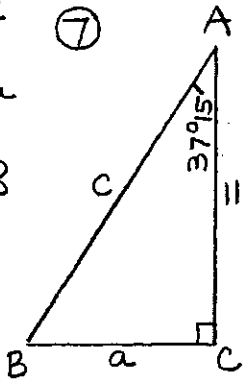
⑤



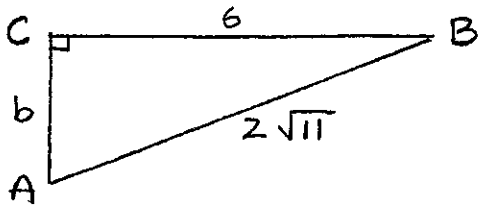

⑥




⑦




⑧



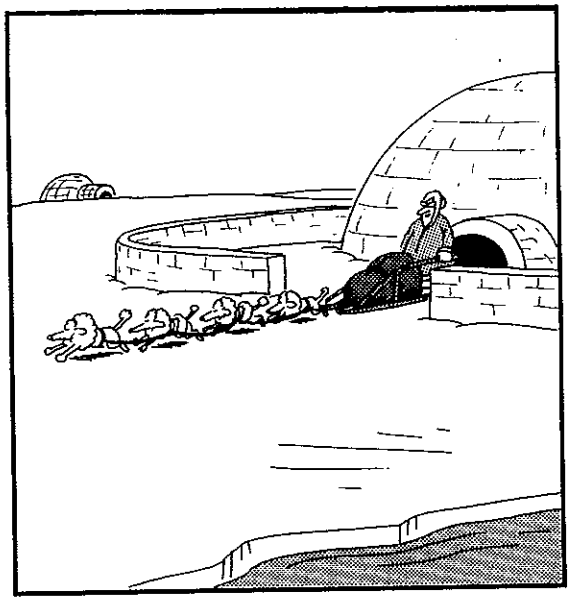

Determine the value of each expression in fraction form:

⑨ $\cos^2 45° - \sin 30°$

⑩ $2\tan^2 60° + (\csc 30°)(\sin^2 45°)$

⑪ $\dfrac{2\cos 60° - \sin^2 45°}{\csc 45°}$

⑫ $\dfrac{(2\tan^2 60°)(\sin 30°)}{\sin 60°}$



Beverly Hills of the North Pole

# *Law of Sines & Cosines*

## UNIT 15 DEMONSTRATION

Law of Sines and
Law of Cosines:

① From a point on the ground 50 m from the base of a flagpole, the angle of elevation to the top is 48°. How tall is the flagpole?

② The diagonal of a rectangle is 30 inches long and makes a 15° angle with one of the sides. Find the dimensions of the rectangle.

③ The base of a monument and two points on the ground are in a straight line. The two points are 50 m apart. The measurements of the angles of elevation to the top of the monument are 45° and 25°. Find the height of the monument.

④ An isosceles triangle has a vertex angle of 80° and a base of 20 cm. Determine the perimeter of the triangle.

⑤ A plane flew 1000 km north. It then changed direction by turning 20° clockwise and flew for another 750 km. How far was the plane from its starting point?

⑥ Determine the area of a triangle with adjacent sides of 12 in. and 20 in. and an angle of 50° 25′ between them.

⑦ $\angle A = 20°$, $b = 9$ cm, $c = 18$ cm

Determine $\angle C$ to the nearest minute.

Washington crossing the street

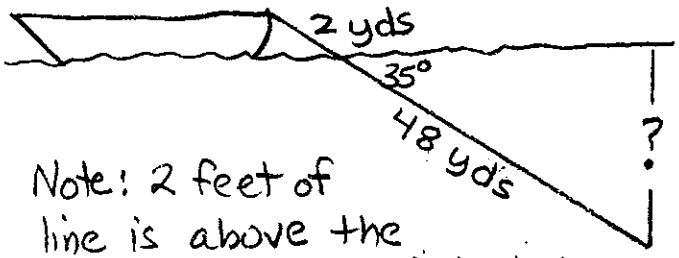
# *Law of Sines & Cosines*

## UNIT 15 REVIEW

Solve each problem:

① A 15-foot plank has one end on the ground and one end 6 feet off the ground. What is the measure of the angle formed by the plank and the ground (to the nearest minute)?

② An angler is trolling for salmon. Her line makes an angle of 35° with the water's surface. She has 50 yards of line out. How deep is her lure?




Note: 2 feet of line is above the water and 48 yards is below.

③ From Fred's position at 2nd base, the angle of elevation to the top of the scoreboard is 30°. Bryan, playing first base, is 25 feet closer. His angle is 45°. How high is the scoreboard?

④ Two planes leave an airport at the same time. One flies 40° east of north and the other flies 20° east of south. If they both fly 200 mph, how far apart are they after 2 hours?

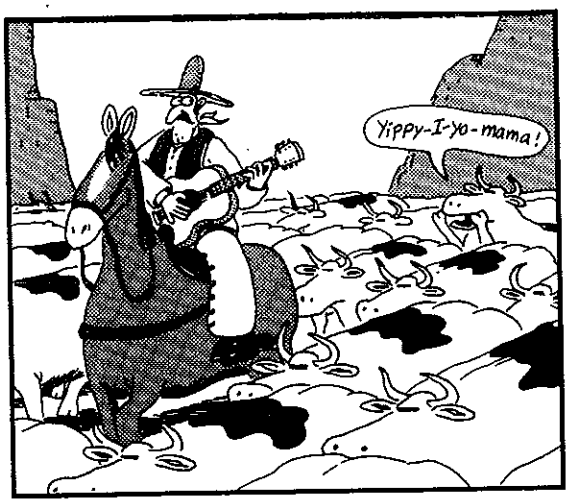
⑤ The sides of a triangle are 8cm, 12 cm, and 15 cm. Determine the smallest angle to the nearest minute.

⑥ Determine the area:

$a = 12$ cm, $b = 15$ cm, $\angle C = 36°$

⑦ $\angle A = 25°$, $b = 5$ cm, $c = 13$ cm

Determine $\angle C$ to the nearest minute. (Use a diagram!)



# *Trigonometric Functions*

## UNIT 16 DEMONSTRATION

① Determine the quadrant that contains the terminal side of an angle measuring $-\frac{7}{6}\pi$.

② Change a $-240°$ angle to radians.

③ Change an angle measure of $\frac{7}{6}\pi$ to degrees.

④ Find the least positive coterminal angle to $-1140°$.

⑤ Determine a value for $(\sin 150°)$ in radical form.

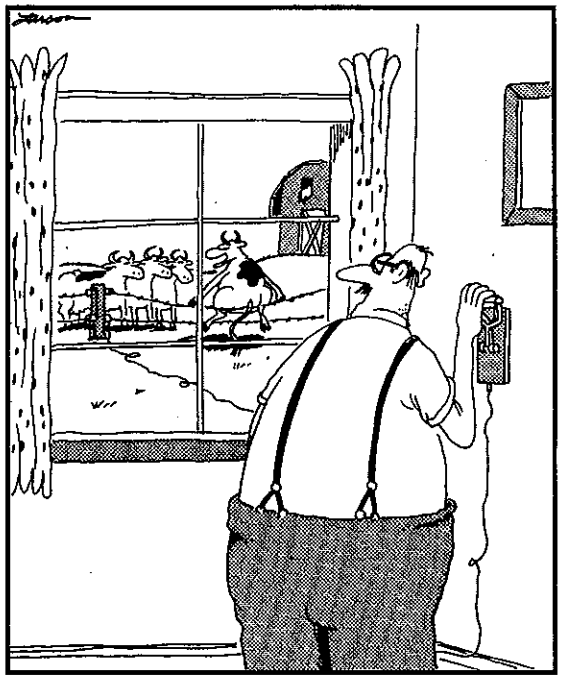
⑥ Determine a value for $(\cos -\frac{3}{4}\pi)$ in radical form.

⑦ Graph the curve: $y = -2 \sin \theta$

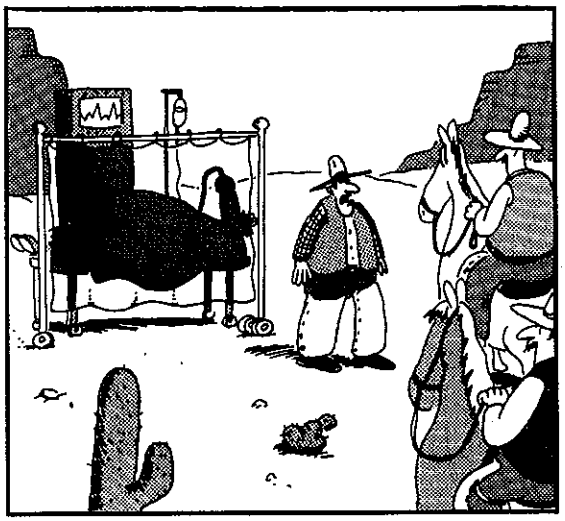
⑧ Graph: $y = \cos 2\theta$

⑨ Evaluate:

$$\frac{\frac{1}{2}(\cos 225°)(\sin 120°)}{(\cos 180°)}$$



"Look, if it was electric, could I do this?"



"Am I glad you boys came along! ... My horse seems to have come up lame."

# *Trigonometric Functions*

## UNIT 16 REVIEW

Determine the quadrant that contains the terminal side:

① $-690°$ ② $\frac{7}{3}\pi$

Change to radians:

③ $900°$ ④ $-240°$

Change to degrees:

⑤ $-\frac{5}{6}\pi$ ⑥ $\frac{4}{3}\pi$

Find the least positive coterminal angle:

⑦ $-1250°$ ⑧ $-\frac{5}{2}\pi$

Determine each value in radical form:

⑨ $\sin 600°$ ⑪ $\cos \frac{5}{6}\pi$

⑩ $\cos -405°$ ⑫ $\sin -\frac{17}{4}\pi$

Evaluate:

⑬ $$\frac{4(\sin 135°) - (\cos 390°)}{\frac{1}{2}}$$

⑭ $$\frac{2(\cos 150°)(\sin 300°)}{(\cos 180°)}$$

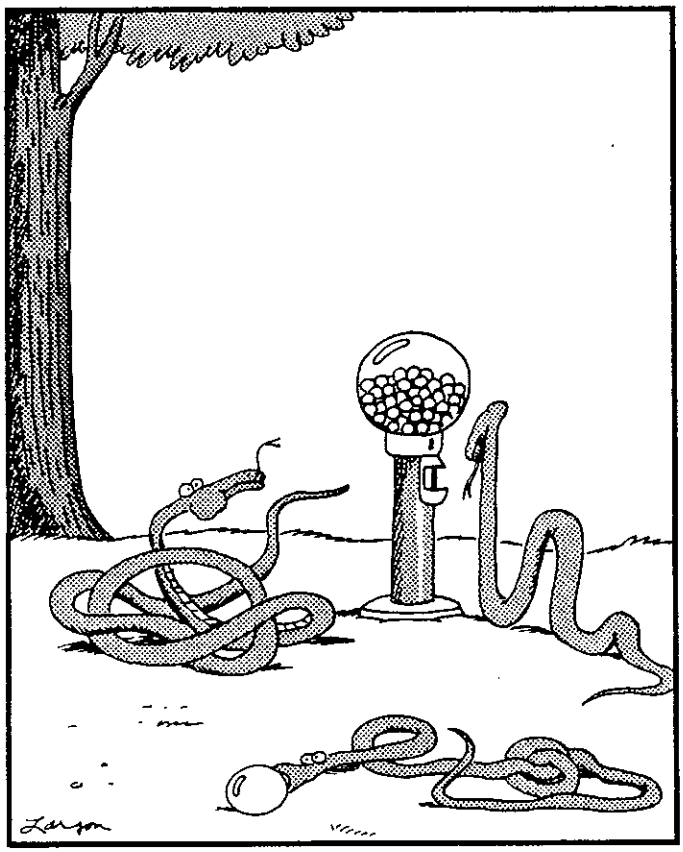
Graph each sine or cosine curve:

⑮ $y = 2 \sin \theta$

⑯ $y = -\frac{2}{3} \cos \frac{1}{2}\theta$

⑰ $-2y = 6 \sin 2\theta$

⑱ $\frac{1}{2}y = 2 \cos \frac{2}{3}\theta$




When snakes try to chew gum and crawl at the same time

# *Sequence & Series*

## UNIT 17 DEMONSTRATION

Expand each binomial:

① $(x-y)^7$

② $(a+3b)^5$

Indicate the sum for each series and the first 3 terms:

③ $\sum_{x=2}^{10} (3x+5)$

④ $\sum_{x=1}^{7} (3)^{x+1}$

Find the sum if possible:

⑤ $(-20)+(-10)+(-5)+(-\frac{5}{2})+\ldots$

Solve:

⑥ Find the sum of all even integers from 2 to 60

Solve:

⑦ Determine the summation notation:

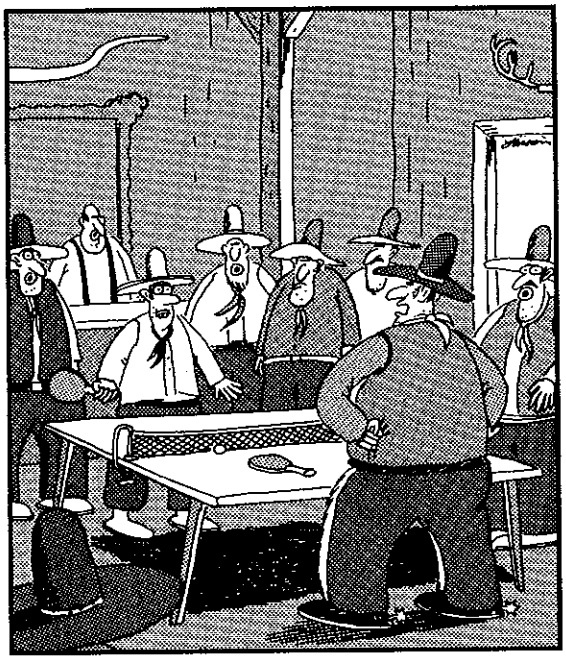
$(16)+(11)+(6)+(1)+(-4)+(-9)$

Reference:

$S = \frac{n}{2}\left[2a_1+(n-1)d\right]$

$S = \frac{a_1-a_1r^n}{1-r}$

$S = \frac{a_1}{1-r}$ for $-1<r<1$



"Well, kid, ya beat me—and now every punk packin' a paddle and tryin' to make a name for himself will come lookin' for *you!* ... Welcome to hell, kid."

# *Sequence & Series*

## UNIT 17 REVIEW

Expand each binomial:

① $(x+y)^7$

② $(3a+4b)^4$

③ $(n-3m)^5$

④ $(2x-3y)^6$

Indicate the sum for each series and the first 3 terms:

⑤ $\sum_{x=1}^{7} (4x-5)$

⑥ $\sum_{c=3}^{10} (8-5c)$

⑦ $\sum_{m=-2}^{9} (2)^m$

⑧ $\sum_{e=2}^{11} \frac{1}{2}(4)^{e-2}$

Find the sum if possible:

⑨ $3+1+\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+\ldots$

⑩ $8-6+\frac{9}{2}-\frac{27}{8}+\ldots$

Solve:

⑪ Find the sum of the even integers from 250 to 350.

⑫ A swinging pendulum moves 50 cm on its first swing and 9/10 of the preceding distance on each successive swing. How far will it move before stopping?

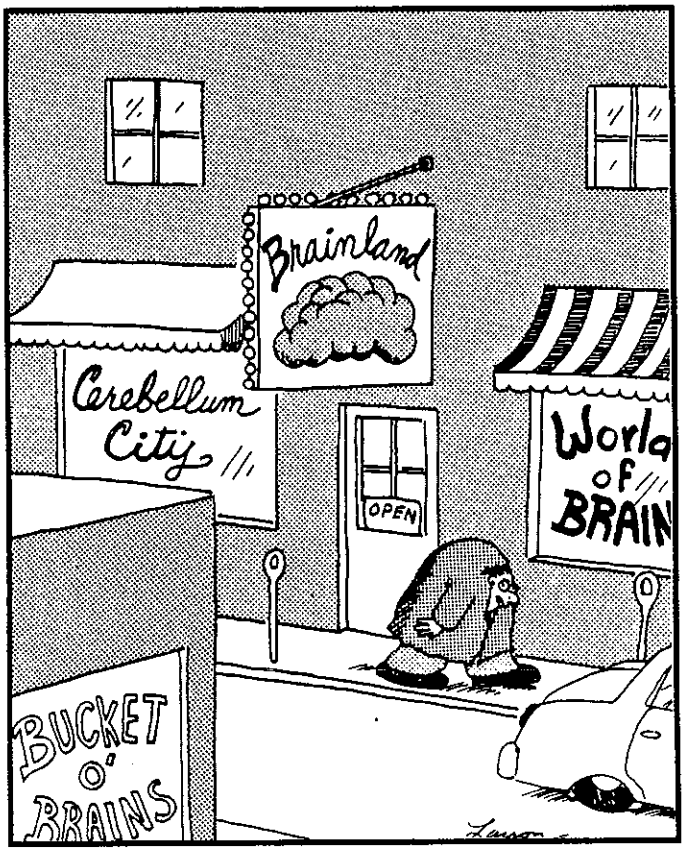
Determine the summation notation for each series:

⑬ $6-2-10-18-26$

⑭ $20+11+2-7-16-25$

⑮ $3+9+27+81+243$

⑯ $10-5+\frac{5}{2}-\frac{5}{4}+\frac{5}{8}$




Igor goes shopping.

# *Combinations & Permutations*

## UNIT 18 DEMONSTRATION

Evaluate:

① $P(7, 5)$

② $C(6, 4)$

Solve:

③ A company makes crayons in 3 lengths, 2 widths, and 20 colors. How many different crayons do they make?

④ How many 3 boy - 3 girl subcommittees are possible if the Student Senate has 12 boys and 14 girls?

⑤ How many ways can the letters of "research" be arranged?

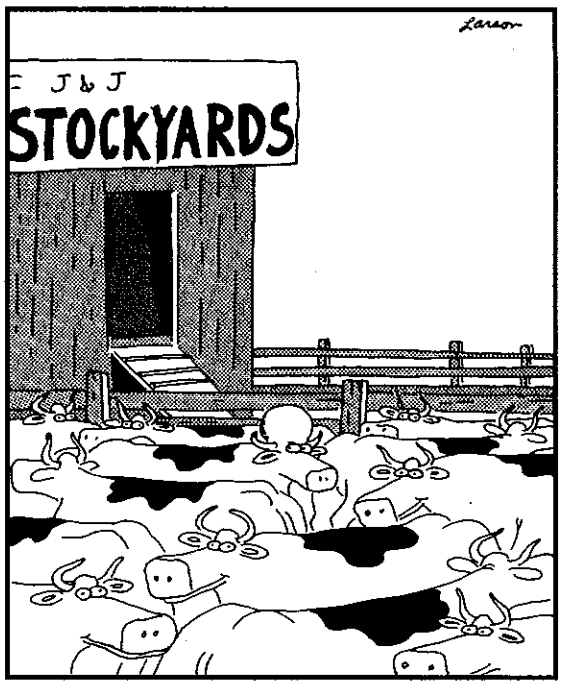
⑥ How many ways can nine beads be placed on a necklace with a clasp?

⑦ How many different teams of 9 softball players can be selected from 14 children?

⑧ How many ways can 11 children sit in a circle?

Solve:

⑨ How many ways can 3 cards be drawn from a 52-card deck so that 2 are from the same suit?




Only Claire, with her oversized brain, wore an expression of concern.

# *Combinations & Permutations*

## UNIT 18 REVIEW

Evaluate:

① $P(11,4)$ ③ $C(9,3)$

② $P(5,5)$ ④ $C(13,5)$

Solve:

⑤ A store sells seven different styles of gloves, each coming in a choice of four different colors. How many different gloves does the store sell?

⑥ How many ways can eight pictures be arranged in a straight line on the wall?

⑦ How many ways can eight students be assigned to a row of twelve lockers?

⑧ How many ways can the letters of the word "television" be arranged?

⑨ How many ways can seven people sit in a circle?

⑩ How many ways can nine different chairs be arranged around a circular table?

⑪ How many ways can eight keys be arranged on a key ring?

⑫ How many ways can six different color beads be arranged on a necklace with a clasp?

⑬ How many different starting units of five players can be selected from a team of twelve players?

⑭ How many math teams of 2 boys and 2 girls can be selected from an ATIM class with 10 boys and 8 girls?

⑮ There are five mystery books and seven romance novels on the reading list. How many lists of four mystery books and three romance novels can be made?

⑯ Eight cards are selected from a fifty-two card deck. How many different eight card combinations include two cards from each suit?

⑰ How many ways can 6 cards be drawn from a 52 card deck so that 3 are one suit and the remaining cards are from 2 other suits?

# *Mathematics of Chance*

## UNIT 19 DEMONSTRATION

① What is the probability of pulling out a penny followed by a dime from a coin purse that contains 5 dimes and 2 pennies?

② What are the odds of rolling a number higher than 1 on a single roll of a die?

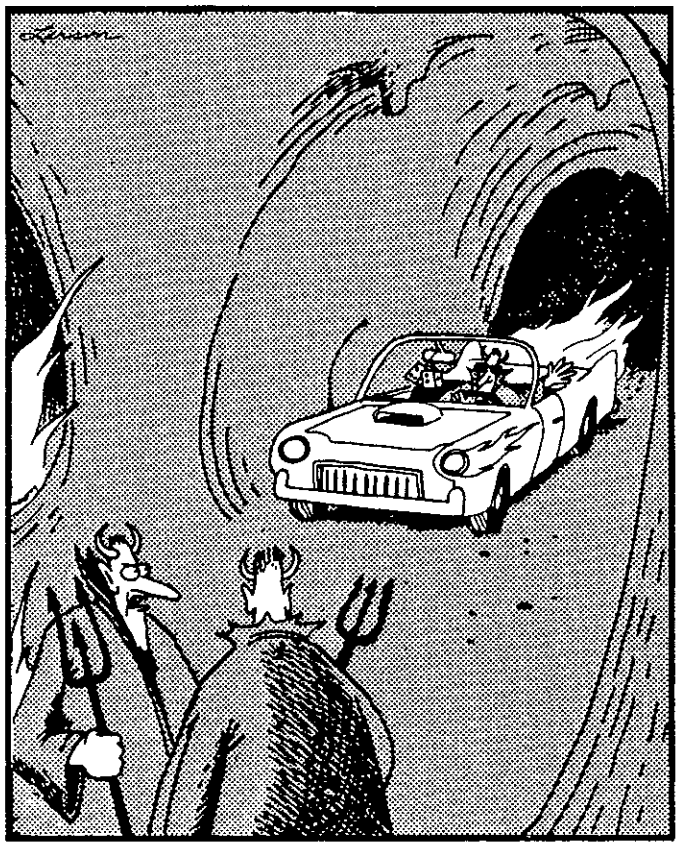
③ In a bag, there are 6 white, 4 black, 2 brown, and 3 blue buttons. What is the probability of selecting 3 buttons - all of the same color?

④ Five cards are drawn from a standard deck. What is the probability of drawing 3 from one suit and 2 from another?

⑤ A coin is tossed 12 times. What is the probability of tossing 6 heads?

⑥ When Joe and Marilyn play ping pong, Marilyn wins 4 and Joe wins 1 out of every 5 games. In 6 games, what is the probability Marilyn will win more than 3 games?

⑦ From a standard deck, what is the probability of drawing 3 cards that are all red or all kings and queens?



"Well, here comes Roy again. He sure does think he's Hell on Wheels."

# *Mathematics of Chance*

## UNIT 19 REVIEW

In a bag are 4 black, 3 white, and 3 green marbles. with no replacement, what is the probability of selecting:

1. 3 marbles – all white
2. 3 marbles – all black or all green
3. 4 marbles – at least 3 black

Four cards are drawn from a standard deck. Determine the probability of drawing:

4. All four face cards
5. A red card or a face card on the <u>first</u> draw
6. Three from one suit

A coin is tossed 7 times. Determine the probability of:

7. 5 heads
8. At least 4 tails
9. 3 heads or 4 heads

A.J. makes 3 out of every 5 free throws he attempts during the basketball season. If he attempts 8, determine the probability he will:

10. Make 6 of them
11. Make at least 7 of them
12. Make more than 7 or less than 2

Determine the probability of drawing:

13. A black marble followed by a green marble from the bag in problems 1-3.
14. Two even number cards <u>or</u> two red cards from a standard deck.

Determine the <u>odds</u> of:

15. Rolling an odd number twice in a row with a standard die.

# *Matrices*

## UNIT 20 DEMONSTRATION

Solve using an augmented matrix:

① $\begin{aligned} 2x + 3y &= 9 \\ x + 2y &= 7 \end{aligned}$

Solve using an augmented matrix and substitution:

② $\begin{aligned} x + 2y + 2z &= 1 \\ 3x - y + 2z &= 8 \\ x + y + z &= 0 \end{aligned}$

Find each product:

③ $-\frac{1}{3}\begin{bmatrix} -2 & 3 & 0 \\ 4 & -1 & 6 \end{bmatrix}\begin{bmatrix} -6 \\ 9 \\ 3 \end{bmatrix}$

④ $\begin{bmatrix} -4 & -5 \\ 2 & 6 \end{bmatrix}\begin{bmatrix} 8 & 2 \\ 0 & -1 \end{bmatrix}$

Find the signed minor for each element in the <u>2nd</u> row:

⑤ $\begin{bmatrix} 4 & 5 & 8 \\ 0 & -1 & 2 \\ -3 & 6 & -2 \end{bmatrix}$

Find the inverse:

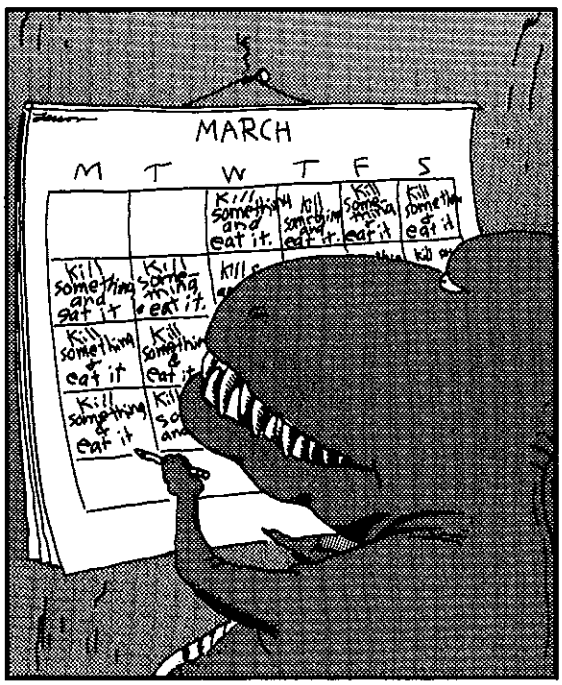
⑥ $\begin{bmatrix} 2 & 4 \\ -7 & 6 \end{bmatrix}$

Solve using an inverse matrix:

⑦ $\begin{aligned} 2x - 3y &= 2 \\ x - 2y &= 3 \end{aligned}$

Find the inverse:

⑧ $\begin{bmatrix} 1 & 3 & 0 \\ 1 & 4 & -2 \\ 2 & 1 & 2 \end{bmatrix}$




Jurassic calendars

# *Matrices*

## UNIT 20 REVIEW

Solve using an augmented matrix:

① $3x + 4y = 12$
$5x + 2y = -8$

Solve using an augmented matrix and substitution:

② $2x + 3y - z = -7$
$4x - y - 6z = 10$
$x + 2y + 3z = -2$

Find each product:

③ $\begin{bmatrix} 2 & 3 \\ -4 & 0 \end{bmatrix} \begin{bmatrix} -3 & 1 \\ -5 & -1 \end{bmatrix}$

④ $-\frac{1}{2} \begin{bmatrix} -2 & 3 & 4 \\ 0 & 2 & 5 \end{bmatrix} \begin{bmatrix} 6 \\ -4 \\ 10 \end{bmatrix}$

⑤ $\begin{bmatrix} -2 & -1 & 0 \\ 3 & 0 & 4 \\ 4 & 2 & -3 \end{bmatrix} \begin{bmatrix} -2 & 3 \\ 5 & -1 \\ 3 & 0 \end{bmatrix}$

Find the signed minor for each element:

⑥ In row 1 $\begin{bmatrix} 6 & -1 & 0 \\ 3 & 4 & -5 \\ 2 & -3 & 7 \end{bmatrix}$

⑦ In row 2

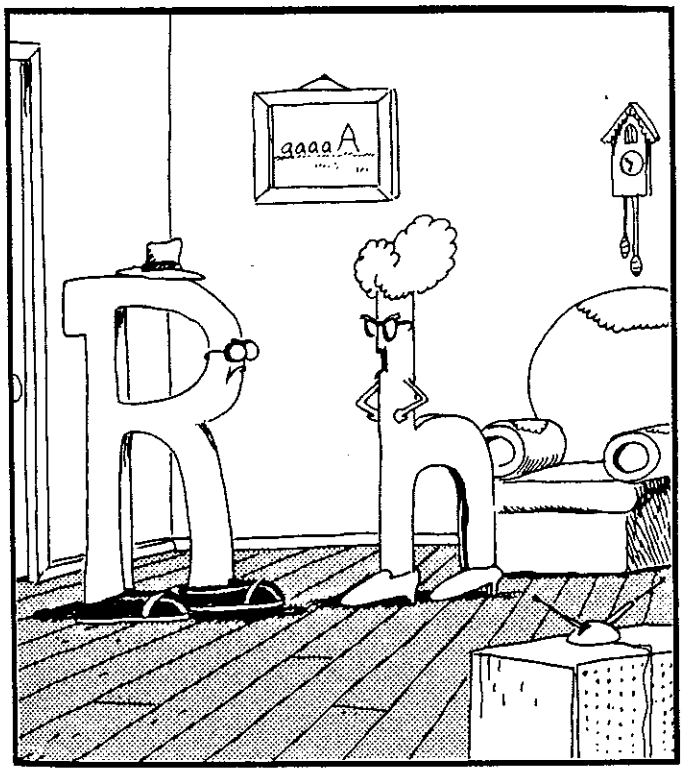
Find the inverse:

⑧ $\begin{bmatrix} 4 & 3 \\ -6 & 8 \end{bmatrix}$

⑨ $\begin{bmatrix} 2 & 0 & 6 \\ -4 & 3 & 8 \\ 5 & -1 & 7 \end{bmatrix}$

Solve using an inverse matrix:

⑩ $3x + 5y = 3$
$x - 3y = 15$




"All right! All right! If you want the truth, off and on I've been seeing *all* the vowels—a, e, i, o, u. . . . Oh, yes! And *sometimes* y!"

# *Logarithms*

## UNIT 21 DEMONSTRATION

Change to logarithmic form:

① $5^2 = 25$

Change to exponential form:

② $\log_9 3 = 1/2$

Solve a basic logarithmic equation:

③ $\log_2 (3x-2) = \log_2 (2x+6)$

Use properties of logarithms to solve:

④ $\log_9 (x+4) + \log_9 (x-4) = 1$

Use the table of mantissas to solve:

⑤ $\log 51.2$

Approximate the value for this logarithm:

⑥ $\log_3 12$ (round to 4 places)

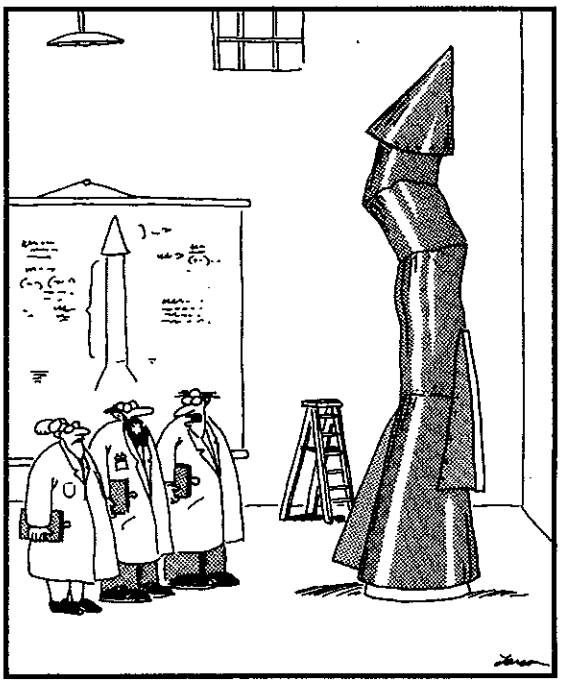
Solve an exponential equation:

⑦ $27^{2x+1} = 2^{4x-1}$

Solve:

⑧ $\log_2 [\log_9 (\log_3 x)] = -1$

| n | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 50 | 6990 | 6998 | 7007 | 7016 | 7024 |
| 51 | 7076 | 7084 | 7093 | 7101 | 7110 |
| 52 | 7160 | 7168 | 7177 | 7185 | 7193 |
| 53 | 7243 | 7251 | 7259 | 7267 | 7275 |
| 54 | 7324 | 7332 | 7340 | 7348 | 7356 |



"It's time we face reality, my friends. ... We're not exactly rocket scientists."

# *Logarithms*

## UNIT 21 REVIEW

Change to logarithmic form:

① $3^{-2} = 1/9$

Change to exponential form:

② $\log_4 2 = 1/2$

Solve a basic logarithmic equation:

③ $\log_4 (1-2x) = \log_4 (x+10)$

Use the properties of logarithms to solve:

④ $\log_6 (n-3) + \log_6 (n+2) = \log_3 3$

⑤ $2\log_2 x - \frac{1}{2}\log_2 16 = 4$

Use the table of mantissas to solve:

⑥ $\log 437$

⑦ $\log x = .5011 - 2$

Approximate the value as a common logarithm:

⑧ $\log_3 8$ (round to 4 places)

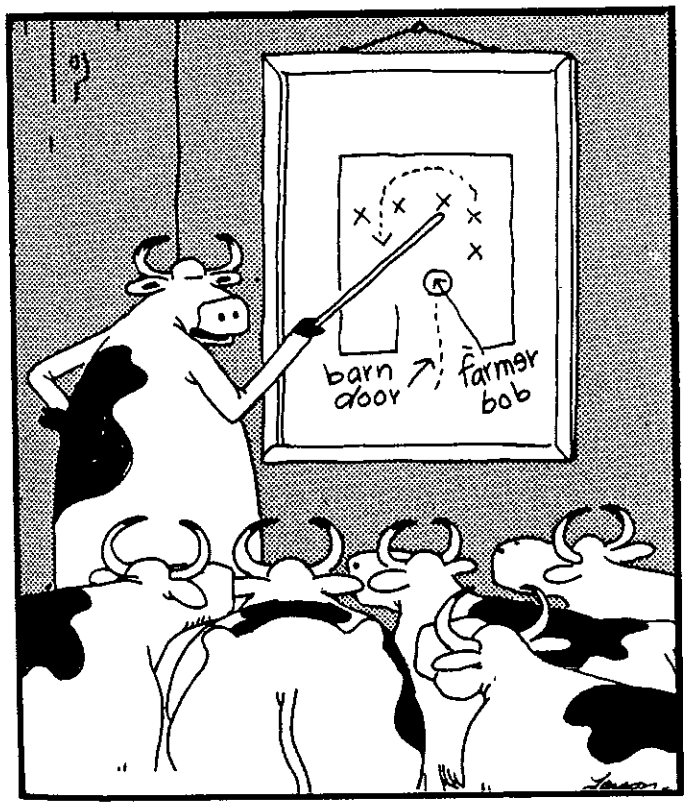
Solve an exponential equation:

⑨ $4^{3x-2} = 6^{2x+1}$

(round to 4 places)

Solve:

⑩ $\log_3 [\log_8 (\log_3 x)] = -1$




"So when Farmer Bob comes through the door, three of us circle around and ... Muriel! ... Are you chewing your cud while I'm talking?"

## Common Logarithms of Numbers

| n | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 0000 | 0043 | 0086 | 0128 | 0170 | 0212 | 0253 | 0294 | 0334 | 0374 |
| 11 | 0414 | 0453 | 0492 | 0531 | 0569 | 0607 | 0645 | 0682 | 0719 | 0755 |
| 12 | 0792 | 0828 | 0864 | 0899 | 0934 | 0969 | 1004 | 1038 | 1072 | 1106 |
| 13 | 1139 | 1173 | 1206 | 1239 | 1271 | 1303 | 1335 | 1367 | 1399 | 1430 |
| 14 | 1461 | 1492 | 1523 | 1553 | 1584 | 1614 | 1644 | 1673 | 1703 | 1732 |
| 15 | 1761 | 1790 | 1818 | 1847 | 1875 | 1903 | 1931 | 1959 | 1987 | 2014 |
| 16 | 2041 | 2068 | 2095 | 2122 | 2148 | 2175 | 2201 | 2227 | 2253 | 2279 |
| 17 | 2304 | 2330 | 2355 | 2380 | 2405 | 2430 | 2455 | 2480 | 2504 | 2529 |
| 18 | 2553 | 2577 | 2601 | 2625 | 2648 | 2672 | 2695 | 2718 | 2742 | 2765 |
| 19 | 2788 | 2810 | 2833 | 2856 | 2878 | 2900 | 2923 | 2945 | 2967 | 2989 |
| 20 | 3010 | 3032 | 3054 | 3075 | 3096 | 3118 | 3139 | 3160 | 3181 | 3201 |
| 21 | 3222 | 3243 | 3263 | 3284 | 3304 | 3324 | 3345 | 3365 | 3385 | 3404 |
| 22 | 3424 | 3444 | 3464 | 3483 | 3502 | 3522 | 3541 | 3560 | 3579 | 3598 |
| 23 | 3617 | 3636 | 3655 | 3674 | 3692 | 3711 | 3729 | 3747 | 3766 | 3784 |
| 24 | 3802 | 3820 | 3838 | 3856 | 3874 | 3892 | 3909 | 3927 | 3945 | 3962 |
| 25 | 3979 | 3997 | 4014 | 4031 | 4048 | 4065 | 4082 | 4099 | 4116 | 4133 |
| 26 | 4150 | 4166 | 4183 | 4200 | 4216 | 4232 | 4249 | 4265 | 4281 | 4298 |
| 27 | 4314 | 4330 | 4346 | 4362 | 4378 | 4393 | 4409 | 4425 | 4440 | 4456 |
| 28 | 4472 | 4487 | 4502 | 4518 | 4533 | 4548 | 4564 | 4579 | 4594 | 4609 |
| 29 | 4624 | 4639 | 4654 | 4669 | 4683 | 4698 | 4713 | 4728 | 4742 | 4757 |
| 30 | 4771 | 4786 | 4800 | 4814 | 4829 | 4843 | 4857 | 4871 | 4886 | 4900 |
| 31 | 4914 | 4928 | 4942 | 4955 | 4969 | 4983 | 4997 | 5011 | 5024 | 5038 |
| 32 | 5051 | 5065 | 5079 | 5092 | 5105 | 5119 | 5132 | 5145 | 5159 | 5172 |
| 33 | 5185 | 5198 | 5211 | 5224 | 5237 | 5250 | 5263 | 5276 | 5289 | 5302 |
| 34 | 5315 | 5328 | 5340 | 5353 | 5366 | 5378 | 5391 | 5403 | 5416 | 5428 |
| 35 | 5441 | 5453 | 5465 | 5478 | 5490 | 5502 | 5514 | 5527 | 5539 | 5551 |
| 36 | 5563 | 5575 | 5587 | 5599 | 5611 | 5623 | 5635 | 5647 | 5658 | 5670 |
| 37 | 5682 | 5694 | 5705 | 5717 | 5729 | 5740 | 5752 | 5763 | 5775 | 5786 |
| 38 | 5798 | 5809 | 5821 | 5832 | 5843 | 5855 | 5866 | 5877 | 5888 | 5899 |
| 39 | 5911 | 5922 | 5933 | 5944 | 5955 | 5966 | 5977 | 5988 | 5999 | 6010 |
| 40 | 6021 | 6031 | 6042 | 6053 | 6064 | 6075 | 6085 | 6096 | 6107 | 6117 |
| 41 | 6128 | 6138 | 6149 | 6160 | 6170 | 6180 | 6191 | 6201 | 6212 | 6222 |
| 42 | 6232 | 6243 | 6253 | 6263 | 6274 | 6284 | 6294 | 6304 | 6314 | 6325 |
| 43 | 6335 | 6345 | 6355 | 6365 | 6375 | 6385 | 6395 | 6405 | 6415 | 6425 |
| 44 | 6435 | 6444 | 6454 | 6464 | 6474 | 6484 | 6493 | 6503 | 6513 | 6522 |
| 45 | 6532 | 6542 | 6551 | 6561 | 6571 | 6580 | 6590 | 6599 | 6609 | 6618 |
| 46 | 6628 | 6637 | 6646 | 6656 | 6665 | 6675 | 6684 | 6693 | 6702 | 6712 |
| 47 | 6721 | 6730 | 6739 | 6749 | 6758 | 6767 | 6776 | 6785 | 6794 | 6803 |
| 48 | 6812 | 6821 | 6830 | 6839 | 6848 | 6857 | 6866 | 6875 | 6884 | 6893 |
| 49 | 6902 | 6911 | 6920 | 6928 | 6937 | 6946 | 6955 | 6964 | 6972 | 6981 |
| 50 | 6990 | 6998 | 7007 | 7016 | 7024 | 7033 | 7042 | 7050 | 7059 | 7067 |
| 51 | 7076 | 7084 | 7093 | 7101 | 7110 | 7118 | 7126 | 7135 | 7143 | 7152 |
| 52 | 7160 | 7168 | 7177 | 7185 | 7193 | 7202 | 7210 | 7218 | 7226 | 7235 |
| 53 | 7243 | 7251 | 7259 | 7267 | 7275 | 7284 | 7292 | 7300 | 7308 | 7316 |
| 54 | 7324 | 7332 | 7340 | 7348 | 7356 | 7364 | 7372 | 7380 | 7388 | 7396 |

## Common Logarithms of Numbers

| n | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 55 | 7404 | 7412 | 7419 | 7427 | 7435 | 7443 | 7451 | 7459 | 7466 | 7474 |
| 56 | 7482 | 7490 | 7497 | 7505 | 7513 | 7520 | 7528 | 7536 | 7543 | 7551 |
| 57 | 7559 | 7566 | 7574 | 7582 | 7589 | 7597 | 7604 | 7612 | 7619 | 7627 |
| 58 | 7634 | 7642 | 7649 | 7657 | 7664 | 7672 | 7679 | 7686 | 7694 | 7701 |
| 59 | 7709 | 7716 | 7723 | 7731 | 7738 | 7745 | 7752 | 7760 | 7767 | 7774 |
| 60 | 7782 | 7789 | 7796 | 7803 | 7810 | 7818 | 7825 | 7832 | 7839 | 7846 |
| 61 | 7853 | 7860 | 7868 | 7875 | 7882 | 7889 | 7896 | 7903 | 7910 | 7917 |
| 62 | 7924 | 7931 | 7938 | 7945 | 7952 | 7959 | 7966 | 7973 | 7980 | 7987 |
| 63 | 7993 | 8000 | 8007 | 8014 | 8021 | 8028 | 8035 | 8041 | 8048 | 8055 |
| 64 | 8062 | 8069 | 8075 | 8082 | 8089 | 8096 | 8102 | 8109 | 8116 | 8122 |
| 65 | 8129 | 8136 | 8142 | 8149 | 8156 | 8162 | 8169 | 8176 | 8182 | 8189 |
| 66 | 8195 | 8202 | 8209 | 8215 | 8222 | 8228 | 8235 | 8241 | 8248 | 8254 |
| 67 | 8261 | 8267 | 8274 | 8280 | 8287 | 8293 | 8299 | 8306 | 8312 | 8319 |
| 68 | 8325 | 8331 | 8338 | 8344 | 8351 | 8357 | 8363 | 8370 | 8376 | 8382 |
| 69 | 8388 | 8395 | 8401 | 8407 | 8414 | 8420 | 8426 | 8432 | 8439 | 8445 |
| 70 | 8451 | 8457 | 8463 | 8470 | 8476 | 8482 | 8488 | 8494 | 8500 | 8506 |
| 71 | 8513 | 8519 | 8525 | 8531 | 8537 | 8543 | 8549 | 8555 | 8561 | 8567 |
| 72 | 8573 | 8579 | 8585 | 8591 | 8597 | 8603 | 8609 | 8615 | 8621 | 8627 |
| 73 | 8633 | 8639 | 8645 | 8651 | 8657 | 8663 | 8669 | 8675 | 8681 | 8686 |
| 74 | 8692 | 8698 | 8704 | 8710 | 8716 | 8722 | 8727 | 8733 | 8739 | 8745 |
| 75 | 8751 | 8756 | 8762 | 8768 | 8774 | 8779 | 8785 | 8791 | 8797 | 8802 |
| 76 | 8808 | 8814 | 8820 | 8825 | 8831 | 8837 | 8842 | 8848 | 8854 | 8859 |
| 77 | 8865 | 8871 | 8876 | 8882 | 8887 | 8893 | 8899 | 8904 | 8910 | 8915 |
| 78 | 8921 | 8927 | 8932 | 8938 | 8943 | 8949 | 8954 | 8960 | 8965 | 8971 |
| 79 | 8976 | 8982 | 8987 | 8993 | 8998 | 9004 | 9009 | 9015 | 9020 | 9025 |
| 80 | 9031 | 9036 | 9042 | 9047 | 9053 | 9058 | 9063 | 9069 | 9074 | 9079 |
| 81 | 9085 | 9090 | 9096 | 9101 | 9106 | 9112 | 9117 | 9122 | 9128 | 9133 |
| 82 | 9138 | 9143 | 9149 | 9154 | 9159 | 9165 | 9170 | 9175 | 9180 | 9186 |
| 83 | 9191 | 9196 | 9201 | 9206 | 9212 | 9217 | 9222 | 9227 | 9232 | 9238 |
| 84 | 9243 | 9248 | 9253 | 9258 | 9263 | 9269 | 9274 | 9279 | 9284 | 9289 |
| 85 | 9294 | 9299 | 9304 | 9309 | 9315 | 9320 | 9325 | 9330 | 9335 | 9340 |
| 86 | 9345 | 9350 | 9355 | 9360 | 9365 | 9370 | 9375 | 9380 | 9385 | 9390 |
| 87 | 9395 | 9400 | 9405 | 9410 | 9415 | 9420 | 9425 | 9430 | 9435 | 9440 |
| 88 | 9445 | 9450 | 9455 | 9460 | 9465 | 9469 | 9474 | 9479 | 9484 | 9489 |
| 89 | 9494 | 9499 | 9504 | 9509 | 9513 | 9518 | 9523 | 9528 | 9533 | 9538 |
| 90 | 9542 | 9547 | 9552 | 9557 | 9562 | 9566 | 9571 | 9576 | 9581 | 9586 |
| 91 | 9590 | 9595 | 9600 | 9605 | 9609 | 9614 | 9619 | 9624 | 9628 | 9633 |
| 92 | 9638 | 9643 | 9647 | 9652 | 9657 | 9661 | 9666 | 9671 | 9675 | 9680 |
| 93 | 9685 | 9689 | 9694 | 9699 | 9703 | 9708 | 9713 | 9717 | 9722 | 9727 |
| 94 | 9731 | 9736 | 9741 | 9745 | 9750 | 9754 | 9759 | 9763 | 9768 | 9773 |
| 95 | 9777 | 9782 | 9786 | 9791 | 9795 | 9800 | 9805 | 9809 | 9814 | 9818 |
| 96 | 9823 | 9827 | 9832 | 9836 | 9841 | 9845 | 9850 | 9854 | 9859 | 9863 |
| 97 | 9868 | 9872 | 9877 | 9881 | 9886 | 9890 | 9894 | 9899 | 9903 | 9908 |
| 98 | 9912 | 9917 | 9921 | 9926 | 9930 | 9934 | 9939 | 9943 | 9948 | 9952 |
| 99 | 9956 | 9961 | 9965 | 9969 | 9974 | 9978 | 9983 | 9987 | 9991 | 9996 |

# *Conics*

## UNIT 22 DEMONSTRATION

Put the equation in vertex form:

① $y^2 - 8y - 8x + 56 = 0$

Determine:

a) vertex
b) opening
c) axis of symmetry
d) length of latus
e) directrix
f) focus
g) draw the graph

② $x^2 + y^2 + 6x - 4y - 7 = 0$

Determine:

a) center
b) radius
c) draw the graph

③ $16x^2 + 9y^2 - 96x - 72y + 144 = 0$

Determine:

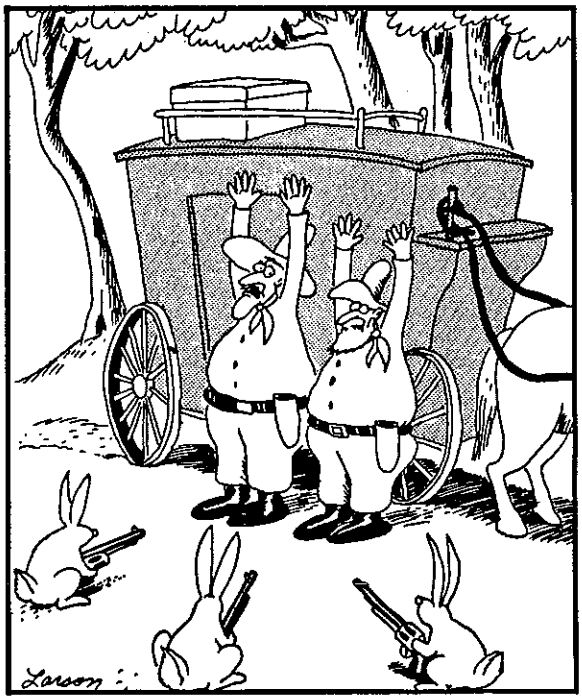
a) center
b) length of major axis
c) length of minor axis
d) foci
e) draw the graph

④ $3y^2 - x^2 - 6y - 10x - 34 = 0$

Determine:

a) center
b) length of transverse axis
c) length of conjugate axis
d) foci
e) asymptote slopes
f) equations of asymptotes
g) draw the graph

The review exercises will include additional related types of conics problems.




"This ain't gonna look good on our report, Leroy."

# *Conics*

## UNIT 22 REVIEW

Put each equation in vertex form and determine the indicated measures:

① $x^2+6x+6y+3=0$

a) vertex
b) opening
c) axis of symmetry
d) length of latus
e) directrix
f) focus
g) draw the graph

② $x^2+y^2-10x-2y+8=0$

a) center
b) radius
c) draw the graph

③ $4x^2+25y^2-16x+350y+1141=0$

a) center
b) length of major axis
c) length of minor axis
d) foci
e) draw the graph

④ $4x^2-9y^2+24x+108y-324=0$

a) center
b) length of transverse axis
c) length of conjugate axis
d) foci
e) asymptote slopes
f) equations of asymptotes
g) draw the graph


"Remember, milk, eggs, loaf of bread ... and pick up one of those No-Penguin-Strips."

Determine the equation:

⑤ Parabola with focus (1,5) and directrix $x=3$

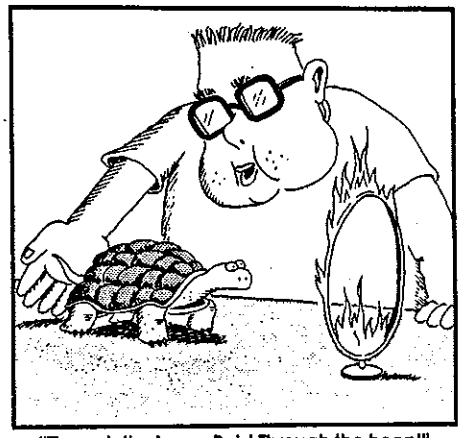
⑥ Ellipse with foci (3,1) and (3,9) and a minor axis of length 6

# *Conics*

## UNIT 22 REVIEW

⑦ Circle with a center at (4, 3) passing through (6,8)

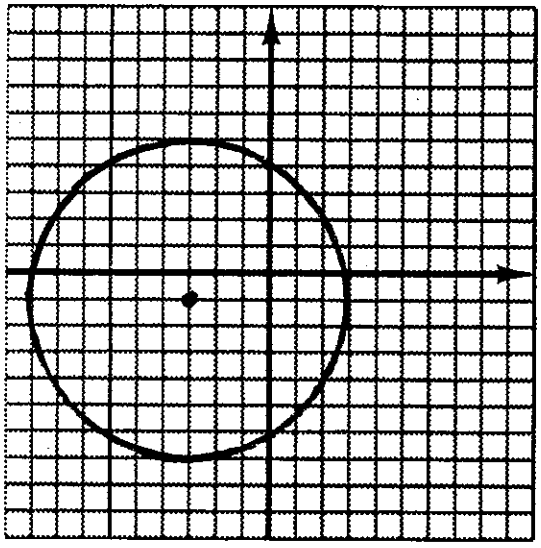
⑧ Hyperbola with foci at $(6, -2 \pm \sqrt{34})$ and a transverse axis of length 6



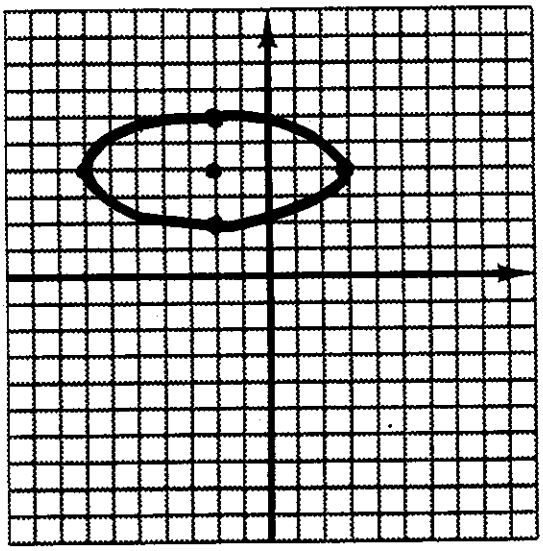
"Through the hoop, Bob! Through the hoop!"

Determine the equation for each graph:

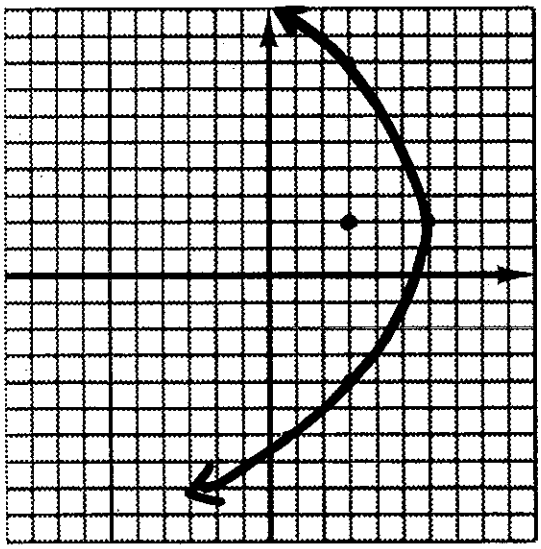
⑨



⑪



⑩



⑫