

1. Probability

December 2000

1. Mark has 3 quarters, 2 dimes and a nickel. He gives Paul 2 coins chosen at random. Find the probability that Mark gives Paul more than 30 cents. Express as a fraction in simplest form.

Ans. _____

2. All possible 3-digit numbers with distinct digits are made from the numbers 1 through 7. What is the probability, if one is chosen at random, that it is less than 400? Express your answer as a fraction in simplest form.

Ans. _____

3. 4 urns contain the marbles shown. If an urn is chosen at random and a marble is chosen at random, what is the probability that the marble is green? Express your answer as a fraction in simplest form.

Ans. _____

1. Probability

December 2001

1. When two dice are tossed, what is the probability that the sum is 10? Assume these are regular 6-sided dice. Give your answer as an exact fraction in simplest form.

Ans. _____

2. Twenty-one balls are in an urn. Four are blue, eight are red, and the rest are yellow. If two balls are removed from the urn at random without replacement, what is the probability that both balls are the same color? Give answer as a fraction simplified to lowest terms.

Ans. _____

3. In a certain country of 500,000 families, each family is expected to continue to have children until it has a girl then stop. Assume that the probability of having a boy is equal to that of having a girl, which is 50%. Assume that fertility is not a problem and no multiple births occur. How many families are expected to have at least five children?

Ans. _____

1. Probability

December 2002

1. Find the difference between the probability of randomly selecting a heart from a deck of 52 cards, and randomly selecting a face card from a deck of 52 cards. Express the answer as a fraction in lowest terms. (Face cards include jacks, queens, and kings only).

Ans. _____

2. A fair coin is tossed six times. The outcomes are recorded. What is the probability that the number of heads recorded was not the same as the number of tails recorded? Express your answer as a fraction in lowest terms.

Ans. _____

3. A monkey is given a box, which contains 3 of each kind of the following figures: 3 squares, 3 triangles, and 3 circles. The monkey picks all nine figures out of the box, one at a time. What is the probability that the monkey picks them out by kinds? That is, all of one kind, then all of another kind and then finally all of the third kind. The kinds can be selected in any order.

Ans. _____

1. Probability

December 2003

1. In room 106 there are 15 freshmen, composed of 5 girls and 10 boys. In room 108 there are 19 freshmen, composed of 12 girls and 7 boys. If a boy is chosen at random from this group of freshmen, what is the probability that he came from room 108?

Ans. _____

2. On average, Mark flunks 25% of his Spanish quizzes. Find the probability Mark will flunk at least one of his next three Spanish quizzes. Express your answer as a fraction in simplest form.

Ans. _____

3. Mudville High is playing Sludgetown in a best of 5 series. The first team to win 3 games wins the series. The probability Sludgetown will win any one of the games is $\frac{3}{5}$. However, Mudville wins the first game. Calculate the probability that Mudville will win the series from this point?

Ans. _____

1. Probability

December 2004

1. The Family Dollar Store has 5 goblin, 4 witch, and 6 Batman costumes left. If each of the 15 costumes has an equal chance of selling, what is the probability that the next costume will be a goblin or a Batman costume? Express in simplest form.

Ans. _____

2. From an ordinary deck of 52 playing cards, John is dealt three cards. What is the probability that the 3 cards that John has are all from the same suit? Express in simplest form.

Ans. _____

3. From a set of 3 red, 4 white, and 5 blue balls, four are selected at random. Find the probability that of those chosen, none are red or none are white. Express in simplest form.

Ans. _____

1. Probability

December 2005 (No Calculator)

1. A faculty council contains 8 members, two of which are men. If two members are selected at random from the faculty council to fill vacancies on the technology committee, what is the probability that both men will be selected? Leave your answer as a fraction in lowest terms.

Ans. _____

2. A five-digit number uses each of the digits 1, 2, 3, 4, and 5 exactly once. What is the probability that the number is a multiple of 4? Express your answer as a fraction in lowest terms.

Ans. _____

3. If two marbles are removed at random from a bag containing only black and white marbles (without replacement), the chances that they are both white is $\frac{1}{3}$. If three marbles are removed randomly (without replacement), the chances all three are white is $\frac{1}{6}$. What is the least number of white marbles in the bag?

Ans. _____

1. Probability

December 2006 (No Calculator)

1. 3 black socks, 4 white socks and 5 green socks are in a drawer. What is the probability that if a person draws two socks at random, both will be the same color? Express answer in simplest form.

Ans. _____

2. Sam's probability of hitting a target is $\frac{3}{4}$. Chris's probability of hitting the same target is $\frac{2}{3}$. Chris and Sam shoot alternately at the target, Chris shooting first. If each shoots two times, find the probability that the target is hit exactly 3 times. Express in simplest form.

Ans. _____

3. There are 8 white and 5 brown mice in a lab. 5 are chosen at random to be used in an experiment. Find the probability that more white mice than brown mice are used. Express answer in simplest form.

Ans. _____

1. Probability

December 2007 (No Calculator)

1. Byron has 2 nickels, 3 dimes and a quarter in his pocket. He draws out two coins. What is the probability that he has at least 20 cents in his hand?

Ans. _____

2. In an ultimate game, the first to score 15 goals wins. If one team leads another team 13 to 11, and if each team has an equal likelihood of scoring each goal, find the probability the team with 13 goals will win the game. Express answer in simplest form.

Ans. _____

3. A basket contains N marbles, including R red marbles and B blue marbles, so that $R + B = N$. The probability that two marbles randomly selected without replacement from the basket will be the same color is exactly $\frac{1}{2}$. Find $|R - B|$ in terms of N .

Ans. _____

1. Probability

December 2008 (No Calculator)

1. Matt has a penny, a nickel, a dime, and a quarter in his hand. He accidentally drops 2 of the coins. What is the probability that Matt still has a quarter left in his hand? Express your answer in simplest form.

Ans. _____

2. Dawna has 5 blue, 3 red and 2 lavender hair pieces. Shawna borrows 5 of them at random from Dawna. What is the probability that she get 2 blue pieces, 2 red pieces and 1 lavender piece? Express your answer in simplest form.

Ans. _____

3. All 52 cards of a standard card deck are dealt, 13 to each of four players. 10 of the hearts are in either the north or south hands. What is the probability all three of the remaining hearts are in just one of the other two hands? Express your answer in simplest form.

Ans. _____

1. Probability

December 2009 (No Calculator)

1. A six-sided die has been altered so that the side that had been a single dot is now a blank zero-valued face. Another die has been altered to show a zero-valued face instead of the face with four dots. What is the probability that a sum of 7 is rolled when the two dice are thrown?

Ans. _____

2. Megan is throwing a die and wants to get all six different outcomes. What is the probability, expressed as a fraction in lowest term, that she succeeds in her first six rolls?

Ans. _____

3. Bob and Betty are playing a game in which either player is equally likely to win any given point. Bob currently has four points and Betty has three points. If the object of the game is the first to get 7 points wins, what is the probability that Bob wins the game?

Ans. _____

2. Exponents and Radicals

December 2000

1. Find P if $5^P = \frac{5^{2000} \cdot 25^{2001}}{125^{1999}}$

Ans. _____

2. Solve for x : $\left(\frac{1}{27}\right)^{x^2-x} = \left(\frac{1}{9}\right)^9$

Ans. _____

3. Solve for x , if $x = \sqrt{1 + \sqrt{1 + \sqrt{1 + \dots}}}$. Give exact answer.

Ans. _____

2. Exponents and Radicals

December 2001

1. If $5^2 \cdot 2^{10}$ was multiplied out to produce a whole number, how many digits are in the whole number?

Ans. _____

2. Solve $\sqrt{x-3} = \sqrt{2} - \sqrt{x}$, where x is a real number.

Ans. _____

3. Find all real values of x for which $(x^2 - 5x + 5)^{x^2 - 9x + 20} = 1$

Ans. _____

2. Exponents and Radicals**December 2002**

1. Find n in simplest form, if $n = \sqrt[3]{81} \cdot \sqrt[4]{81}$

Ans. _____

2. Find the smallest possible sum of $n + x + y$, if each is a natural number and

$$\sqrt[3]{a^2b} \cdot \sqrt[4]{ab^2} = \sqrt[n]{a^x b^y}$$

Ans. _____

3. Find all x , such that $x - 36 = 5\sqrt{x}$

Ans. _____**2. Exponents and Radicals****December 2003**

1. Find the value of $\frac{\sqrt{9!}\sqrt{8!}}{7!}$. Note: $x! = 1 \cdot 2 \cdot 3 \cdot 4 \cdot \dots \cdot x$, where x is a natural number.

Ans. _____

2. If $2^4 - 2^3 + 2^2 - 2^1 + 2^0 - 2^{-1} + 2^{-2} - 2^{-3} + 2^{-4} = 11 - x$, find x .

Ans. _____

3. Let $P = \frac{1}{3 - \sqrt{8}} - \frac{1}{2\sqrt{2} - \sqrt{7}} + \frac{1}{\sqrt{7} - \sqrt{6}} - \frac{1}{\sqrt{6} - \sqrt{5}} + \frac{1}{\sqrt{5} - 2}$. Express P in simplest possible form.

Ans. _____

2. Exponents and Radicals

December 2004

1. If $(a \cdot a^3)^6 = (a^2 \cdot a^4)^k$, find k.

Ans. _____

2. Express the following as a single radical in simplest form: $\frac{\sqrt[3]{9}\sqrt{4}}{\sqrt[6]{27}}$

Ans. _____

3. Find all real values of x such that: $\sqrt{5x+4} - \sqrt{3x-11} = \sqrt{2x-9}$

Ans. _____

2. Exponents and Radicals

December 2005 (No Calculators)

1. Simplify the following. Leave your answer in simplest radical form. $6\sqrt{\frac{1}{3}} - \frac{9}{\sqrt{3}}$

Ans. _____

2. Solve the following for x : $\sqrt{2x-1} = x-2$

Ans. _____

3. Find all integral solutions for x such that: $(x^2 - x - 1)^{x+2} = 1$

Ans. _____

2. Exponents and Radicals

December 2006 (No Calculators)

1. Solve the following for x : $\sqrt{x^2 - 3x + 12} = 4$

Ans. _____

2. Find all the rational values of x so that $64^{5x^2-4x-4} = 4^{2x^3+3x^2-2x}$

Ans. _____

3. What is the value of $\sqrt{17-12\sqrt{2}} + \sqrt{17+12\sqrt{2}}$?

Ans. _____

2. Exponents and Radicals

December 2007 (No Calculators)

1. Find $\left(\frac{144}{225}\right)^{-\frac{1}{2}}$. Express in simplest form.

Ans. _____

2. Find the value of $\sqrt{5-2\sqrt{6}}$ in the form $\sqrt{A} - \sqrt{B}$, where A and B are both integers.

Ans. _____

3. Solve for x if, $\sqrt{3x + \sqrt{2-2x}} = \sqrt{1-x}$.

Ans. _____

2. Exponents and Radicals

December 2008 (No Calculators)

1. Simplify $\sqrt{39^2 + 52^2}$

Ans. _____

2. Express the following in simplest form: $64^{5/6} \cdot 81^{1/4} \cdot 125^{2/3}$

Ans. _____

3. Find all values of x such that: $3^{2x+2} - 3^{x+3} - 3^x + 3 = 0$

Ans. _____

2. Exponents and Radicals

December 2009 (No Calculators)

1. Solve the following for x: $\sqrt[3]{432} = x\sqrt{2}$

Ans. _____

2. Simplify: $\left(\frac{3^0 \cdot 2^{-2} \cdot 5^3}{3 \cdot 5 \cdot 12}\right)^{1/2}$

Ans. _____

3. Express the following in simplest form: $\frac{1 + \sqrt[4]{2}}{1 - \sqrt[4]{2}}$

Ans. _____

3. Lines, Angles, and Polygons

December 2000

1. The measures of the angles of a pentagon are in the ratio of 7:8:9:10:11. Find the sum of the smallest and largest angles of the polygon.

Ans. _____

2. A polygon has ten times as many diagonals as it has sides. How many sides does it have? The polygon has more than three sides.

Ans. _____

3. The diagonals of regular hexagon $ABCDE$ form another regular hexagon $MNOPQR$. The diagonals of this hexagon form another regular hexagon $STUVWX$. If the perimeter of $ABCDE$ is 72, find the perimeter of $STUVWX$.

Ans. _____

3. Lines, Angles, and Polygons

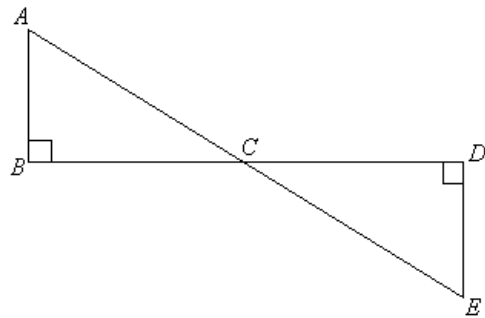
December 2001

1. On hypotenuse AB of right triangle ABC , D is the point for which $CB = BD$. If the measure of angle $ABC = 40^\circ$, find the measure of angle ACD .

Ans. _____

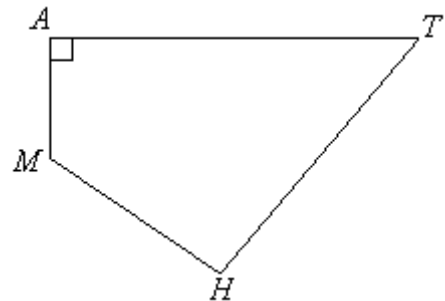
2. In the diagram, $BD = 6$ km, $AB = 3$ km, and $DE = 5$ km. What is the number of kilometers in AE ?

Ans. _____



3. Quadrilateral $MATH$ contains right angles at vertices A and H . If $m\angle AMH = 120^\circ$, $MA = 10$, and $MH = 40$, find TH . Give exact answer.

Ans. _____



3. Lines, Angles, and Polygons

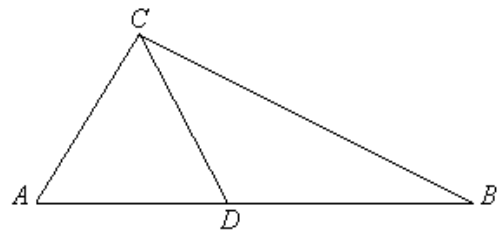
December 2002

1. A regular polygon has 20 diagonals. Find the degree measure of one of its angles.

Ans. _____

2. In the figure, $AC = CD = BD$ and $m\angle BDC = 5m\angle ACD$. Find $m\angle ACB$.

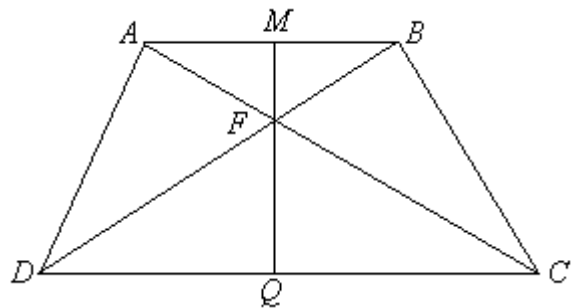
Ans. _____



3. $ABCD$ is a trapezoid.

$AB = BC = AD = \frac{1}{2}DC$, $\overline{MQ} \perp \overline{DC}$ and \overline{AC} , \overline{BD} , and \overline{MQ} meet at F . If $BD = 12$ units, find the measure of MQ .

Ans. _____



3. Lines, Angles, and Polygons

December 2003

1. Given:

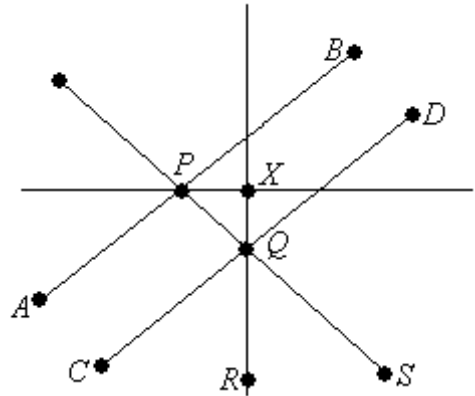
$$\overline{AB} \parallel \overline{CD}$$

$$\overline{PX} \text{ bisects } \angle BPQ$$

$$\overline{QX} \text{ bisects } \angle P Q D$$

$$m\angle RQS = 18^\circ$$

Find: $m\angle QPX$



Ans. _____

2. Four towns are shown at different locations on a map. It is 4 miles from town A to town B, four miles from town A to town C, 4 miles from town B to town C, 4 miles from town B to town D, and 4 miles from town C to town D. Find the exact distance from town A to town D.

Ans. _____

3. The degree measure of each angle of a regular octagon is the same as the number of diagonals in a regular n-gon. Find the sum of all the angles of the n-gon.

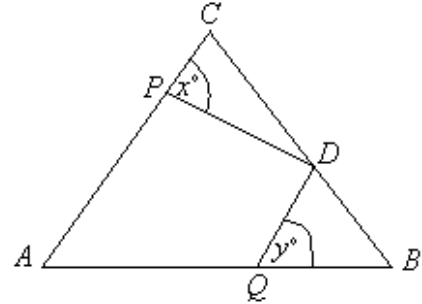
Ans. _____

3. *Lines, Angles, and Polygons*

December 2004

1. Triangle ABC is equilateral. $m\angle PDQ = 90^\circ$. Find the sum of x and y .

Ans. _____

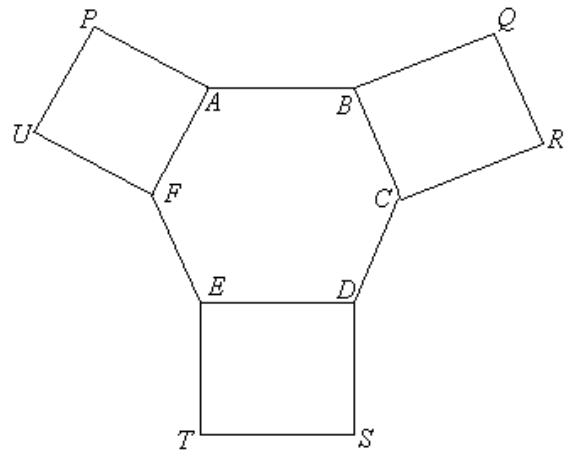


2. Squares are attached to the nonconsecutive sides of the regular hexagon as shown in the figure. The figure begins to form 3 more regular polygons at vertices $P, A, B, Q; R, C, D, S;$ and T, E, F, U . If $AB = 6$, find the sum of the perimeters of all the regular polygons including the 3 to be formed.

Ans. _____

3. Use the figure and information from number 2. Find the perimeter of the hexagon $PQRSTU$. Express in simplest form.

Ans. _____



3. Lines, Angles, and Polygons

December 2005 (No Calculators)

1. The side lengths of a triangle are 4 cm, 6 cm, and 9 cm. One of the side lengths of a similar triangle is 36 cm. What is the maximum number of centimeters possible in the perimeter of the second triangle?

Ans. _____

2. A regular convex polygon has 90 diagonals. Find the measure of each of its angles.

Ans. _____

3. What is the length of the radius of a circle inscribed in a rhombus with diagonals of length 10 feet and 24 feet? Give your answer as a rational number in simplest form.

Ans. _____

3. Lines, Angles, and Polygons

December 2006 (No Calculators)

1. A regular n-gon has 27 diagonals. How many vertices does the n-gon have?

Ans. _____

2. Convex quadrilateral $ABCD$ exists such that $\overline{AC} \cap \overline{BD}$ at x . $\overline{AC} \perp \overline{BD}$, $AC = 10$, and $BX = DX = AX = 3$ units. Find the unit measure of the perimeter of $ABCD$. Express your answer in simplest radical form.

Ans. _____

3. Define a “kite” to be a convex quadrilateral with one diagonal being a perpendicular bisector of the other. The smallest and largest angles of a kite are 60° and 120° . The shortest side has length of $6\sqrt{6}$. Find the sum of the lengths of the diagonals of all the different kites that fit these specifications.

Ans. _____

3. Lines, Angles, and Polygons

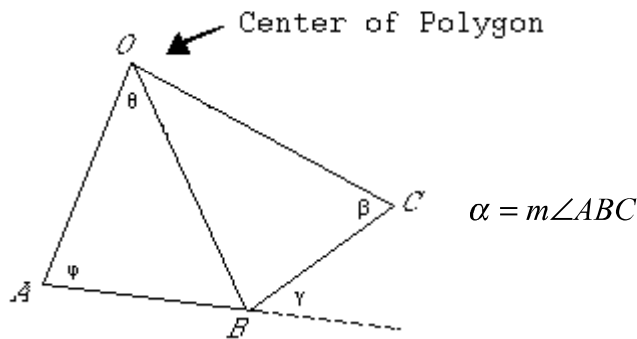
December 2007 (No Calculators)

1. A solid figure has 8 faces. Two of the faces are congruent regular hexagons in horizontal planes, and the other six are congruent rectangles in vertical planes. How many diagonals can be drawn between the vertices of the solid that pass through the interior of it?

Ans. _____

2. $A, B,$ and C are vertices of a regular polygon with N sides, part of which is shown in the drawing. Find the sum of angles $\theta, \phi, \alpha, \beta,$ and γ .

Ans. _____



3. Quadrilateral $ABCD$ has the property that all four vertices are equidistant from a point in the plane containing $ABCD$. If the measure of angle A is 70° , find the measure of angle C .

Ans. _____

3. *Lines, Angles, and Polygons*

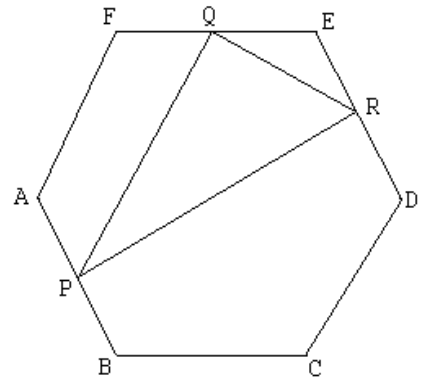
December 2008 (No Calculators)

1. Each of the angles of a regular n -gon is 12° less than 15 times its exterior angle. Find n .

Ans. _____

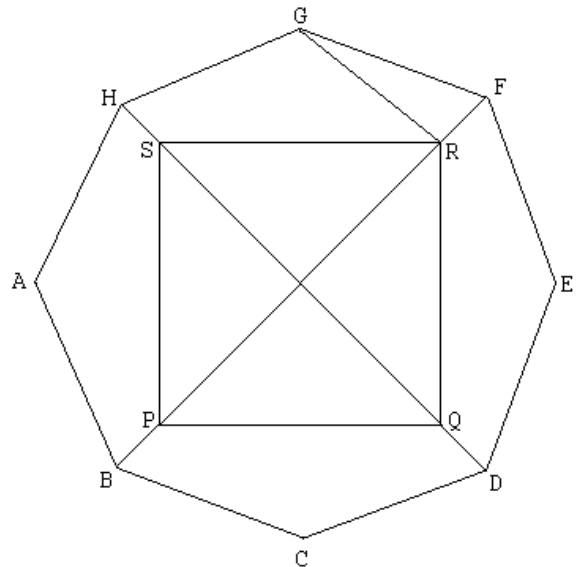
2. The perimeter of the regular hexagon at right is 108. P , Q , and R are midpoints of the sides shown. Find the perimeter of triangle PQR .

Ans. _____



3. The diagonals of the square $PQRS$ are extended in both directions 5 units to points B , D , F , and H . If the perimeter of $PQRS$ is 40, and the octagon formed is regular, find the length of line segment GR . Express in simplest form.

Ans. _____

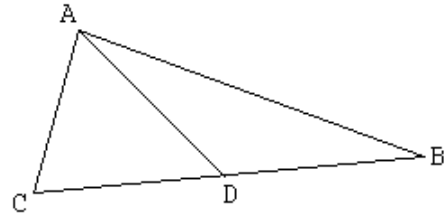


3. *Lines, Angles, and Polygons*

December 2009 (No Calculators)

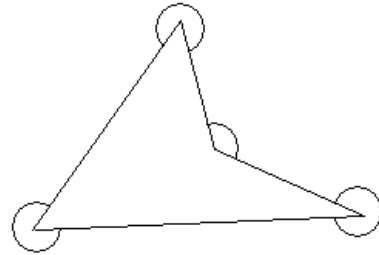
1. In the triangle below, $AB = CB$ and $\overline{AC} \cong \overline{AD} \cong \overline{BD}$. Determine the measure of angle ABC .

Ans. _____



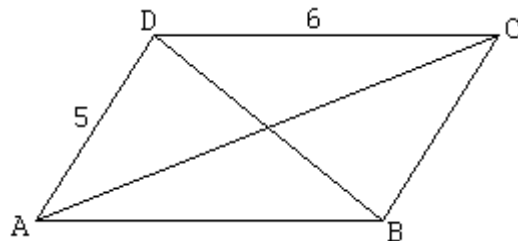
2. Let's define a new kind of exterior angle and call it the "outer angle". The quickest way to define the "outer angle" is visually. The "outer angles" are drawn freehand in the quadrilateral below. What is the sum of the "outer angles" of a convex or concave polygon of n sides?

Ans. _____



3. The lengths of the sides in the parallelogram $ABCD$ at right are 5 and 6, and $0^\circ < m\angle DAB < 90^\circ$. If diagonal $AC = w$ and diagonal $BD = z$, find the value of $w^2 + z^2$.

Ans. _____



4. Complex Numbers**December 2000**

1. Express the following fraction as a complex number in simplest $a + bi$ form.

$$\frac{(2 + 3i)(2 - 3i)}{5 + 12i}$$

Ans. _____

2. Find the ordered pair (x, y) for which $(15 + 9i)x + (4i - 7)y = 39 + 48i$

Ans. _____

3. Find all ordered pairs (x, y) which are solutions of the system of equations: $\begin{cases} xy = -6 \\ x - y = 2 \end{cases}$

Ans. _____**4. Complex Numbers****December 2001**

1. Express $(2 + i)(3 + i)(2 + i)(3 + i)$ as a complex number in $a + bi$ form. Then find the sum of $a + b$.

Ans. _____

2. One root of the equation $4x^2 + kx + 13 = 0$ is $\frac{2 + 3i}{2}$, find k .

Ans. _____

3. If $1 + i$ is a root of $x^4 - 2x^3 + 7x^2 - 10x + 10 = 0$, find the other root(s).

Ans. _____

4. Complex Numbers

December 2002

1. If $x = 3 - 2i$ and $y = 2 - 3i$, find the complex number $\frac{x}{y}$ in $a + bi$ form, where a and b are real numbers. Express in simplest form.

Ans. _____

2. If $n = (3 + 3i)^4$, find the complex number n in simplest $a + bi$ form.

Ans. _____

3. The equation $x^4 - 10x^3 + 42x^2 - 82x + 65 = 0$ has 4 complex roots. If one of these is $2 + i$, what are the other three?

Ans. _____

4. Complex Numbers

December 2003

1. Find the product of $4 + 12i$ and $3 - 9i$.

Ans. _____

2. If the product of the two solutions of a quadratic polynomial is 4 and the sum of the solutions is -3, what is the difference of the two solutions? Express your answer without a negative sign.

Ans. _____

3. Define a number to be a *squareback* if its square equals its complex conjugate. That is, $z = a + bi$, where a and b are real numbers, is *squareback* if $z^2 = \bar{z}$. Determine how many *squareback* numbers exist in the complex plane.

Ans. _____

4. Complex Numbers

December 2004

1. Simplify completely: $(3 + 2i)(3 - 2i) - (2 - 3i)(2 + 3i)$

Ans. _____

2. Express $\frac{4 + 3i}{2 - i}$ as a complex number in simplest $a + bi$ form.

Ans. _____

3. P is a complex number in the form $a + bi$, where a and b are integers. If $P(P + 1) = -19 + 77i$, find P .

Ans. _____

4. Complex Numbers

December 2005 (No Calculators)

1. Express $\frac{-2 - 3i}{4 + 3i}$ as a complex number in $a + bi$ or $(a + bi)/c$ form.

Ans. _____

2. Find the polynomial equation $P(x) = 0$, with real coefficients and leading coefficient 1 (one) which has exactly three solutions, two of which are 2 and $-3i$. Express your answer in standard form.

Ans. _____

3. Given that $-i$ is a root of the equation $iz^3 - 2z^2 - 1 = 0$, find the other roots.

Ans. _____

4. Complex Numbers

December 2006 (No Calculators)

1. If $(2 + 3i)D = 3 - i$, find D in the form of $a + bi$, where a and b are rational numbers in simplest form.

Ans. _____

2. $x = 2 - 3i$ and $y = 1 - 2i$. Find $|xy|$ in simplest radical form.

Ans. _____

3. Expand $(1 + i)^{18}$ and express in simplest form.

Ans. _____

4. Complex Numbers

December 2007 (No Calculators)

1. Express in simplest form: $(2i - 4i^2)(i^3 - 1)$.

Ans. _____

2. Find the value of $y - x$, if $(8 + 9i)x + (12i - 11)y = 96i - 23$.

Ans. _____

3. Find the least order polynomial equation in x with real coefficients and a real constant, and 1 as a leading coefficient that has both $1 - i$ and $-1 + i$ as roots.

Ans. _____

4. Complex Numbers

December 2008 (No Calculators)

1. Express the following in simplest $a + bi$ form, where $i^2 = -1$:

$$9i^2(i^2 + i) + (5i + 7)(2i + 3)$$

Ans. _____

2. Find the modulus of $\frac{4 + 3i}{(2 + i)(1 + 2i)}$

Ans. _____

3. One of the roots of $6x^4 - 31x^3 + 42x^2 + 101x - 78 = 0$ is $3 + 2i$. Find the other roots.

Ans. _____

4. Complex Numbers

December 2009 (No Calculators)

1. For what value(s) of k is $x - i$ a factor of $x^2 - 6x + k$?

Ans. _____

2. Solve over the set of complex numbers: $3z + iz + 4 - i = 2i$

Ans. _____

3. The square of a complex number $a + bi$, where a and b are real numbers and i is $\sqrt{-1}$, is $2i$. What complex number(s) satisfy this?

Ans. _____

5. *Arithmetic w/Percent*

December 2000

1. Find the single discount that is equivalent to successive discounts of 20%, 10%, and 15%.

Ans. _____

2. A family paid 52 cents/gallon for oil for 2 years ago. This year it looks like they'll be paying 91 cent/gallon. If the family paid \$1,640 for oil during 1998, at this rate of change, how much will they pay for oil in 2000?

Ans. _____

3. An alloy of brass and aluminum is 72% brass. How much brass should be melted with 60 grams of this alloy to make an alloy which is 80% brass?

Ans. _____

5. *Arithmetic w/Percent*

December 2001

1. John took a picture to a copy machine and had a copy made, not realizing that someone had left the machine set for a reduction to 80 percent of the original size. What percent setting will John have to use on the copy machine to obtain from his reduced copy a picture with the original dimensions?

Ans. _____

2. If A is 35% less than B and if C is 75% more than B , what percent of C is A ? Round your answer to the nearest hundredth of a percent.

Ans. _____

3. A pencil distributor divided a certain number of pencils equally into 100 boxes and had 50 pencils left over. He changed his mind and decided to divide the pencils equally into 110 boxes and had five fewer pencils in each box than he had before, and none were left over. How many pencils did he have?

Ans. _____

5. Arithmetic w/Percent

December 2002

1. $\frac{2}{3}$ is what percent of $\frac{1}{6}$?

Ans. _____

2. $212_{base\ 8}$ is what percent of $10220_{base\ 6}$? Write your answer as a percent in base 10.

Ans. _____

3. DollMart is selling a product at price A . Price A was reduced by 20%. Thus creating the new price B . Price B was then increased to price C . Price C represents a 10% reduction from price A . By what percent was price B increased to reach price C ?

Ans. _____

5. Arithmetic w/Percent

December 2003 (You may use a Calculator)

1. Suppose that you are told that the non-zero number A is $2A$ percent of B . What must the number B equal?

Ans. _____

2. Elmer kept a log of the high temperatures for all five days of a school week. The high Tuesday was 20% lower than the Monday high. Wednesday was 50% higher than Tuesday. Thursday was 25% lower than Wednesday. Friday was 25% higher than Thursday and 5 degrees warmer than Monday. What was the high on Wednesday in degrees?

Ans. _____

3. The interest rate in a certain bank is compounded annually. On Jan. 2, 1990 it was 6%. On Jan. 2, 1995 it changed to 5%. On Jan. 2, 2000 it changed to $1\frac{1}{2}\%$. If a person invested \$4000 on January 2, 1990 and did not take it out until Jan 2, 2004, what amount of money should he be able to receive on that date?

Ans. _____

5. *Arithmetic w/Percent*

December 2004 (You may use a Calculator)

1. If 8 is 4% of N , and 10 is 20% of M , what percent of M is N ?

Ans. _____

2. Find the LCM of 21, 25, and 27.

Ans. _____

3. How many pints of an antifreeze solution, which is 72% alcohol, should be mixed with 21 pints of an antifreeze solution 96% alcohol to make an antifreeze solution that will be 81% alcohol?

Ans. _____

5. *Arithmetic w/Percent*

December 2005 (You may use a Calculator)

1. How many girls would have to leave a room containing 98 girls and 2 boys, in order to reduce the percentage of girls in the room to 92%?

Ans. _____

2. Half a strip of cloth is red. A fifth is blue. Half of the remaining strip is green and the remaining 6 feet of the strip is yellow. How long is the strip?

Ans. _____

3. In Mr. Thompson's math class of thirty students, all took an exam on statistics. If the average passing grade was 84%, the average failing grade was 60%, and the overall average was 80%, how many students passed the exam?

Ans. _____

5. Arithmetic w/ Percent

December 2006 (You may use a Calculator)

1. On March 1, at Jefferson Elementary School:
- 40% of the students rode the bus
 - 60 students walked to school
 - 35% of the students rode with their parents to school
 - No one was absent
 - No other form of transportation to school was used on that day
- How many students attended Jefferson Elementary on March 1?

Ans. _____

2. A Going out of Business sale is held. Products will be reduced in price by 10% at the beginning of each day, based on the prices of the previous day. The store is open every day of the week. The first day of the sale is May 12th. Find the first date when the percent of the prices of items of May 11th will be more than 50% off?

Ans. _____

3. Unlucky Luke lost 75% of his money gambling. He then had \$500 stolen by a pickpocket. He now has 18.75% of what he had first. How much did he lose gambling?

Ans. _____

5. Arithmetic w/Percent

December 2007 (You may use a Calculator)

1. X is 75% of Y and 50% of $(Y + 10)$. What percent is $(Y - 5)$ of $(X + 10)$?

Ans. _____

2. Anca buys shares on the commodities market at 20 % margin, meaning she foots 20% of the purchase price and borrows the other 80%. The shares increase 40% in value and Anca sells, using part of the proceeds to satisfy her interest-free loan. By what percent does Anca profit on her investment?

Ans. _____

3. It takes Sam 3 hours and 18 minutes to mow the lawn, moving at an average speed of $\frac{3}{4}$ miles per hour and cutting a swath of grass on average 20 inches wide. How many acres are in the lawn? Hint: there are 640 acres in a square mile.

Ans. _____

5. *Arithmetic w/Percent*

December 2008 (You may use a Calculator)

1. The population of Mamalia increases by 10% every 10 years. In 1960 the population was 10,000 people. What will the population be in 2010?

Ans. _____

2. A merchant bought a complete bed set from a retail outlet store, when the store offered a 20% discount on all its stock. She then put the set on display at her own store, trying to make a 60% profit based on what she paid for it. However, she had to drop the ticketed price by 20% before she sold it for \$921.60. What was the outlet store's price on the set before the 20% sale that the merchant purchased it for?

Ans. _____

3. Find the unit's digit of the following sum after each is multiplied out:

$$27^{72} + 36^{63} + 59^{95} + 38^{83}$$

Ans. _____

5. *Arithmetic w/Percent*

December 2009 (You may use a Calculator)

1. Increasing x by y percent gives 12. Decreasing x by y percent gives 8. Find x .

Ans. _____

2. The Smiths press carrots by hand to make carrot juice. 25% of the juice is extracted from the first pressing. Each subsequent pressing extracts 25% of the remaining juice from the carrots. What is the least number of times that the carrots need to be pressed to extract at least $66\frac{2}{3}\%$ of the juice?

Ans. _____

3. Darren bought supplies for a pumpkin-carving contest, but the receipt went through the wash with his clothes. All that could be read was 72 pumpkins \$67.9. The first and last digits of the total cost were unreadable. Assuming that all pumpkins were the same price, what is the price of a single pumpkin, assuming no quantity discount and no tax was added.

Ans. _____