Question #1
What number is 10% greater than 90?

Question #2
What number is 5% less than 80?

Question #3
5 is 10% of a number. What is the number?

Question #4
Two numbers total to 42. The first number is 25% less than the second number. What are the two numbers?

Question #5
12 is 8% of a number. What is that number?

Question #6
John grew from 60 inches to 65 inches. By what percent did John's height increase?

Question #7
Three numbers total to 42. The second number is 40% more than the first. The third number is 80% more than the first. What are the three numbers?

Question #8
Three numbers total to 100. The second number is 25% more than the first. The third number is four times the first. What are the three numbers?

Question #9
Two numbers sum to 75. The first number is 50% more than the second number. What are the two numbers?

Question #10
Two numbers sum to 45. The first number is 20% less than the second number. What are the two numbers?

Question #11
What is A + B if…

$A = \begin{bmatrix} 1 & 7 \\ 4 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 9 \\ 1 & 6 \end{bmatrix}$

Question #12
Using the same matrices as in Question #11, what is A – B?

Question #13
Using the same matrices as in Question #11, what is B – A?

Question #14
What is A + B if…

$A = \begin{bmatrix} 1 & 7 & 3 \\ 4 & 9 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 9 \\ 1 & 6 \end{bmatrix}$

Question #15
Using the same matrices as in Question #14, what is A – B?

Question #16
What is A + B if…

$A = \begin{bmatrix} 5 & 7 & 8 \\ 3 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 9 & 3 & 7 \\ 8 & 1 & 2 \end{bmatrix}$

Question #17
Using the matrices in Question #16, what is A – B?

Question #18
Using the matrices in Question #16, what is B – A?

Question #19
What is the value of X, and what is the value of Y if…

$A = \begin{bmatrix} 3 & X & 2 \\ 4 & 1 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3X & 9 \\ 2X + 3Y & 5 & 1 \end{bmatrix}$ and $A + B = \begin{bmatrix} 7 & 28 & 11 \\ 24 & 6 & 8 \end{bmatrix}$

Question #20
What is A x B if…

$A = \begin{bmatrix} 1 & 4 & 2 \\ 7 & 3 & 6 \\ 9 & 8 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 7 & 3 \\ 1 & 4 & 2 \\ 5 & 1 & 6 \end{bmatrix}$ (Note: Sometimes A x B is written as A • B)

Question #21
Using the matrices in Question #20 what is B x A (Note: Sometimes B x A is written as B • A)?

Question #22
If a matrix is a 3 x 2 matrix, then how many rows does the matrix have? How many columns does the matrix have?

Question #23
If a matrix is a 1 x 3 matrix, then how many rows does the matrix have? How many columns does the matrix have?

Question #24
If a matrix is a 3 x 1 matrix, then how many rows does the matrix have? How many columns does the matrix have?

Question #25
What is D x E if…

$D = [1 \quad 4 \quad 3]$ and $E = \begin{bmatrix} 5 \\ 3 \\ 9 \end{bmatrix}$ (Note: Sometimes D x E is written as D • E)

Question #26
What is D x C if…

$D = [1 \quad 4 \quad 3]$ and $C = \begin{bmatrix} 2 & 4 \\ 3 & 7 \\ 1 & 5 \end{bmatrix}$ (Note: Sometimes D x C is written as D • C)

Question #27
If matrix R is a 20 x 15 matrix, and matrix M is a 15 x 30 matrix, then what will be the size (or dimension) of R x M?

Question #28
What is 3 x E if…

$E = \begin{bmatrix} 5 \\ 3 \\ 9 \end{bmatrix}$

Question #29
What is the value of a if…

$D = [1 \quad 4 \quad 3]$ and $A = \begin{bmatrix} 1 & 4 & 2 \\ 7 & 3 & 6 \\ 9 & 8 & 4 \end{bmatrix}$ and $D\ x\ A = [56 \quad 40 \quad 2a]$

Question #30
What is A x C if…

$A = \begin{bmatrix} 1 & 4 & 2 \\ 7 & 3 & 6 \\ 9 & 8 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 4 \\ 3 & 7 \\ 1 & 5 \end{bmatrix}$ (Note: Sometimes A x C is written as A • C)

Question #31
If matrices A and C are defined as in Question #30, then what is C x A (Note: Sometimes C x A is written as C • A)

Question #32
Simplify $3x^2 \cdot 4x^3$

Question #33
Simplify $3x^2 + 4x^2$

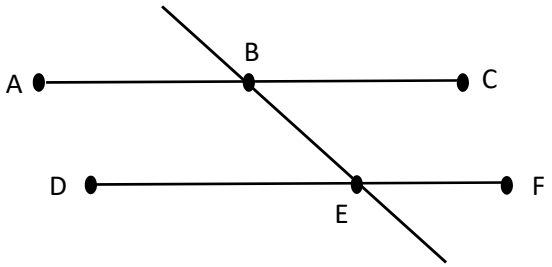
Question #34
Simplify $8x^{12} \cdot 4x^{3}$

Question #35
Simplify $8x^{12} + 4x^{12}$

Question #36
Commit to memory…

When a transversal line crosses two parallel lines the ALTERNATE INTERIOR ANGLES are equal;

If $\overline{AC}$ is parallel to $\overline{DF}$ then ∠ABE = ∠BEF, and ∠ABE & ∠BEF are alternate interior angles as are ∠CBE & ∠DEB and ∠CBE = ∠DEB.

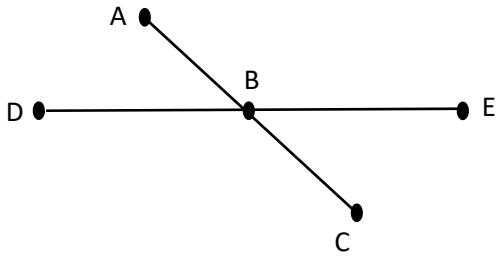


Question #37
Commit to memory…

When two lines intersect, the angles opposite each other are called VERTICAL ANGELS and are equal;

∠DBA & ∠CBE are vertical angles and are equal.

∠DBC & ∠ABE are vertical angles and are equal.



Question #38
Points A (5, 1) and E (4, 7) lie in the standard (x, y) coordinate plane. What is the midpoint of $\overline{AE}$?

Question #39
Points C (0, 0) and G (-8, -4) lie in the standard (x, y) coordinate plane. What is the midpoint of $\overline{CG}$?

Question #40
Points R (-3, -5) and S (-7, -13) lie in the standard (x, y) coordinate plane. What is the midpoint of $\overline{RS}$?

Question #41
Points T (-6, -8) and U (3, 7) lie in the standard (x, y) coordinate plane. What is the midpoint of $\overline{TU}$?

Question #42
Points D (1½ , 2¾) and E (-¼, -¾) lie in the standard (x, y) coordinate plane. What is the midpoint of $\overline{DE}$?

Question #43
The total length of 3 boards is 60 inches. The lengths of the boards are in the ratio of 3:5:7. What is the length in inches of the longest piece?

Question #44
The sum of three numbers is 90. The ratio of the three numbers is 2:3:4. What is the smallest of the three numbers?

Question #45
That ages of four children sum to 30. The ratio of the four ages is 1:3:4:7. What are the four ages?

Question #46
The high temperatures for three days sum to 280 degrees. The ratio of the high temperatures for the three days was 20:22:23. What was the hottest high temperature of the three days?

Question #47
A car company sold the following number of cars by type:

Type	# Sold
Mustang	40
CRV	35
Sienna	70
Miata	135
Total	**280**

In a circle graph illustrating the four types in the table, what should be the measure of the central angle of the Sienna sector (see Question #60 for the definition of Central Angle)?

Question #48
Using the information in Question #47, in a circle graph illustrating the four types in the table, what should be the measure of the central angle of the CRV sector?

Question #49
Using the information in Question #47, what percent of the cars sold were neither a CRV nor a Mustang?

Question #50
The M&M manufacturing company produced the given number of M&Ms by color during the year:

Color	# Produced
Green	375
Red	500
Yellow	25
Blue	30
Other	70
Total	**1,000**

In a circle graph illustrating the 5 categories listed above, what should be the measure of the central angle of the Green sector?

Question #51
Using the information in Question #50, in a circle graph illustrating the 5 color categories, what should be the measure of the central angle of the Red sector?

Question #52
Using the information in Question #50, what percent of the number produced is neither green nor yellow?

Question #53
Using the information in Question #50, the number that are blue are higher than the number that are yellow by what percent?

Question #54
An airline company has the following frequent flyer program whereby a customer can earn points:

Sign up for the program and earn 100 points; for each round trip ticket earn 50 points; for each one way ticket earn 25 points.

If a customer has purchased 120 tickets and R equals the number of round trip tickets and S equals the number of one way tickets, what equation in R and S would reflect the number of tickets purchased?

Question #55
Using the information from Question #54, if a customer earns 1,000 points and the 100 points for signing up for the program are included in the 1,000 points, then what equation using R and S represents the points excluding the 100 points for signing up?

Question #56
A veterinarian gets $50 for treating a dog weighing over 70 pounds, and gets $30 for treating a dog weighing 70 pounds or less.

Let L equal the number of dogs treated weighing over 70 pounds, and let S equal the number of dogs treated weighing 70 pounds or less. If the veterinarian treated 95 dogs, what equation using L and S represents the number of dogs treated?

Question #57
Using the information in Question #56, if the veterinarian received a total of $12,000 for treating dogs, what equation using L and S represents the total amount received?

Question #58
A car dealership sales the following cars for the price shown below:

Car	Price
Sienna	$30,000
CRV	$20,000
Miata	$25,000

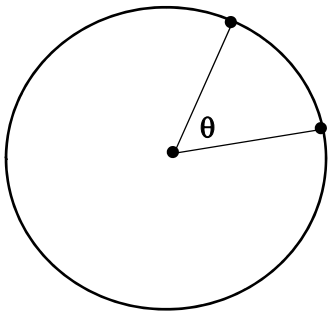
If the car dealership sold 100 cars and S equals the number of Siennas sold, C equals the number of CRVs sold, and M equals the number of Miatas sold, then what equation using S, C, and M would represent the number of cars sold?

Question #59
Using the information in Question #58, if the car dealership had $2,000,000 in sales, what equation using S, C, and M would represent the total dollars in sales?

Question #60
Commit to memory…

The CENTRAL ANGLE is an angle whose vertex is the center of a circle and the two legs of the angle are radii intersecting the circle in two distinct points (radii is plural form of radius).

In the illustration below, the angle θ is an example of a central angle.



Question #61
Consider the following series of numbers: 3, 5, 7, 9, …

What would be the 67^{th} term of the series?

Question #62
The first rectangle in a series of rectangles has length of 10 inches and width of 5 inches. Each subsequent rectangle in the series has length increased by 2 inches and width increased by 1 inch from the previous rectangle. What is the perimeter of the 100^{th} rectangle in the series?

Question #63
The first circle in a series of circles has a radius of 3 feet. Each subsequent circle in the series has a radius that is 0.5 feet longer than the previous circle. What is the circumference of the 20^{th} circle in the series?

Question #64
A series of numbers begins with the first number being 2. Each subsequent number in the series is 3 more than the previous number. What is the 47^{th} number in the series?

Question #65
Sydnee has $2.15 in quarters, dimes, nickels, and pennies. There are two less quarters than dimes, four less nickels than dimes, and two less pennies than dimes. How many coins does Sydnee have in total?

Question #66
Sydnee has $3.03 in quarters, dimes, nickels, and pennies. There are two less pennies than nickels, five more dimes than nickels, and two more quarter than nickels. How much money would Sydnee have if she gave away all her dimes?

Question #67
Sydnee has $2.48 in quarters, dimes, nickels, and pennies. There are two more nickels than pennies, one more dime than pennies, and four less quarters than pennies. If Sydnee buys a coke for $0.48 and pays for it using all her nickels, how much change does she get back?

Question #68
Sydnee has $1.97 in quarters, dimes, nickels, and pennies. There are 1 less nickel than dimes, four more pennies than dimes, and 3 times as many quarters than nickels. How many coins does Sydnee have?

Question #69
The graph of y = (3x + 7) / (4x - 12) in the standard (x, y) coordinate plane has a vertical asymptote with equation x = ?

Question #70
The graph of the equation below in the standard (x, y) coordinate plane has vertical asymptotes with equations x = ?

$$y = \frac{2x + 9}{(x - 1)(x + 3)(2x + 18)}$$

Question #71
The graph of the equation below in the standard (x, y) coordinate plan has vertical asymptotes with equations x = ?

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

Question #72
What fraction of a 12 inch diameter pizza contains the same amount of pizza as 1 slice of a 24 inch diameter pizza of the same thickness cut into six equal pizzas?

Question #73
What fraction of a 10 inch diameter pizza contains the same amount of pizza as 2 slices of a 16 inch diameter pizza of the same thickness cut into 8 equal slices?

Question #74
The perimeter of a rectangular pizza is 40 inches. The length is four times as long as the width. What is the length and width of this rectangular pizza?

Question #75
What is the area of the rectangular pizza in question #74?

Question #76
If a person wanted a square pizza instead of the rectangular pizza in Question #75, but wanted this square pizza to have the same area as the rectangular pizza in Question #75, how long would the sides this square pizza need to be?

Question #77
When $2 \leq x \leq 7$ and $4 \leq y \leq 12$, what is the smallest possible value for:

$3 / (x + y)$?

Question #78
When $2 \leq x \leq 7$ and $4 \leq y \leq 12$, what is the largest possible value for:

$3 / (x + y)$?

Question #79
When $2 \leq x \leq 7$ and $4 \leq y \leq 12$, what is the largest possible value for:

$2(x + y)$?

Question #80
When $2 \leq x \leq 7$ and $4 \leq y \leq 12$, what is the smallest possible value for:

$2(x + y)$?

Question #81
When $1 \leq x \leq 5$ and $9 \leq y \leq 13$, what is the largest possible value for:

$4 / (y - x)$?

Question #82
When $1 \leq x \leq 5$ and $9 \leq y \leq 13$, what is the smallest possible value for:

$4 / (y - x)$?

Question #83
x can take on any of the values of {½, 1, 7, 13}.
y can take on any of the values of {3, 6, 9}.

What is the smallest possible value for:

x • y?

Question #84
x can take on any of the values of {½, 1, 7, 13}.
y can take on any of the values of {3, 6, 9}.

What is the largest possible value for:

x • y?

Question #85
With x and y defined as in Question #84, what is the largest possible value for:

x / y?

Question #86
With x and y defined as in Question #84, what is the smallest possible value for:

x / y?

Question #87
Suppose a number will be randomly selected from the set {-2, 0, 1, 2} and another number will be randomly selected from the set {-7, -6, 4}. What is the probability the product of the two numbers will be negative?

Question #88
With sets defined as in Question #87, what is the probability the product of the two numbers will be positive?

Question #89
With sets defined as in Question #87, what is the probability the product of the two numbers will be zero?

Question #90
A six sided die is rolled and a spinner is spun; the spinner is divided into four equal sectors numbered 1, 2, 3, and 4. What is the probability the number on the die when added to the number on the spinner is greater than 4 but less than or equal to 6?

Question #91
Using the die and the spinner in Question #90, what is the probability the sum of the die and the spinner equals 4?

Question #92

Distinct points A, B, C, and D are collinear (i.e., all are on the same line), and B is between A and C. For D to be between A and C such that:

$\overline{AD} + \overline{DB} + \overline{BC} = \overline{AC}$, which of the follow statements I, II, III, or IV must be true? (Note: If B is between A and C, the AB + BC = AC).

I. $\overline{AD} = \overline{DB}$
II. $\overline{AD} = \overline{BC}$
III. B is between D and C
IV. D is between B and C

Question #93

Distinct points A, B, C, and D are collinear, and C is the midpoint of A and D, and B is the midpoint of C and D.

Which of the following statements are true (note that there may be more than one of the following statements that are true)?

I. $\overline{AB} + \overline{CD} = \overline{AD}$
II. $\overline{AB} + \overline{BD} = \overline{AD}$
III. $\overline{BD} = \frac{1}{2}\overline{CD}$
IV. $\overline{CB} = \overline{BD}$
V. $\overline{AC} = \overline{CD}$
VI. $\overline{AD} = 2\overline{BD}$
VII. $\overline{AD} = 4\overline{BD}$
VIII. $\overline{AB} + \overline{AC} = \overline{AD}$
IX. $\overline{AB} = 3\overline{BD}$
X. $\overline{AD} = 2\overline{CD}$

Question #94

Distinct points E, F, G, and H are collinear. G is between E and F. For H to be between E and F such that:

$$\overline{EG} + \overline{GH} + \overline{HF} = \overline{EF}$$

which of the following statements I – VI must be true (note more than one of the following statements may be true)? Note, if G is between E and F then

$$\overline{EG} + \overline{GF} = \overline{EF}$$

I. H is between E and G
II. $\overline{GH} = \overline{EG}$
III. G is between E and H
IV. $\overline{GH} = \overline{HF}$
V. $\overline{EH} + \overline{HF} = \overline{EF}$
VI. $\overline{GH} + \overline{HF} = \overline{EH}$

Question #95
What is the value of K for which the two lines:

$y = kx + 1$, and
$y = x – 2$

…intersect at the point (4, 2) in the standard (x, y) coordinate plane?

Question #96
Two lines:

$y = 3x – 2$, and
$y = x + 8$

…intersect at a point in the standard (x, y) coordinate plane. What are the coordinates of the point of intersection?

Question #97
What is the value of c for which the lines:

$y = 2x – c$, and
$y = 3x – 2$

…intersect at the point (3, 7) in the standard (x, y) coordinate plane?

Question #98
Two lines:

$2y = 3x + 4$, and
$3y = 2x – 1$

…intersect at a point in the standard (x, y) coordinate plane. What are the coordinates of the point of intersection?

Question #99
(this problem was not created by Steve Carew)
What is the area, in square inches, of a circle with a diameter equal to 12 inches?

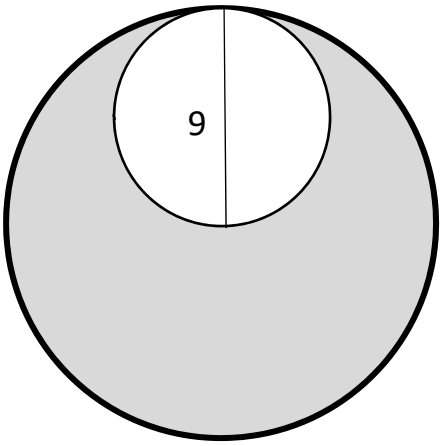
F. 144
G. 36
H. 12π
J. 36π
K. 144π

Question #100

(this problem was not created by Steve Carew)

The figure below shows 2 tangent circles such that the 9-inch diameter of the smaller circle is equal to the radius of the larger circle. What is the approximate area, in square inches, of the shaded region?

A. 28.27
B. 56.55
C. 63.62
D. 190.74
E. 254.47



Question #101

(this problem was not created by Steve Carew)

If the circumference of a circle is $\frac{4}{3}\pi$ inches, how many inches long is its radius?

A. $^{3}/_{4}$

B. $^{3}/_{2}$

C. $^{2}/_{3}$

D. $\sqrt{^{4}/_{3}}$

E. $^{4\sqrt{3}}/_{3}$

Question #102

(this problem was not created by Steve Carew)

How many units long is the circumference of a circle with diameter of 8 units?

A. 4π
B. 8π
C. $4\pi^2$
J. 16π
K. $16\pi^2$

Question #103

(this problem was not created by Steve Carew)

A circular lamp base has a radius of 2.5 inches. When placed on a flat table, approximately how much area does the lamp base cover, in square inches?

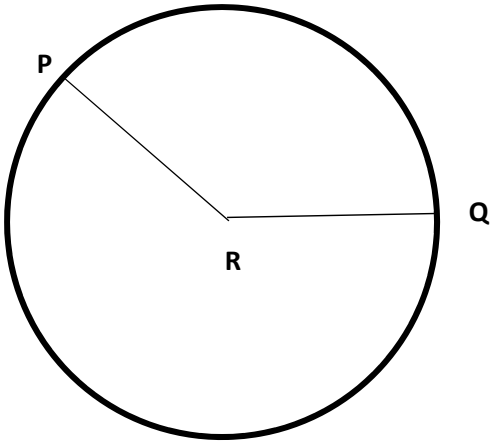
F. 5.00
G. 6.25
H. 15.70
J. 19.63
K. 25.00

Question #104

(this problem was not created by Steve Carew)

In the figure below, P and Q lie on the circle R, which has a radius of 9. If the angle PRQ is 120°, what is the area of sector PRQ?

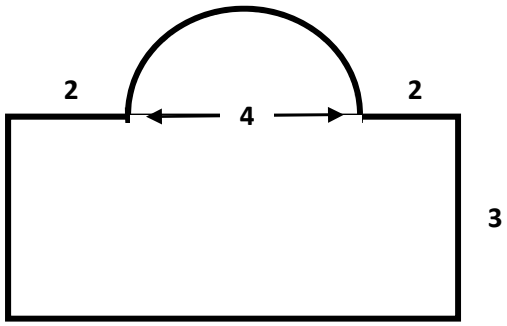
A. 3π
B. 9π
C. 27π
D. 81π
E. 243π



Question #105

(this problem was not created by Steve Carew)

The figure below shows a semicircle joined to a rectangle with distances given in units. What is the area, in square units, of this figure?



F. 22 + π
G. 24 + π
H. 24 + 2π
J. 24 + 4π
K. 24 + 8π

Question #106

(this problem was not created by Steve Carew)

The distance around a circular path is 1,000 meters. Which of the following most nearly approximates the radius of the path, in meters? (Note: $\pi = 3.14$)

A. 10
B. 18
C. 32
D. 159
E. 318

Question #107

(this problem was not created by Steve Carew)

Meg pounded a stake into the ground. When she attached a leash to both the stake and the dog's collar, the dog could reach 9 feet from the stake in any direction. Using 3.14 for π, what is the approximate area of the lawn, in square feet, the dog could reach from the stake?

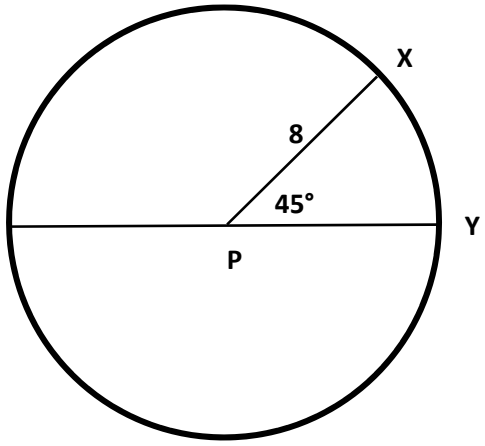
A. 28
B. 57
C. 113
D. 254
E. 283

Question #108

(this problem was not created by Steve Carew)

The circle below has its center at Point P. What is the area of the sector formed by $\angle$ XPY if the measure of $\angle$ XPY is 45° and the radius of the circle is 8?

A. 4π
B. 8π
C. 16π
D. 32π
E. 64π

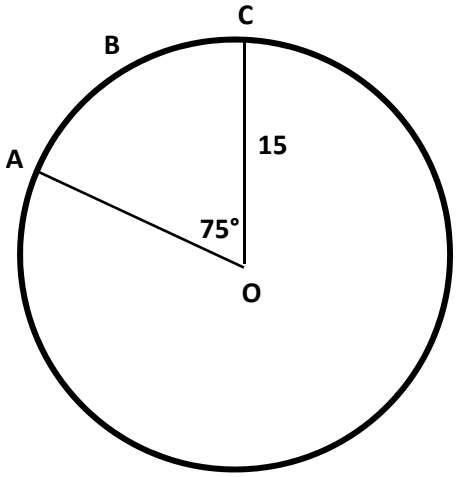


Question #109

(this problem was not created by Steve Carew)

The figure below is a circle with center O and a radius of 15. What is the length of the arc ABC in the figure below?

A. $15\pi/8$
B. 15π
C. 30π
D. $25\pi/4$
E. 75π



Question #110

(this problem was not created by Steve Carew)

Which of the following expresses the number of meters a contestant must travel in a 3 lap race where the course is a circle of radius R meters?

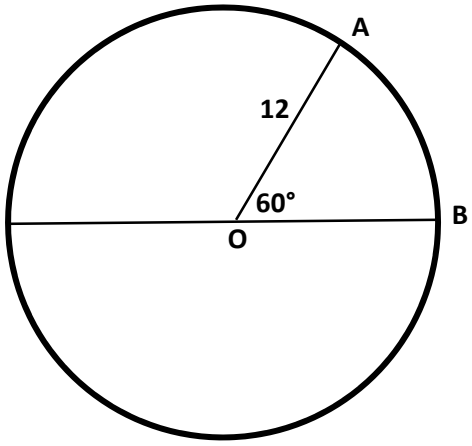
F. 3R
G. $3\pi R$
H. $3\pi R^2$
J. 6R
K. $6\pi R$

Question #111

(this problem was not created by Steve Carew)

A circle with its center at Point O has a radius of 12cm. If $\angle$ AOB has a measure of 60°, what is the length of arc AB?

F. 2π
G. 4π
H. 6π
J. 12π
K. 24π



Question #112

(this problem was not created by Steve Carew)

A water wheel turns 120° arc every minute. If the radius of the wheel is 6m, how far in meters does the wheel turn along its edge each minute?

A. $5\pi/3$
B. 4π
C. 8π
D. $\pi/4$
E. 10π

Question #113

(this problem was not created by Steve Carew)

A circle with equation $x^2 + y^2 = 37$ has center (0, 0). The circle is shifted 3 units to the right and 4 units down. What is the equation of the new circle?

A. $(x + 4)^2 + (y - 3)^2 = 37$
B. $(x - 4)^2 + (y + 3)^2 = 37$
C. $(x + 3)^2 + (y - 4)^2 = 37$
D. $(x - 3)^2 + (y + 4)^2 = 37$

Question #114

(this problem was not created by Steve Carew)

Which of the following best describes all points in a plane that are 5 inches from a given point in the plane?

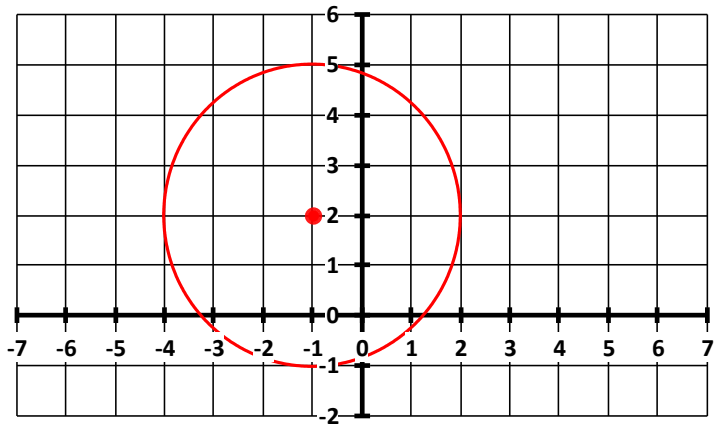
A. A circle with a 5 inch radius
B. A circle with a 5 inch diameter
C. A circle with a 25 inch radius
D. A rectangle with 5 inch sides
E. A sphere with a 5 inch diameter

Question #115

(this problem was not created by Steve Carew)

What is the equation of the circle below?

A. $(x + 1)^2 + (y - 2)^2 = 6$
B. $(x - 1)^2 + (y + 2)^2 = 6$
C. $(x + 1)^2 + (y - 2)^2 = 9$
D. $(x - 1)^2 + (y + 2)^2 = 9$



Question #116

(this problem was not created by Steve Carew)

A circle is tangent to the x-axis at (-4, 0) and the y-axis at (0, 4). What is the equation of this circle?

A. $(x - 4)^2 + (y + 4)^2 = 4$
B. $(x + 4)^2 + (y - 4)^2 = 4$
C. $(x - 4)^2 + (y + 4)^2 = 16$
D. $(x + 4)^2 + (y - 4)^2 = 16$

Question #117

(this problem was not created by Steve Carew)

What is the equation of the circle with center (3, -6) and radius of 15/8?

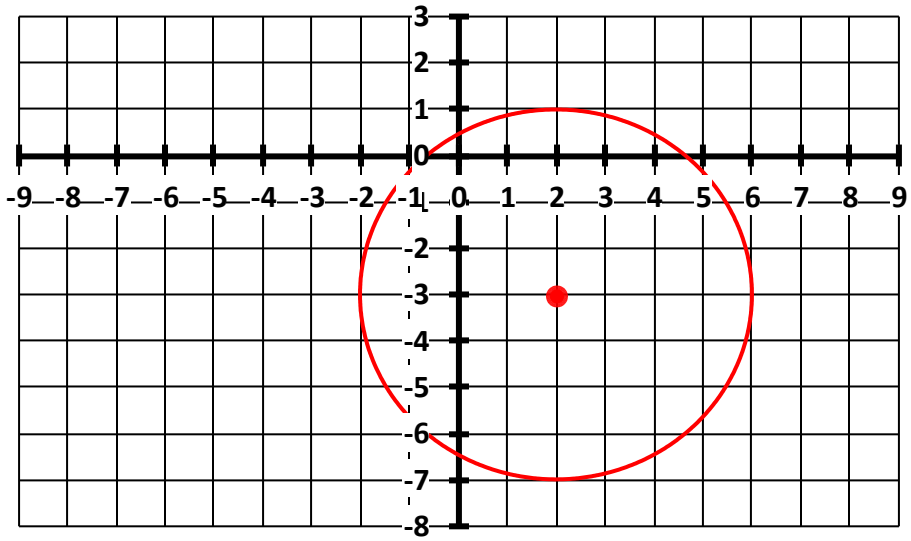
A. $(x - 3)^2 + (y + 6)^2 = 225/64$
B. $(x - 3)^2 + (y + 6)^2 = 15/8$
C. $(x + 3)^2 + (y - 6)^2 = 225/64$
D. $(x + 3)^2 + (y - 6)^2 = 15/8$

Question #118

(this problem was not created by Steve Carew)

What is the equation of this circle?

A. $(x - 2)^2 + (y + 3)^2 = 4$
B. $(x - 2)^2 – (y + 3)^2 = 4$
C. $(x - 2)^2 + (y + 3)^2 = 16$
D. $(x - 2)^2 – (y + 3)^2 = 16$



Question #119

(this problem was not created by Steve Carew)

Given the equation of a circle $(x - 3)^2 + (y + 5)^2 = 16$, what is the sum of the x-coordinate of the center, the y-coordinate of the center, and the radius of the circle?

A. 24
B. 18
C. 12
D. 6
E. 2

Question #120

(this problem was not created by Steve Carew)

What is the equation of a circle with a radius of 8 and a center shifted down 6 units and right 3 units from the origin?

A. $(x - 6)^2 + (y + 3)^2 = 8$
B. $(x - 3)^2 + (y + 6)^2 = 64$
C. $(x + 6)^2 + (y - 3)^2 = 8$
D. $(x + 3)^2 + (y - 6)^2 = 64$
E. $(x - 3)^2 + (y + 6)^2 = 8$

Question #121
(this problem was not created by Steve Carew)
What is the equation of a circle with a radius of 5 and a center shifted up 3 units and left 5 units from the origin?

A. $(x + 5)^2 + (y - 3)^2 = 25$
B. $(x - 5)^2 + (y + 3)^2 = 25$
C. $(x + 5)^2 + (y - 3)^2 = 5$
D. $(x + 3)^2 + (y - 5)^2 = 25$
E. $(x - 5)^2 + (y + 3)^2 = 5$

Question #122
(this problem was not created by Steve Carew)
What is the center of the circle given by the equation $(x - 8)^2 + (y + 2)^2 = 49$?

A. (8, 2)
B. (7, 49)
C. (8, -2)
D. (7, -2)
E. (8, -7)

Question #123
(this problem was not created by Steve Carew)
Use substitution to determine whether each of the following points is on the circle with the equation

$$(x + 1)^2 + (y - 5)^2 = 16.$$

A. (-1, 1)
B. (3, 4)
C. (-5, 5)
D. (-3.4, 1.8)

Question #124
(this problem was not created by Steve Carew)
For the given endpoints of a diameter, find the center of the circle and the length of the radius of the circle.

A. (-8, 6) and (0, 0)
B. (4, -9) and (-2, -9)
C. (-2, -3) and (4, -5)

Question #125
For what value of "a" will a circle centered at (2, -3) pass through points (1, a) and (a, 3) in the standard (x, y) plane?

Question #126
For what value of "a" will a circle centered at (-3, 4) pass through points (a, 7) and (3, a)?

Question #127
The imaginary number, i, is defined such that $i^2 = -1$.

What does $i + i^2 + i^3 + \ldots + i^{49}$ equal?
(Hint: look how many terms sum to zero)

Question #128
Which of the following complex numbers is equal to

$$\sqrt{-80} - \sqrt{-125}$$

A. -9i $\sqrt{5}$
B. -3i $\sqrt{5}$
C. -i $\sqrt{5}$
D. i
E. 3i $\sqrt{5}$

Question #129
Which of the following complex numbers is equal to

$$(i-1)\Big/(i+1)$$

(Hint: multiply by the conjugate)

A. - i - 1
B. - i + 1
C. - i
D. i - 1
E. i

Question #130
Which of the following is equal to the sum of the complex numbers given below?

$(2 + i)^2$ and $(2 - i)^2$

A. 4
B. 6
C. 10
D. 6i
E. 8i

Question #131

Which of the following equations has roots at: 2, 2i, -2i?

A. $(x - 2)(x^2 + 4)$
B. $(x - 2)(x^2 - 4)$
C. $(x + 2)(x^2 + 4)$
D. $(x + 2)(x^2 - 4)$
E. $(x + 2)(x - 2)^2$

Question #132

Given that the imaginary number i is defined as $i^2 = -1$, what is the value of the following:

$i - i^2 + i^3 - i^4 + \ldots + i^{97} - i^{98}$

Hint: look at how many terms sum to zero.

A. -i - 1
B. -i + 1
C. 0
D. i - 1
E. i + 1

Question #133

Which of the following complex numbers is equal to

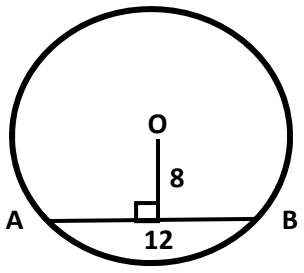
$$\frac{5i + 5}{1 - 2i}$$

Hint: multiply by the conjugate.

A. 2i + 7
B. i + 1
C. i - 2i
D. 3i - 1
E. i + 5

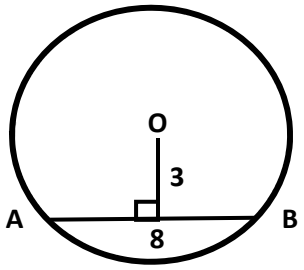
Question #134

In the circle below, O is the center. Chord $\overline{AB}$ is 12 inches long and is 8 inches from O. What is the area, in square inches, of the circle?



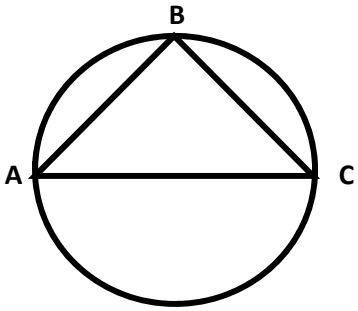
Question #135

In the circle below, O is the center. Chord $\overline{AB}$ is 8 inches long and is 3 inches from O. What is the area, in square inches, of the circle?



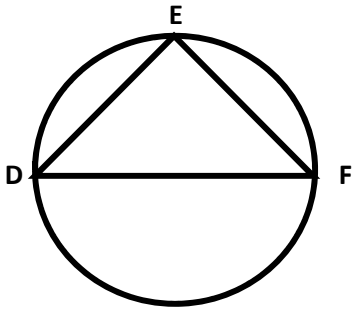
Question #136

In the figure below AB = BC, and $\overline{AC}$ is a diameter of the circle, having a length of 4 centimeters. What is the area of ΔABC in square centimeters?



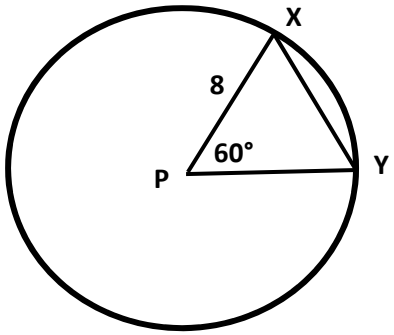
Question #137

In the figure below DE = EF, and $\overline{DF}$ is a diameter of the circle, having a length of 12 centimeters. What is the area of ΔDEF in square centimeters?



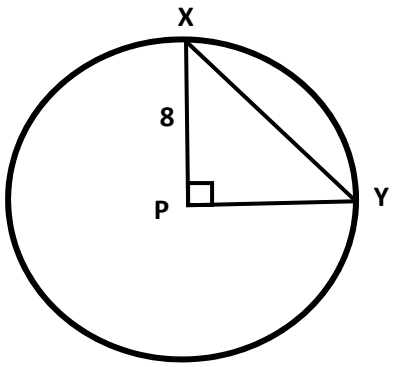
Question #138

The circle below has its center at Point P. What is the area of the triangle formed by connecting points P, X, and Y if $\angle$ XPY is 60° and the radius of the circle is 8 units?



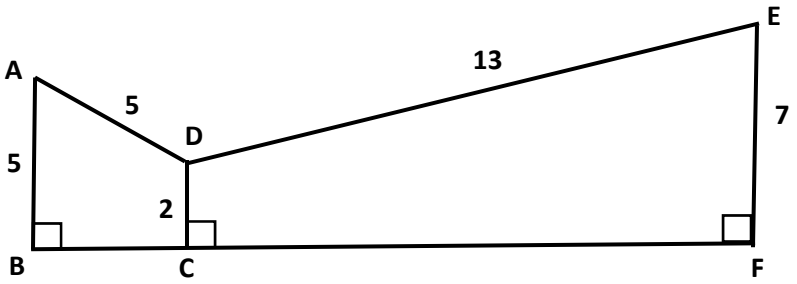
Question #139

The circle below has its center at Point P. What is the area of the triangle formed by connecting points P, X, and Y if $\angle$ XPY is as shown below and the radius of the circle is 8 units?



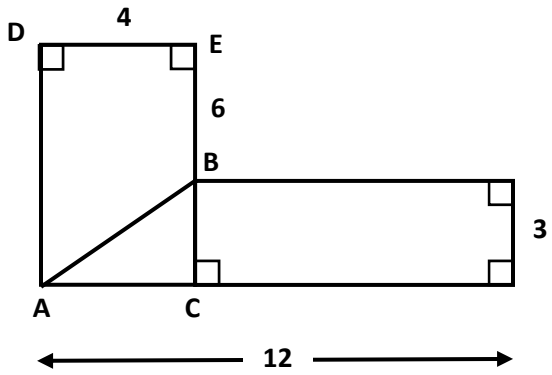
Question #140

In the figure below, $\overline{BF}$ is a straight line and all distances are given in centimeters. What is the ratio of the area of quadrilateral ABCD to the area of quadrilateral DCFE?



Question #141

Consider the figure shown below. What is the area of ΔABC?

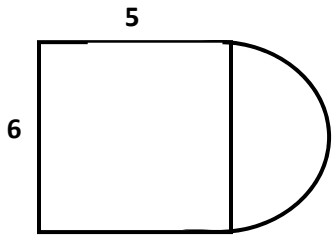


Question #142

In the figure in Question 141, what is the perimeter of the quadrilateral ADEB?

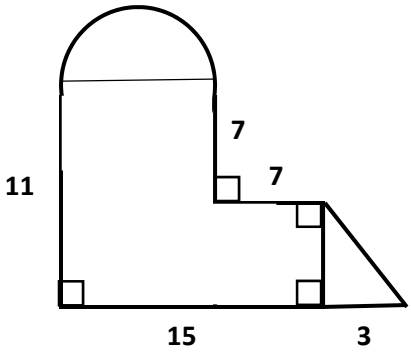
Question #143

The figure below is a rectangle with a semi-circle. What is the perimeter of the figure?



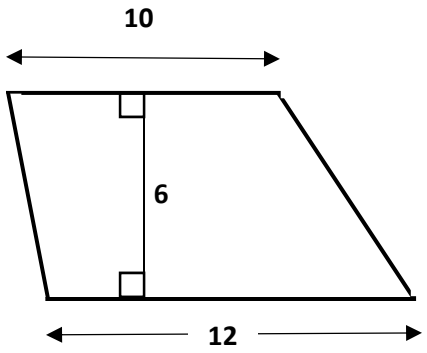
Question #144

Consider the figure below (there is a semi-circle). What is the area and the perimeter?



Question #145

Melanie is helping to paint a geometric design on a school wall. The figure below, with its dimensions in feet, shows the trapezoidal region Melanie agreed to paint. The bases of the trapezoidal region are 10 feet and 12 feet. By painting the trapezoidal region, how many square feet of the wall will Melanie paint?



Question #146

Which of the following complex numbers is equal to:

$$\frac{5 + 15i}{1 - 2i}$$

HINT: Multiply by the conjugate.

A. -3 + i
B. -2 - 10i
C. -5 + 5i
D. 4 + i
E. 7 - 6i

Question #147

What are real solutions for x, if any, to the equation:

$(|x| - a)\ (|x| - b) = 0$

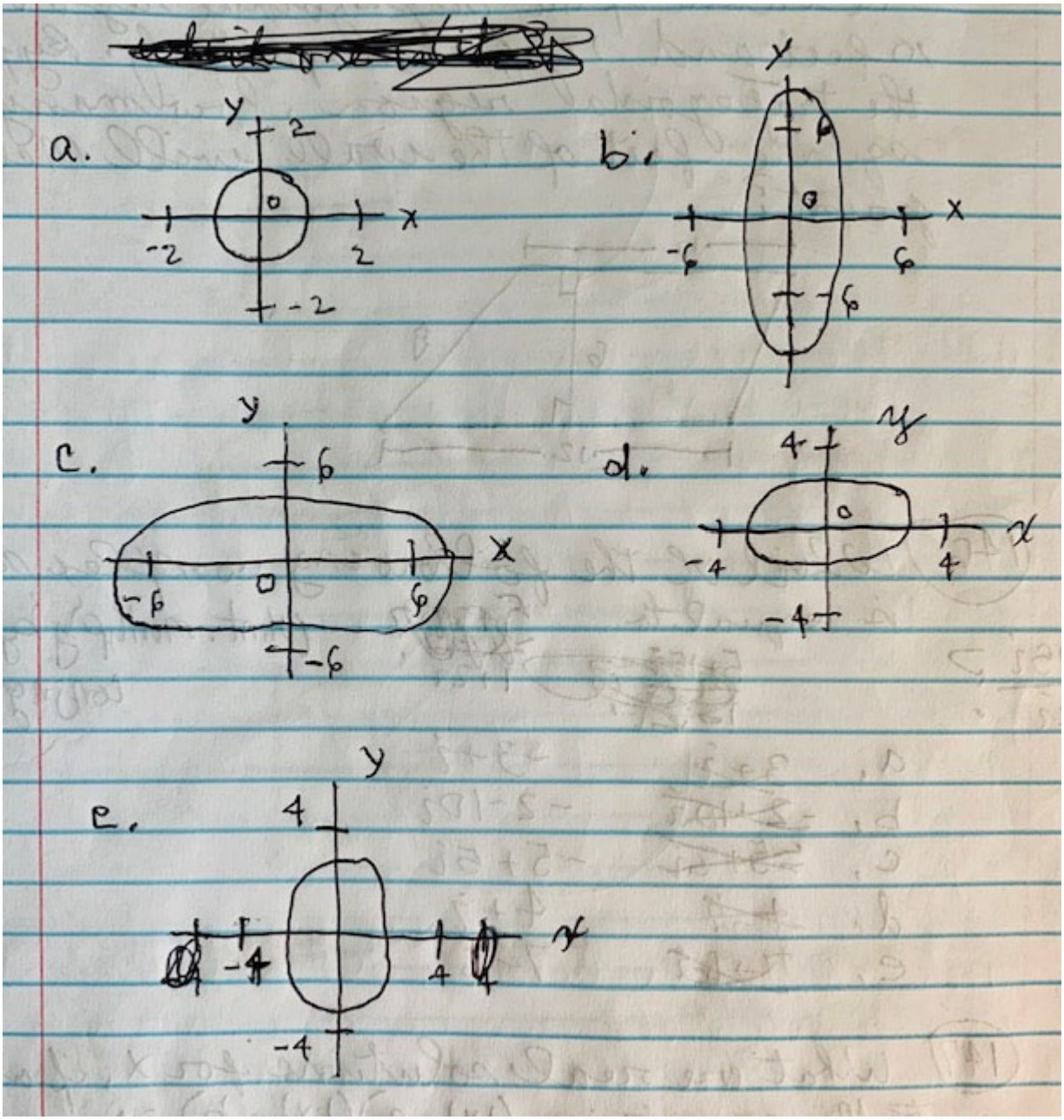
if a and b are positive integers?

A. ± a and ± b
B. - a and - b
C. a and b
D. $\sqrt{a}\ and\ \sqrt{b}$
E. There are no real solutions.

Question #148

Which of the following graphs in the standard (x, y) coordinate plane is the graph of the equation:

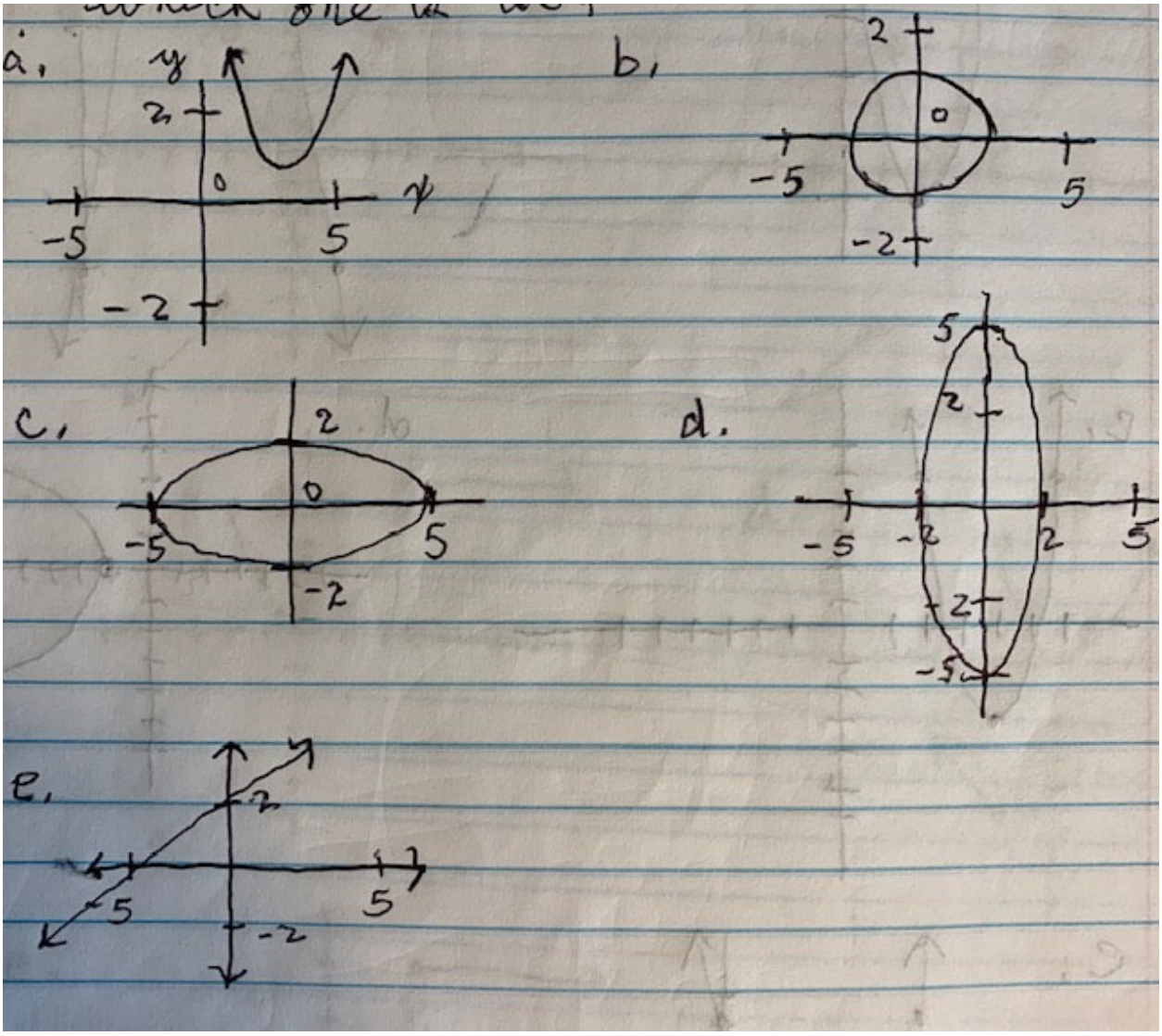
$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$



Question #149

Which of the following graphs in the standard (x, y) coordinate plane is the graph of the equation:

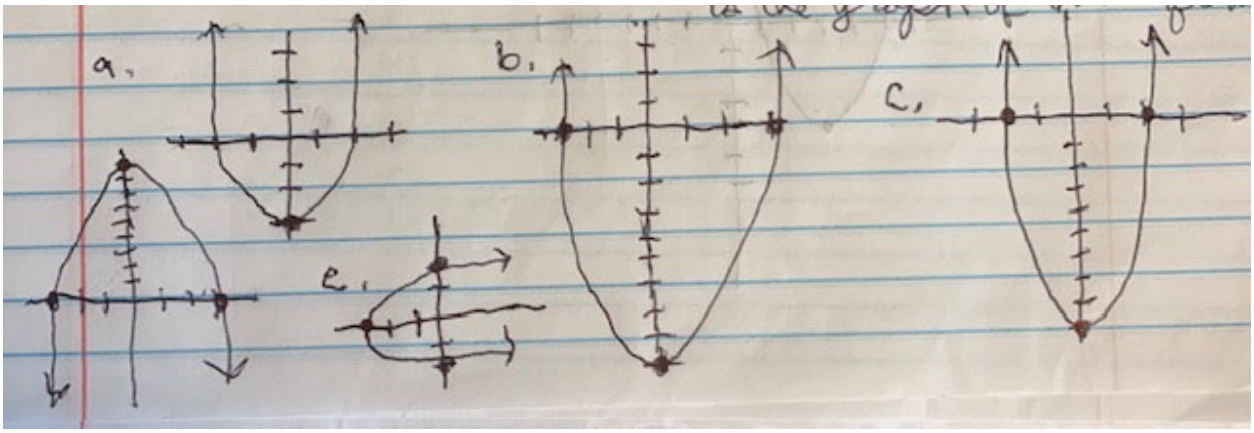
$$\frac{x^2}{25} + \frac{y^2}{4} = 1$$



Question #150

Which of the following graphs in the standard (x, y) coordinate plane is the graph of the equation:

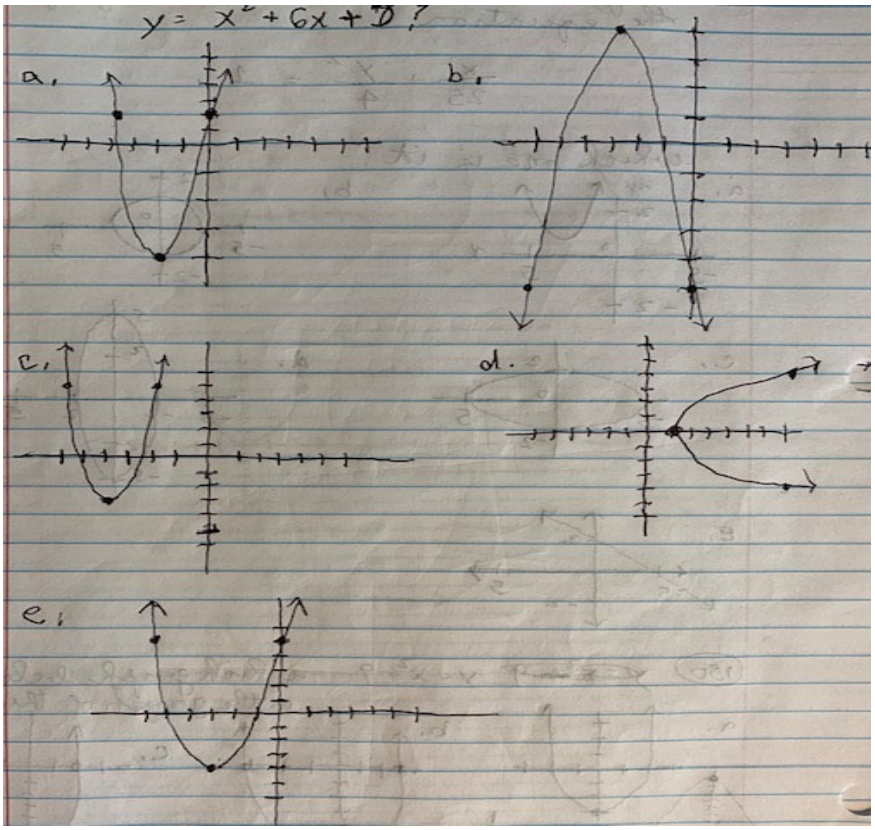
$$y = x^2 - 9$$



Question #151

Which of the following graphs in the standard (x, y) coordinate plane is the graph of the equation:

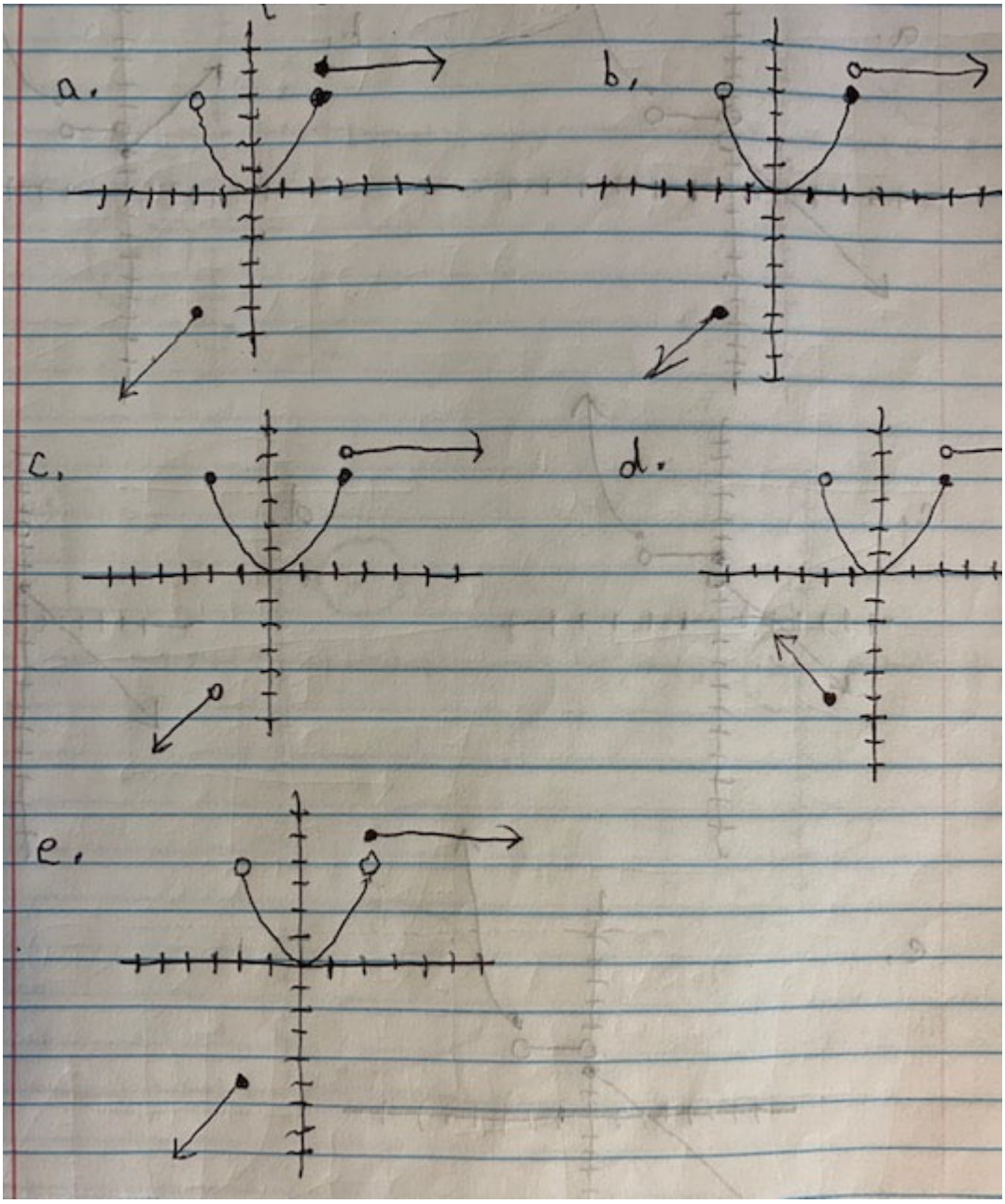
$$y = x^2 + 6x + 5$$



Question #152

Which of the following graphs in the standard (x, y) coordinate plane is the graph of the equation:

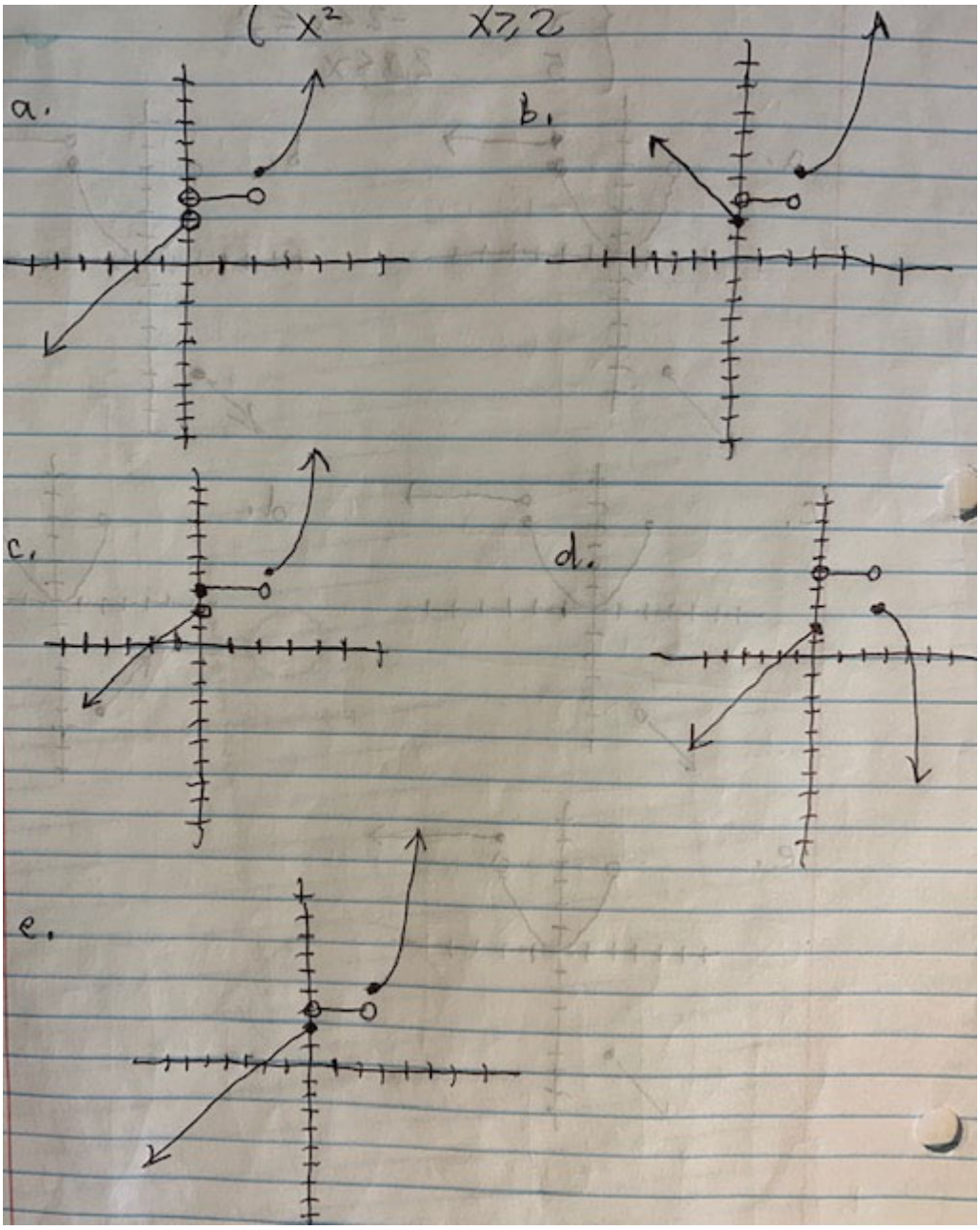
$$y = \begin{cases} x - 3 & x \le -2 \\ x^2 & -2 < x \le 2 \\ 5 & 2 < x \end{cases}$$



Question #153

Which of the following graphs in the standard (x, y) coordinate plane is the graph of the equation:

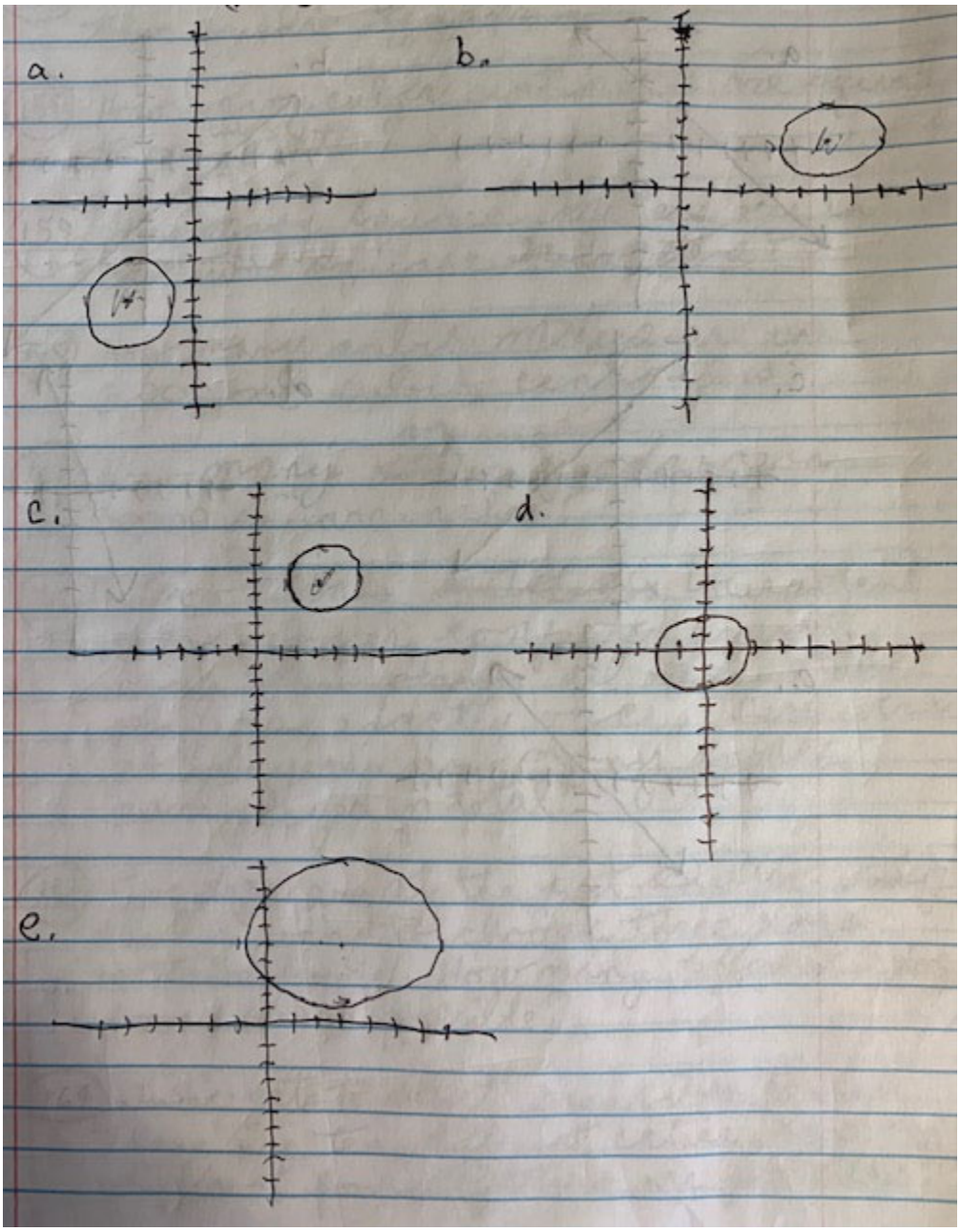
$$y = \begin{cases} x + 2 & x \le 0 \\ 3 & 0 < x < 2 \\ x^2 & x \ge 2 \end{cases}$$



Question #154

Which of the following graphs in the standard (x, y) coordinate plane is the graph of the equation:

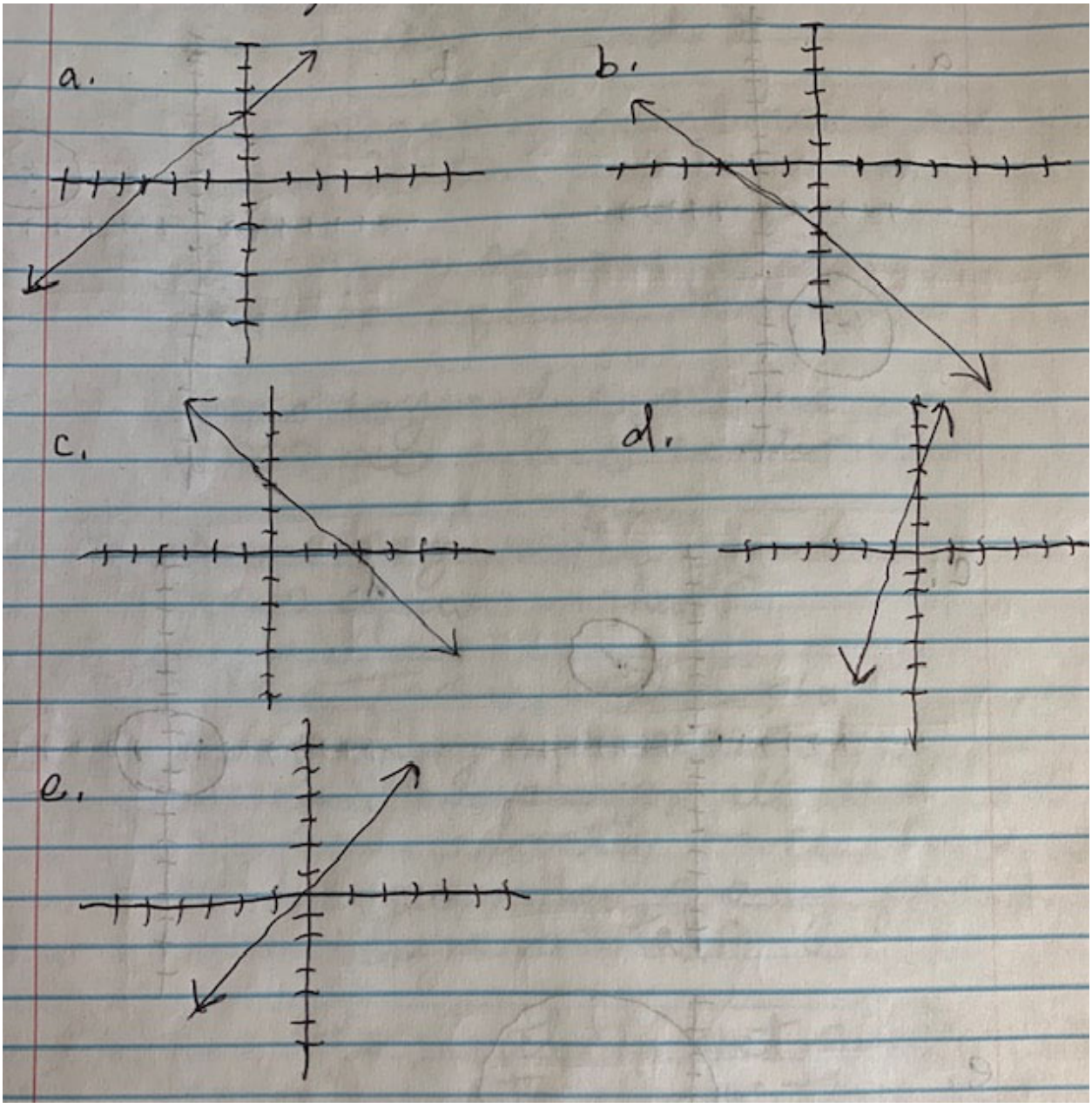
$$(x-3)^2 + (y-5)^2 = 4$$



Question #155

Which of the following graphs in the standard (x, y) coordinate plane is the graph of the equation:

$$y = x + 3$$



Question #156

How many square inches are in three square feet?

Question #157

How many square inches are in two square yards?

Question #158
How many cubic centimeters are equal to one cubic meter?

Question #159
How many square meters are in two square kilometers?

Question #160
How many cubic meters are in 3,000,000 cubic centimeters?

Question #161
How many square yards are in 30,000 square inches?

Question #162
In a tennis tournament every player competed against all other players exactly once. There were 24 players. How many games were played in total?

Question #163
Five dogs are at the pet shelter. Paul is going to choose three dogs to take home. How many different three dog groups are possible?

Question #164
Julie gets to select four cities to visit. There are ten different cities. How many different four city tours are possible?

Question #165
At a chess tournament, each person played exactly one game with every other person. Twenty-eight games were played. How many people played in the tournament.

Question #166
At a tennis tournament, each person played exactly one match with every other person. Forty-five matches were played. How many people played in the tournament?

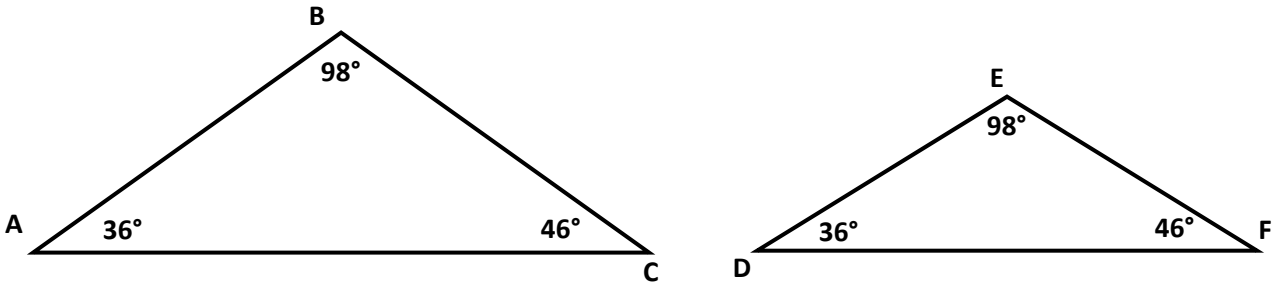
Question #167
At a ping-pong tournament, each person played exactly one game with every other person. Twenty-one games were played. How many people played in the tournament?

Question #168
It takes four people to play a doubles match in ping-pong. There are 20 people. How many different doubles matches are possible?

Question #169

COMMIT TO MEMORY:

If two triangles are similar then their corresponding angles are equal. For example:



Δ ABC is similar to Δ DEF because they have the same angle measure for each of the corresponding angles.

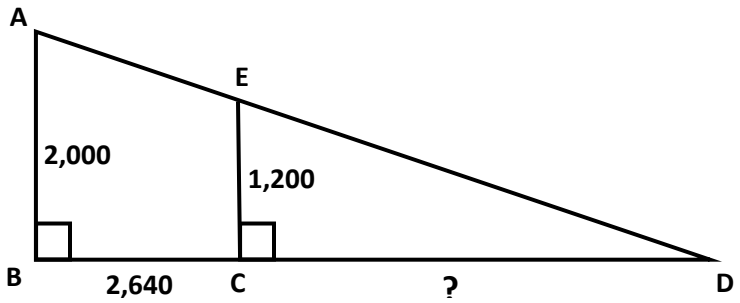
Δ ABC ~ Δ DEF means Δ ABC is similar to Δ DEF.

Δ ABC ≅ Δ DEF means Δ ABC is congruent to Δ DEF where congruent means corresponding angles and corresponding sides are equal.

Also, similar triangles have corresponding sides that are all in the same proportion.

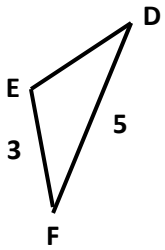
Question #170

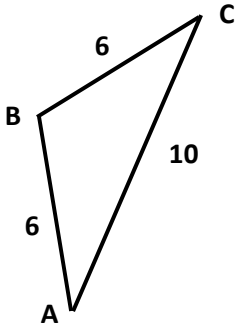
In the figure below, E is on $\overline{AD}$, and C is on $\overline{BD}$. The dimensions given are in meters. What is the length in meters of $\overline{CD}$?



Question #171

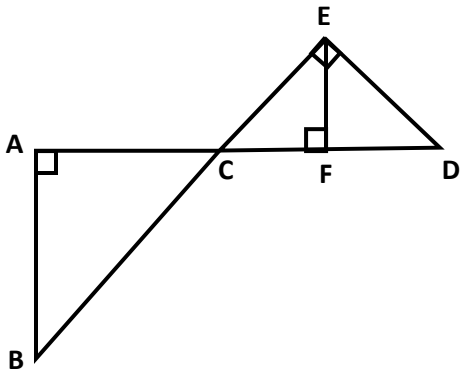
In the figure below, Δ ABC and Δ DEF are similar triangles with the given side lengths in meters. What is the perimeter, in meters, of Δ DEF?





Question #172

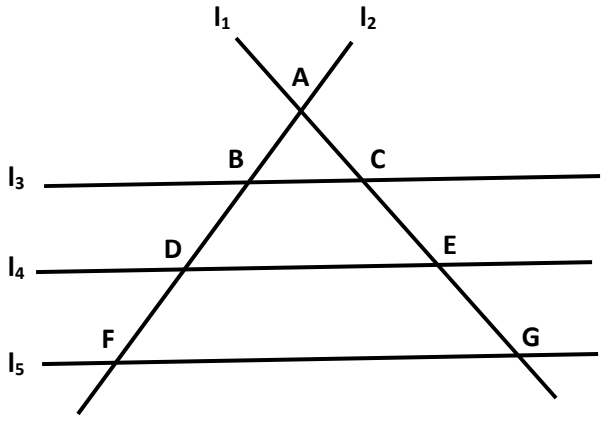
In the figure below, A, C, F, and D are collinear; B, C, and E are collinear; and the angles at A, E, and F are right angles as marked. Which of the following statements is NOT justifiable from the given information?



a. $\overline{AB}$ is parallel to $\overline{EF}$
b. $\overline{DE}$ is parallel to $\overline{BE}$
c. $\angle$ ACB $\cong \angle$ FCE
d. Δ BAC $\sim \Delta$ EFC
e. $\overline{CE} \cong \overline{ED}$

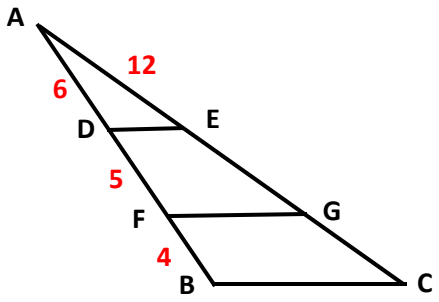
Question #173

Lines l_1 and l_2 intersect each other and three parallel lines: l_3, l_4, and l_5 at the points shown in the figure below. The ratio of the perimeter of Δ ABC to the perimeter of Δ AGF is 1:3. The ratio of $\overline{DE}$ to $\overline{FG}$ is 2:3. What is the ratio of $\overline{AC}$ to $\overline{CE}$?



a. 1:1
b. 1:2
c. 1:3
d. 2:1
e. 3:1

Question #174
In the figure shown below,
E and G lie on $\overline{AC}$,
D and F lie on $\overline{AB}$,
$\overline{DE}$ and $\overline{FG}$ are parallel to $\overline{BC}$, and
the given lengths are in feet in **red** font.
What is the length of $\overline{AC}$ in feet?



Question #175
3 is 20% of a number that is 25% of a second number. What is the second number?

Question #176
5 is 10% of a number that is 25% of a second number. What is the second number?

Question #177
20 is 40% of a number that is 5% of a second number. What is the second number?

Question #178
14 is 10% of a number that is 200% of a second number. What is the second number?

Question #179
30 is 10% of a number that is 600% of a second number. What is the second number?

Question #180
A student has earned 460 points out of a possible 500 points so far in the semester. There is one more test remaining for the semester and it is worth 100 points. It if takes an 89.5% to earn an A for the semester, what is the lowest score out of 100 points possible that the student can get on the last test and have an A for the semester?

Question #181
A student has earned 704 points out of a possible 800 points so far in the semester. There is a final exam worth 200 points remaining. If it takes an 89.5% to earn an A for the semester, what is the lowest score out of 200 the student can get on the final and have an A for the semester?

Question #182
So far this basketball season, Tony has made 80 free throws, and he has attempted 100 free throws. Consequently, Tony has made 80% of his free throws. What is the least number of additional free throws Tony must have to make 90% of his free throws?

Question #183
So far this basketball season, Rob has made 96 out of 110 free throws. What is the least number of additional free throws Rob must have to make 90% of his free throws?

Question #184
A little league baseball player has batted 120 times and has 25 hits. Starting now, if he gets a hit each time he is at bat, what is the least number of additional times he must be at bat to raise his batting average to 0.300?

Question #185
Five friends are sledding on a five person sled. What is the maximum number of times they can go down the hill without repeating the order on the sled?

Question #186
Five friends are sledding. They have a two person sled. What is the maximum number of times they can go down the hill without repeating the order on the two person sled?

Question #187
How many different orders can the letters PARTY be arranged?

Question #188
How many different orders can the letters SSRPYS be arranged?

Question #189
John is planting six trees in a row:

1 maple tree,
1 elm tree,
1 oak tree,
1 poplar tree,
1 cherry tree, and
1 peach tree.

How many different orders can John plant the six trees?

Question #190
John is planting eight trees in a row.

4 maple trees,
1 oak tree,
2 elm trees, and
1 poplar tree.

How many different orders can John plant the eight trees?

Question #191
What is the x-intercept of the line that contains the points (-3, 5) and (5, 1) in the standard (x, y) coordinate plane?

Question #192
What is the y-intercept of the line that contains the points (2, 3) and (-3, -7)?

Question #193
A line has slope of 3 and y-intercept of -9. What is the x-intercept of the line?

Question #194
A line passes through the point (7, -3) and is parallel to the line that passes through the points (2, 1) and (4, 3). What is the x-intercept and y-intercept of the line that passes through the (7, -3)?

Question #195
What is the x-intercept and the y-intercept of the line that passes through point (5, 3) and is parallel to the line that passes through the points (-3, 1) and (-6, 10)?

Question #196
What is the x-intercept and the y-intercept of the line that passes through the point (7, -3) and is perpendicular to the line that passes through the points (2, 1) and (4, 3)?

Question #197
What is the x-intercept and the y-intercept of the line that passes through the point (5, 3) and is perpendicular to the line that passes through the points (-3, 1) and (-6, 10)?

Question #198
What is the x-intercept and the y-intercept of the line that passes through the point (4, 3) and is parallel to the line:

$$y = \frac{2}{3}x + 3$$

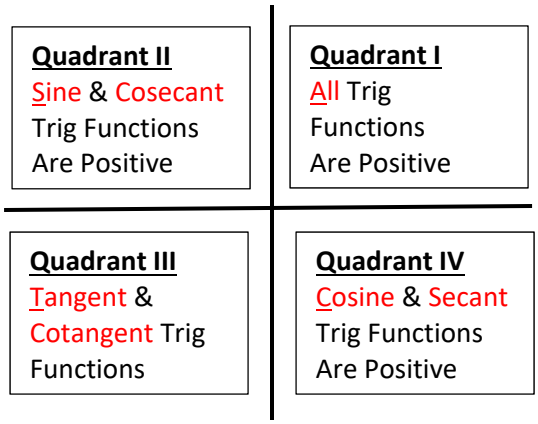
Question #199
What is the x-intercept and the y-intercept of the line that passes through the point (4, 3) and is perpendicular to the line:

$$y = \frac{2}{3}x + 3$$

Question #200

COMMIT TO MEMORY:

Quadrants in which trigonometric functions are positive:



A Smart Trig Class

Question #201

Suppose $0° < x < 90°$ and $\text{Tan } x = \frac{3}{7}$.

What is the value of Cos x + Sin x?

Question #202

Suppose $90° < x < 180°$ and $\text{Tan } x = -\frac{3}{7}$.

What is the value of Cos x + Sin x?

Question #203

Suppose $180° < x < 270°$ and $\text{Tan } x = \frac{3}{7}$.

What is the value of Cos x + Sin x?

Question #204

Suppose $270° < x < 360°$ and $\text{Tan } x = -\frac{3}{7}$.

What is the value of Cos x + Sin x?

Question #205

Suppose $90° < x < 180°$ and $\text{Cos } x = -\frac{1}{2}$.

What is the value of Sin x ÷ Tan x (i.e., Sin x / Tan x)?

Question #206

Suppose $0° < x < 90°$ and $\text{Cos } x = \frac{1}{2}$.

What is the value of Sin x + Tan x?

Question #207

Suppose $180° < x < 270°$ and $\text{Cos } x = -\frac{1}{2}$.

What is the value of Sin x + Tan x?

Question #208

Suppose $270° < x < 360°$ and $\text{Cos } x = \frac{1}{2}$.

What is the value of Sin x + Tan x?

Question #209

Suppose $0° < x < 90°$ and $\text{Sin } x = \frac{3}{5}$.

What is the value of Tan x – Cos x?

Question #210

Suppose $180° < x < 270°$ and $\text{Sin } x = -\frac{3}{5}$.

What is the value of Tan x – Cos x?

Question #211

Suppose $270° < x < 360°$ and $\text{Sin } x = -\frac{3}{5}$.

What is the value of Tan x – Cos x?

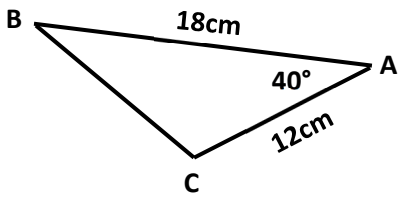
Question #212

Suppose $90° < x < 180°$ and $\text{Sin } x = \frac{3}{5}$.

What is the value of Tan x – Cos x?

Question #213

Triangle Δ ABC is shown in the figure below. The measure of ∠A is 40°, $\overline{AB}$ = 18cm, and $\overline{AC}$ = 12cm. What is the length in centimeters of $\overline{BC}$? Use the **Law of Cosines**.



Note for a triangle with sides of length a, b, and c opposite angles ∠A, ∠B, and ∠C, respectively, the ***Law of Sines*** states:

$$\frac{Sin\ \angle A}{a} = \frac{Sin\ \angle B}{b} = \frac{Sin\ \angle C}{c}$$

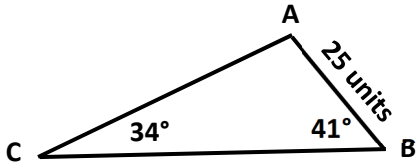
And the ***Law of Cosines*** states:

$$c^2 = a^2 + b^2 - 2ab\ Cos\ \angle C$$

In the ACT test the formula for the Law of Sines and the Law of Cosines is given as part of the problem so you do not have to memorize the formula, but you do have to know how to apply it.

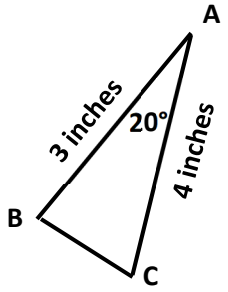
Question #214

In ΔABC, shown below, the measure of ∠B is 41°, the measure of ∠C is 34°, and $\overline{AB}$ is 25 units long. What is the length in units of $\overline{BC}$ (use the **Note** from Question #213)…use the **Law of Sines**.



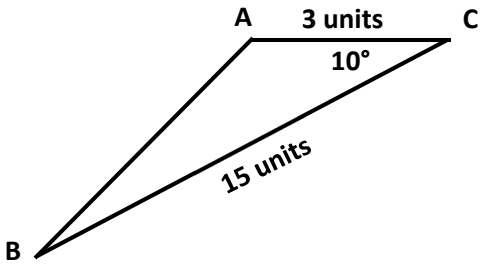
Question #215

Using the **Note** from Question #213, consider the triangle below. Use the **Law of Cosines** to find the length of $\overline{BC}$.



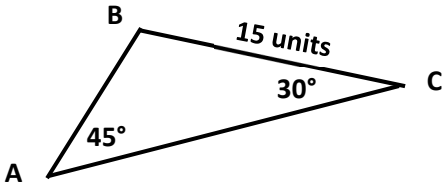
Question #216

Using the **Note** from Question #213, consider the triangle below. Use the **Law of Cosines** to find the length of $\overline{AB}$.



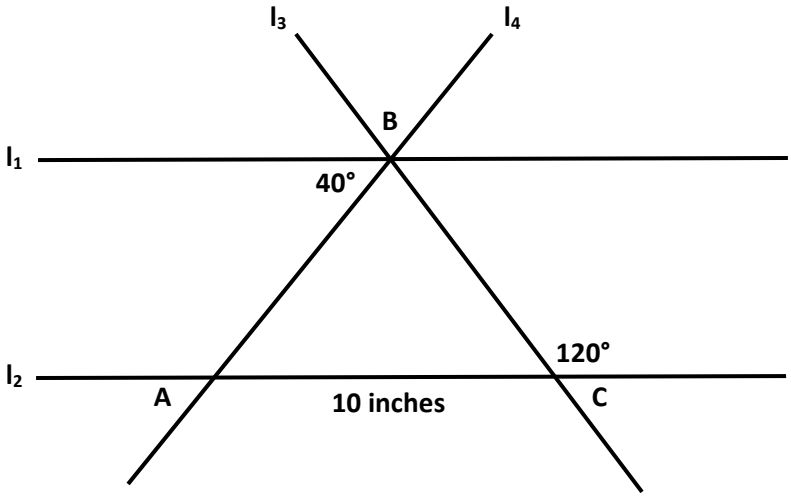
Question #217

Using the **Note** from Question #213, consider the triangle below. Use the **Law of Sines** to find the length of $\overline{AC}$.



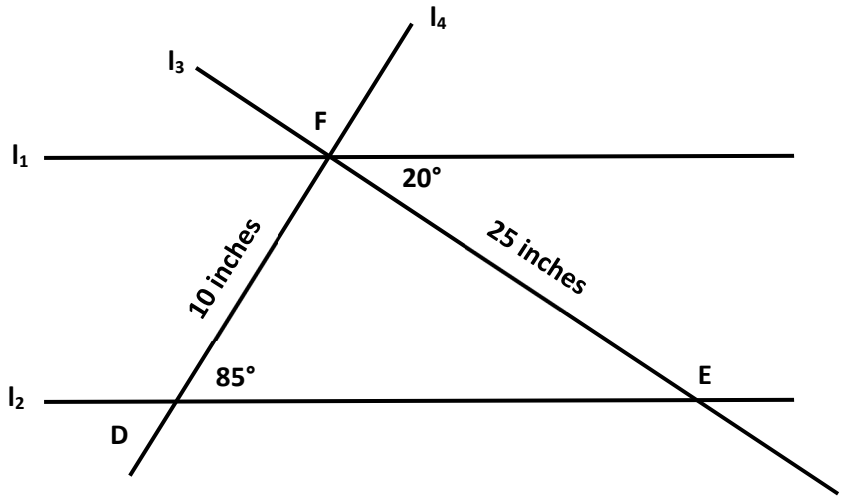
Question #218

Consider the figure below. Lines l_1 and l_2 are parallel, and lines l_3 and l_4 are transversal lines intersecting each other and the other lines at the given points. Use the **Note** from Question #213, and the **Law of Sines** to find the length of $\overline{BC}$ given the length of $\overline{AC}$ is 10 inches and the angles are as shown below.



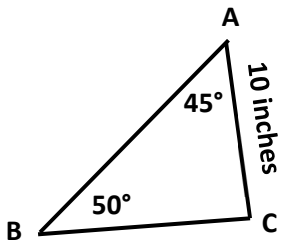
Question #219

Consider the figure below. Lines l_1 and l_2 are parallel, and lines l_3 and l_4 are transversal lines intersecting each other and the other lines at the given points. Use the **Note** from Question #213, and the **Law of Cosines** to find the length of $\overline{DE}$ given the lengths and angles labeled below.



Question #220

Consider triangle ΔABC. If $\overline{AC}$ is 10 inches, then use the **Note** from Question #213, and the **Law of Sines** to determine the length of $\overline{AB}$.



Question #221

f(x) = 3x + 7

$g(x) = x^2$

For what value(s) of x is g(f(x)) = 0?

Question #222

$f(x) = 2x^2$

g(x) = 4x – 2

For what value(s) of x is g(f(x)) = 0?

Question #223
$g(x) = -x^3$, what is $g(g(x))$ as a function of x?

Question #224
$f(x) = x^4$, what is $f(f(x))$ as a function of x?

Question #225
$f(x) = -x^5 + 3$
$g(x) = -x^2$

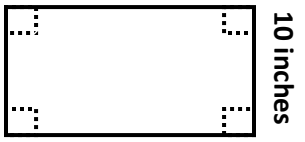
What is $f(g(x))$ as a function of x?

Question #226
$f(x) = 3x - 6$
$g(x) = 2x^2$

For what value(s) of x is $f(g(x)) = 0$?

Question #227
For f(x) and g(x) defined in Question #226, for what value(s) of x is $g(f(x)) = 0$?

Question #228
A rectangular piece of cardboard is 10 inches wide and 20 inches long. If a one inch square is cut out of each corner to make a box, what is the area of the base of the box?



Question #229
A rectangular box is made from a rectangular piece of sheet metal 20 inches wide and 30 inches long by cutting a square piece of equal size from each of the corners and bending up the sides so that they make a 90° angle with the base. The base of the finished box will be 200 square inches. How many inches high will the box be?

Question #230
A rectangular piece of cardboard has its length that is 20% longer than its width. The perimeter of the cardboard rectangle is 44 inches. If a box is made from this piece of cardboard by cutting 2 inch squares out of each corner and bending up the sides, what is the area of the base of the box?

Question #231
A circle has area of 25π square inches. What is the radius of the circle?

Question #232

A circle with circumference of 32π inches has its radius increased by 25%. By what percent does the circle's area increase when the radius increases by this 25%?

Question #233

A rectangle has its length that is two times as long as its width. The perimeter of the rectangle is 30 inches. What is the length and the width of the rectangle?

Question #234

A rectangle has its length 25% longer than its width. The area of the rectangle is 500 square inches.

If the length of this rectangle is increased by 20%, and the width is increased by 10%, what is the area of the new rectangle?

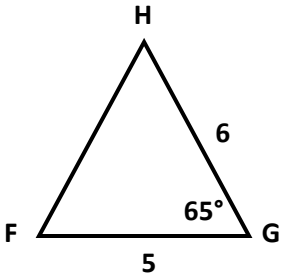
Question #235

A rectangle has perimeter of 100 feet, and its width is 25% of its length.

If a square has an area that is 25% of the area of the rectangle, what is the perimeter of the square?

Question #236

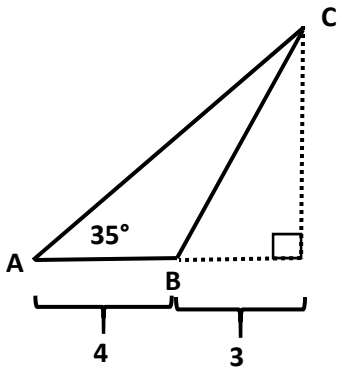
Which of the following expressions gives the area, in square inches, of ΔFGH, shown below with the given side lengths in inches?



a) 30 Cos 65°
b) 30 Sin 65°
c) 15 Cos 65°
d) 15 Sin 65°
e) 15 Tan 65°

Question #237

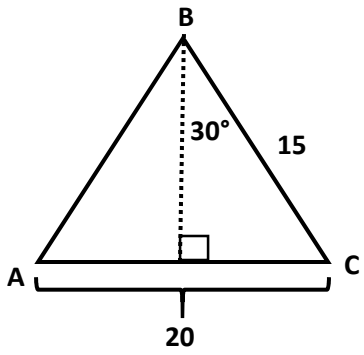
Which of the following expressions gives the area, in square inches of ΔABC, shown below with the given lengths in inches?



a. $\frac{49}{2}$ Tan 35°
b. 14 Tan 35°
c. 14 Sin 35°
d. 49 Tan 35°
e. 14 Cos 35°

Question #238

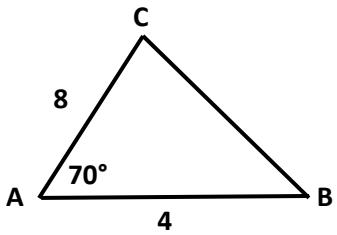
Which of the following expressions gives the area, in square inches of ΔABC, shown below with the given lengths in inches?



a. 150 Cos 30°
b. 300 Cos 30°
c. 150 Sin 30°
d. 150 Tan 30°
e. 300 Sin 30°

Question #239

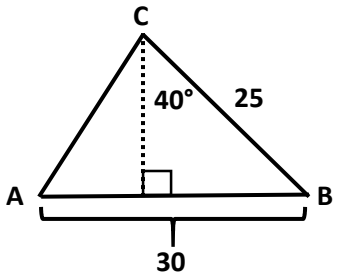
Which of the following expressions gives the area, in square inches, of ΔABC, shown below with the given lengths in inches?



a. 16 Cos 70°
b. 32 Sin 70°
c. 32 Cos 70°
d. 16 Sin 70°
e. 16 Tan 70°

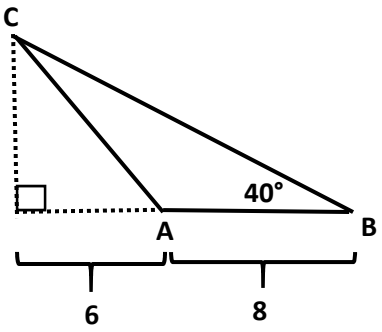
Question #240

Which of the following expressions gives the area, in square inches, of ΔABC, shown below with the given lengths in inches?



a. 750 Cos 40°
b. 375 Cos 40°
c. 375 Sin 40°
d. 375 Tan 40°
e. 750 Sin 40°

Question #241
Which of the following expressions gives the area, in square inches, of ΔABC, shown below with the given lengths in inches?



a. 112 Tan 40°
b. 56 Sin 40°
c. 56 Cos 40°
d. 112 Sin 40°
e. 56 Tan 40°

Question #242
The probability of drawing a red marble out of a bag of marbles is 7/16. The probability of drawing a blue marble is 3/16. What is the probability of drawing a red or a blue marble?

Question #243
Considering Question #242, what is the probability of drawing neither a red nor a blue marble?

Question #244
A bag contains 3 green chips, 4 red chips, and 6 blue chips. What is the probability of drawing one chip at random that is red?

Question #245
One die is rolled, what is the probability the number rolled is greater than 4 or even?

Question #246
One dies is rolled, what is the probability the number rolled is either a two or a number greater than 3?

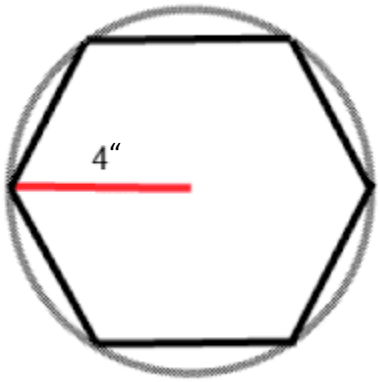
Question #247
When Bill went to sleep the temperature was 32° F. When Bill woke up the temperature was -11° F. Let + represent a rise in temperature, and - denote a drop in temperature. What was the change in temperature from the time Bill went to sleep until the time he awoke?

Question #248
When Tony arrived at school, it was -5° F. When Tony left the school it was 28° F. Letting + denote a rise in temperature and letting - denote a drop in temperature, what was the change in temperature from the time Tony arrived at school to the time Tony left school?

Question #249
When John went to the basketball game, the temperature was 25° F. When John left the basketball game the temperature was 20% higher. Letting + denote a rise in temperature and letting - denote a drop in temperature, what was the change in temperature from the time John went to the basketball game and when he left?

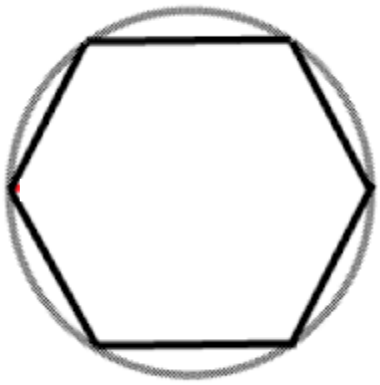
Question #250
When Steve went to the airport, the temperature was 20° F. When Steve left the airport the temperature had dropped by 31° F. What was the temperature when Steve left the airport?

Question #251
A regular hexagon is inscribed in a circle whose radius is 4 inches. What is the perimeter, in inches of the regular hexagon (NOTE: a polygon is regular if all interior angles are equal and all sides are of equal length).



Question #252
What is the area of the circle in Question #251?

Question #253
A regular hexagon is inscribed in a circle and the perimeter of the regular hexagon is 30 inches. What is the circumference of the circle?



Question #254
Tina runs at a rate of 8 miles per hour. At that rate, how many miles will she run in 2 hours?

Question #255
Tina runs at a rate of 8 miles per hour. At that rate, how many miles will Tina run in 20 minutes?

Question #256
Bill runs 3 miles per hour. How may feet will Bill run in 10 minutes (1 mile = 5,280 feet).

Question #257
A car is going ten miles per hour. How many centimeters will the car travel in five minutes given the following:

- 1 mile = 5, 280 feet,
- 1 foot = 12 inches, and
- 1 inch = 2.54 centimeters?

Question #258
A faucet pours 109 gallons per hour. How many quarts will be poured in 10 minutes given 1 gallon = 4 quarts?

Question #259
Marcos programs his calculator to evaluate a ***linear*** function, but he doesn't say what the function is. When 5 is entered, the calculator displays the value 2. When 15 is entered, the calculator displays the value 6. What value will the calculator display when the number n is entered?

Question #260
After 1 hour, John is 3 miles from home. After 3 hours, John is 9 miles from home. If John's distance is a ***linear*** function, how many miles is John from home after t hours?

Question #261
Water flows into a bucket. After 30 minutes, the water in the bucket is 6 inches deep. After 45 minutes the water in the bucket is 8 inches deep. If the depth of the water is a ***linear*** function, what is the depth at time t?

Question #262
Jenny gives a clerk $55, and the clerk gives $10 back. The next day, Jenny gives the clerk $43 and the clerk gives $50 back. If the money the clerk gives back is a ***linear*** function, then how much will the clerk give back to Jenny if Jenny gives the clerk D dollars?

Question #263
Circle A has a radius of 6 inches, and Circle B has a radius of 5 inches. What is the ratio of the area of Circle A to Circle B?

Question #264
A square has side length of 4 inches. A rectangle is 17 inches long and 2 inches wide. What is the ratio of the area of the square to the area of the rectangle?

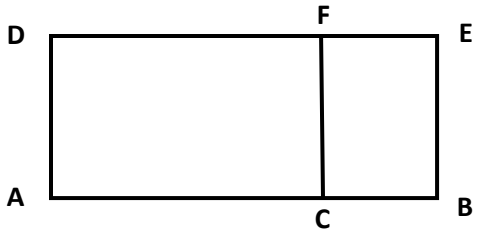
Question #265
The sum of Julie's and Tony's heights is 102 inches. Tony is 3 inches less than half of Julie's height. What is the ratio of Julie's height to Tony's height?

Question #266

Consider the figure below. All angles are right angles and the measurements are as follows:

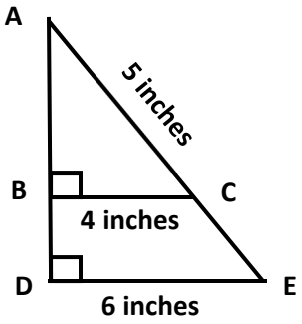
$\overline{DF}$ = 100 inches
$\overline{BC}$ is 16% of the length of $\overline{DF}$
$\overline{CF}$ is 25% longer than $\overline{BC}$

What is the ratio of the area of the rectangle ABED to the area of the rectangle BEFC?



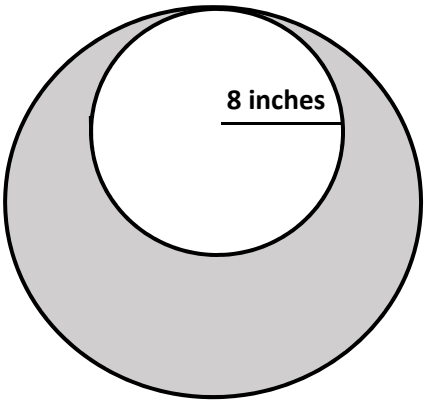
Question #267

Consider the figure below. Given that $\overline{BC}$ = 4 inches, $\overline{AC}$ = 5 inches, and $\overline{DE}$ = 6 inches, what is the ratio of the area of triangle ΔABC to the area of trapezoid BCDE?



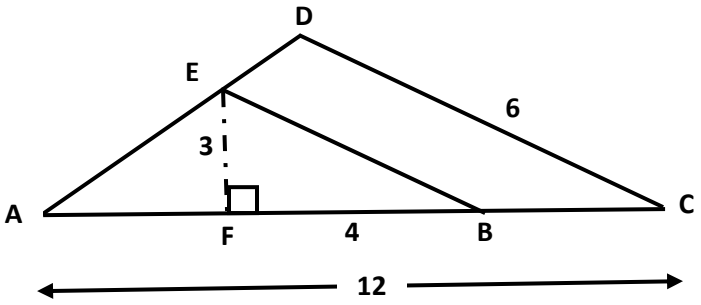
Question #268

Consider the figure below. The smaller circle has radius of 8 inches and the larger circle has radius that is 25% larger than the radius of the small circle. What is the ratio of the area of the smaller circle to the area of the shaded region of the larger circle?



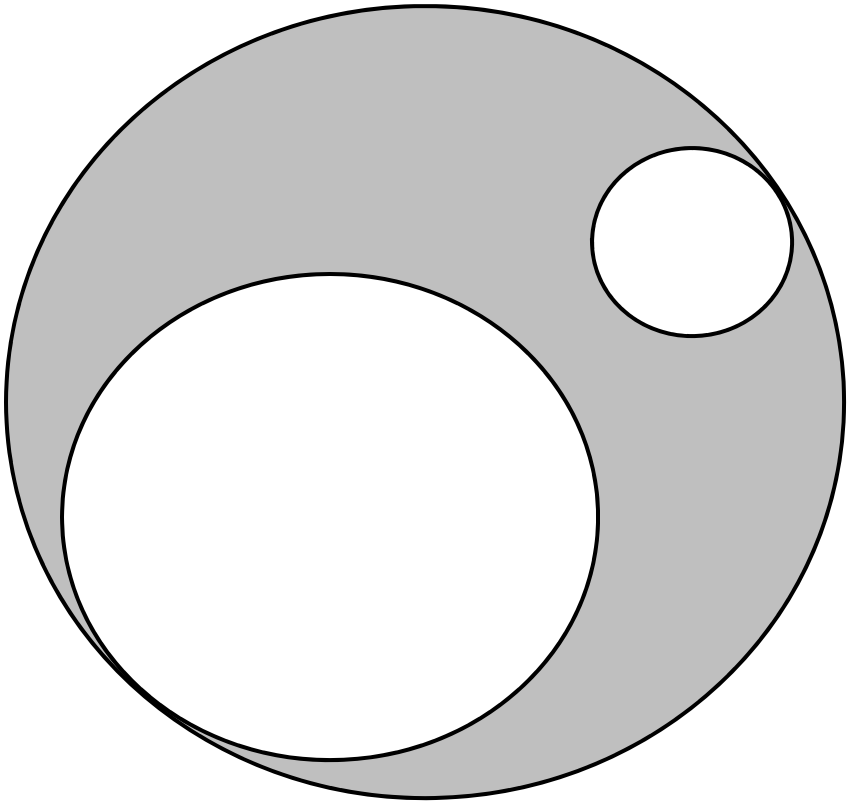
Question #269

Consider the figure below. $\overline{DC}$ is parallel to $\overline{EB}$. $\overline{DC}$ = 6, $\overline{EF}$ = 3, $\overline{FB}$ = 4, and $\overline{AC}$ = 12. Also $\overline{EF}$ intersects $\overline{AB}$ at a right angle. What is the perimeter of trapezoid BCDE?



Question #270

In the figure below, the largest circle has a radius that is 2 inches longer than the middle sized circle. Also, the radius of the smallest circle is one inch shorter than that of the middle sized circle. If you add the lengths of the three radii, the sum is 13 inches. What is the area of the shaded region?



Question #271
COMMIT TO MEMORY: Solving equations

- If you solve an equation for x and the result is:

  0 = 0 or 3 = 3 or something like that, then the solution is all numbers or infinitely many solutions.

- If you solve an equation for x and the result is:

  0 = 3 or 2 = 7 or something like that, then there are no solutions.

Question #272
Solve for x:

$3x + 2 = 2(x + 1) + x$

Question #273
Solove for x:

$3x + 2 = 2(x + 2) + x$

Question #274
Solve for x:

$2x + 3 = 7$

Question #275
Solve for x if:

$y = 2x + 3$, and
$y = 3x + 2$

Question #276
Solve for x if:

$y = x + 3$, and
$2y = 2x + 6$

Question #277
Solve for x if:

$y = 2x + 3$, and
$2y = 4x + 8$

Question #278
Ana and Amy started a landscaping job together. When Ana stopped, she had completed 2/5 of the job. When Amy stopped, she had completed 1/3 of the job. Then Ruben completed the rest of the job in 2 hours. Assume that Ana, Amy, and Ruben all worked at the same rate. How many hours would it have taken one of them to complete the entire job alone?

Question #279
If it takes 3 hours to compete 3/7 of a hike, how long will it take to complete the entire hike from start to finish?

Question #280
If it takes 2 hours to walk 5/8 of the way home, how long will it take to walk the entire distance from start to finish?

Question #281
Jim, Bob, and Dan are running a relay. Julie ran 1/5 of the total distance, Bob ran ¾ of the total distance, and Dan ran his distance in one hour. If Julie, Bob, and Dan each run at the same rate, how long would it have taken one of them to run the entire race by himself?

Question #282
Mary, Jill, and Julie, each walked a dog a given distance. Mary walked the dog 1/8 of the way, Jill walked the dog 1/3 of the way, and Julie walked the dog the rest of the way. Also Julie's portion of the walk took five hours. If Mary, Jill, and Julie each walked the dog at the same rate, how long would it have taken one of them to walk the dog the entire distance from start to finish?

Question #283
If a and b are positive real numbers, what is the result of simplifying the following?

$$(2a^{-1}\sqrt{b})^4 \Big/ (a\,b^{-3})$$

Question #284
If x and y are positive real numbers, what is the result of simplifying the following?

$$\frac{(4x)^{-2}\,(-2x^2y)^3}{(3y)^2\,(2x\sqrt{y})^{-3}}$$

Question #285
If x and y are positive real numbers, what is the result of simplifying the following?

$$\frac{(-2\sqrt[3]{y^2}\,x)^{-4}(\frac{x}{y})^2\,(xy)^{-3}}{(-3\sqrt[5]{x^2}\,\sqrt[4]{y})^3}$$

Question #286
Simplify the following expression:

$$\frac{(3^{-1}\,a^{4}\,b^{-3})^{-2}}{(6\,a^{2}\,b^{-1}\,c^{-2})^{2}}$$

Question #287
Simply the following expression:

$$\left(\frac{15\,m^{3}\,n^{-2}\,p^{-1}}{25\,m^{-2}\,n^{-4}}\right)^{-3}$$

Question #288
If matrix A equals:

$$\begin{bmatrix} a \\ 2a \\ 3a \end{bmatrix}$$

…and matrix B equals:

$$\begin{bmatrix} 1 & 0 & -1 \end{bmatrix}$$

…what is A x B?

Question #289
If matrix A and matrix B are as defined in Question #288, what is B x A?

Question #290
To become a contestant on a quiz show, a person must correctly order four rock stars by age, from youngest to oldest. The contestant randomly guesses at the order. What is the probability the contestant will get all four in the correct order?

Question #291
Same question as Question #290, except the contestant knows which one is the oldest rock star. The contestant guesses at the order. What is the probability the contestant will get all four in the correct order?

For Questions #292, #293, and #294, the possible letters are A, B, C, …, X, Y, and Z; the possible numbers are 0, 1, 2, …, 7, 8, and 9.

Question #292
A license plate is to have two letters followed by three single digit numbers. How many different license plates are possible?

Question #293
A license plate is to have two letters followed by three single digit numbers. No letter can appear more than once, and no number can appear more than once. How many different license plates are possible?

Question #294
A license plate is to have three letters followed by two single digit numbers. The first letter must be either an A or a B. How many different license plates are possible?

Question #295
Simplify the following:

$$\frac{x/3 + 1/2}{2/3 - 1/4}$$

Question #296
Simplify the following:

$$\frac{3/4 - 2/3}{x/6 - 4/9}$$

Question #297
Simplify the following:

$$\frac{2x - 3/4}{x/3 - 5/8}$$

Question #298
Simplify the following:

$$\frac{x^2/7 + 3/5}{2/5 - 2/7}$$

Question #299
Simplify the following:

$$\frac{1/4 + 1/8}{7/16 + 5/32}$$

Question #300

The triangle shown below has side lengths of 37, 38, and 39 inches. Which of the following expressions gives the measure of the largest angle of the triangle?

Note: for every triangle with sides of length a, b, and c that are opposite ∠A, ∠B, and ∠C respectively:

$$c^2 = a^2 + b^2 - (2ab)\ Cos\ C$$

a. $Cos^{-1}(-\frac{37^2-38^2-39^2}{2(38)(39)})$

b. $Cos^{-1}(-\frac{39^2-37^2-38^2}{2(37)(38)})$

c. $Cos^{-1}[37^2 - 38^2 - 39^2 + 2(38)(39)]$

d. $Cos^{-1}[38^2 - 37^2 - 39^2 + 2(37)(39)]$

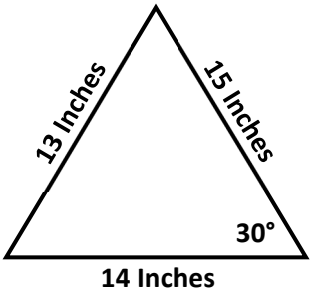
e. $Cos^{-1}[39^2 - 37^2 - 38^2 + 2(37)(38)]$

Question #301

The triangle shown below has side lengths of 13, 14, and 15. The angle opposite the side of length 13 is 30°. What expression gives the measure of the largest angle of the triangle?

Note: for every triangle with sides of length a, b, and c that are opposite ∠A, ∠B, and ∠C respectively:

$$\frac{Sin\ A}{a} = \frac{Sin\ B}{b} = \frac{Sin\ C}{c}$$

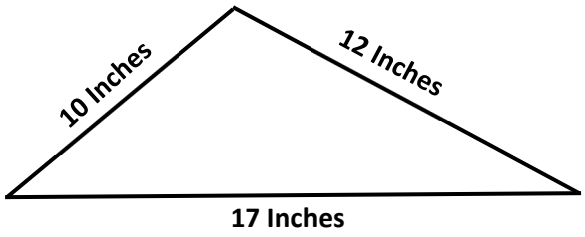


Question #302

The triangle shown below has side lengths of 10, 12, and 17 inches. Write the expression for the measure of the smallest angle of the triangle.

Note: for every triangle with sides of length a, b, and c that are opposite ∠A, ∠B, and ∠C respectively:

$$c^2 = a^2 + b^2 - (2ab)\ Cos\ C$$

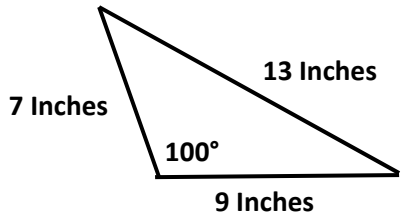


Question #303

The triangle shown below has side lengths of 7, 9, and 13 inches. The angle opposite the side of length 13 inches is 100°. What expression gives the measure of the smallest angle of the triangle?

Note: for every triangle with sides of length a, b, and c that are opposite ∠A, ∠B, and ∠C respectively:

$$\frac{Sin\ A}{a} = \frac{Sin\ B}{b} = \frac{Sin\ C}{c}$$



Question #304

A sequence is defined for all positive integers of n by:

$$S_n = 2\ S_{n-1} + n + 1, where\ S_1 = 3.$$

What is S_4?

Question #305

A sequence is defined for all positive integers of n by:

$$S_n = (^1/_2)\ S_{n-1}, where\ S_1 = 4.$$

What is S_5?

Question #306

A sequence is defined for all positive integers of n by:

$$S_n = 3\ S_{n-1} + 2n, where\ S_1 = 2.$$

What is S_5?

Question #307

A sequence is defined for all positive integers of n by:

$$S_n = 2\ S_{n-1} - 7, where\ S_{30} = 151.$$

What is S_{29}?

Question #308
A sequence is defined for all positive integers of n by:

$$S_n = 2\,S_{n-1}^2 + 3\,S_{n-2}, where\ S_1 = 2\ and\ S_2 = 1.$$

What is S_4?

Question #309
At the school carnival, Ann is playing a game involving a stack of 10 index cards. Each card has a single number written on it: 1 card has a 1, 2 cards have a 2, 3 cards have a 3, and 4 cards have a 4. Ann will choose 1 card at random, and she will be awarded the number of points equal to the number written on the card. Let the random variable X represent the number of points Ann receives on any 1 draw. What is the expected value of X?

Question #310
A single die is rolled. Let the random variable X equal the number rolled. What is the expected value of X?

Question #311
Two dice are rolled. Let the random variable X equal the number rolled. What is the expected value of X?

Question #312
A number is drawn at random from the set of numbers {-2, 3, 5}. A second number is drawn at random from the set of numbers {8, 9}. Let the random variable X represent the product of the two numbers drawn. What is the expected value of X?

Question #313
A bag contains 6 chips. Two chips have the number five written on them, three chips have the number seven written on them, and one chip has the number eleven written on it. Let the random variable X represent the number on the chip drawn when one chip is drawn from the bag. What is the expected value of X?

Question #314
The mean of a set of six numbers {2, 6, 8, 5, 9, X} is 12. What is the value of X?

Question #315
The median of a set of eight numbers is 13. If the set of numbers is given below, what is the value of X?

{27, 1, 21, 20, 4, 12, 9, X}

Question #316
The median of a set of four numbers is 6. If the set of numbers is given below, what is the value of X?

{12, 1, X, 9}

Question #317
The median of a set of five numbers is 12. If the set of numbers is given below, what is the value of X?

{5, 19, 2, X, 18}

Question #318
The mean of a set of six numbers is 9, and the set is given below:

{12, 15, 3, X, Y, 12}

The mean of a set of four numbers is 5, and the set is given below:

{X, 3, 1, 9}

What is X – Y?

Question #319
The mean of the set of five numbers {42, 3, 11, 27, X} is 24.

The median of the set of four numbers {53, 8, 29, Y} is 38.

What is the value of X – Y?

Question #320
The equation below is that of a circle that lies in the standard (x, Y) coordinate plane.

$$(x-7)^2 + (y-8)^2 = 10$$

One endpoint of a diameter of the circle has a y-coordinate of 11. What is the y-coordinate of the other endpoint of the diameter?

Question #321
The equation of a circle is given below.

$$(x+3)^2 + (y-4)^2 = 17$$

What is the area of the circle?

Question #322
The equation of a circle is given below.

$$(x-7)^2 + (y+3)^2 = 26$$

What is the area of the circle?

Question #323
Using the equation in Question #321, if one endpoint of a diameter of the circle has a y-coordinate of 5, what is the y-coordinate of the other endpoint?

Question #324
Using the equation in Question #322, if one endpoint of a diameter of the circle has an x-coordinate of 10, what is the x-coordinate of the other endpoint?

Question #325
The plans for diving pool call for a rectangular prism that has length of 30 meters, width of 25 meters, and depth of 5 meters. If the plans are changed to increase both the length and the width of the pool by 10%, what will be the increase to the nearest 1% of the volume of the pool?

Question #326
A cube has a side length of 10 meters. If the side length is increased by two meters, what is the percentage change in the cube's volume?

Question #327
The plans for a diving pool call for a rectangular prism that has a given length, width, and depth. If the length is to be increased by 3%, the width is to be increased by 5%, and the depth is to be increased by 7%, what is the percentage increase in the volume of the pool?

Question #328
The formula for the volume of a right cylinder is given below.

$$V = \pi\, r^2\, h$$

A given cylinder has dimeter of 12 units, and height of 7 units. If the diameter is increased by 50%, and the height is increased by 2 units, then what is the percentage increase in the cylinder's volume?

Question #329
A cube has a given side length. If the side length is increased by 3% then what is the percentage increase in the volume of the cube?

Question #330
The formula for the volume of a right cylinder is given below.

$$V = \pi\, r^2\, h$$

A given right cylinder has a given diameter and a given height. If the diameter is increased by 5% and the height is decreased by 17%, what is the percentage change in volume of the right cylinder (negative means volume decreased and positive means volume increased).

Question #331

One solution of the equation given below is x = -1.

$$4x^3 - 2x^2 + x + 7 = 0$$

Which of the following describes the other two solutions?

a. Both are negative real numbers,
b. One is a negative real number, and the other is a positive real number,
c. Both are positive real numbers,
d. One is a positive real number, and the other is a complex number, or
e. Both are complex numbers

Question #332

One solution of the equation given below is x = -1.

$$x^3 + 5x^2 + 8x + 4 = 0$$

Which of the following describes the other two solutions?

a. Both are negative real numbers,
b. One is a negative real number, and the other is a positive real number,
c. Both are positive real numbers,
d. One is a positive real number, and the other is a complex number, or
e. Both are complex numbers

Question #333

One solution of the equation given below is x = 7.

$$3x^3 - 19x^2 - 5x = 63$$

Which of the following describes the other two solutions?

a. Both are negative real numbers,
b. One is a negative real number, and the other is a positive real number,
c. Both are positive real numbers,
d. One is a positive real number, and the other is a complex number, or
e. Both are complex numbers

Question #334
One solution of the equation given below is x = 2.

$$x^3 - 3x^2 = 10x - 24$$

Which of the following describes the other two solutions?

a. Both are negative real numbers,
b. One is a negative real number, and the other is a positive real number,
c. Both are positive real numbers,
d. One is a positive real number, and the other is a complex number, or
e. Both are complex numbers

Question #335
One solution of the equation given below is x = 3.

$$2x^3 + 31x = 8x^2 + 75$$

What are the other solution(s)?

Question #336
What is the greatest common factor of 8 and 12?

Question #337
What is the greatest common factor of 414 and 324?

Question #338
What is the greatest common factor of 1,680 and 504?

Question #339
What is the greatest common factor of 1,536 and 408?

Question #340
What is the greatest common factor of 1,170 and 546?

Question #341
What is the least common multiple of 3 and 7?

Question #342
What is the least common multiple of 1,170 and 420?

Question #343
What is the least common multiple of 108 and 224?

Question #344
What is the least common multiple of 60,225 and 150?

Question #345
What is the least common multiple of 32,100 and 64?

Question #346
What is the least common multiple of 160,100 and 64?

Question #347
What is the greatest common factor of 160,100 and 320?

Question #348
The area of circle A is 20% of the area of circle B. If the area of circle B is 25 square inches, what is the area of circle A?

Question #349
The length of the side of a square is 5% longer than the length of a rectangle. If the length of the side of the square is 40 inches, what is the length of the rectangle?

Question #350
The width of a rectangle is 5% less than its length. If the area of the rectangle is 20 square inches, what is its length?

Question #351
The width of a rectangle is 5% of the length. If the length is 20 inches what is the width?

Question #352
If the circumference of circle A is 30% of the circumference of circle B, and the circumference of circle A is 70 inches, then what is the circumference of circle B?

Question #353
Tony's height is 75% of Jim's height. If Jim is 64 inches tall, how tall is Tony?

Question #354
Fido can run 20% faster than Barkey. If Fido can run 20 mph, then how fast can Barkey run?

Question #355
Fido runs a distance that is 7% less than the distance Barkey runs. If Barkey runs 10 miles, then how far did Fido run?

Question #356
The temperature in Idaho is 95% of the temperature in Alabama. If the temperature in Alabama is 80°, what is the temperature in Idaho?

Question #357
If the weight of container A is 25% of the weight of container B, and the weight of container A is 40 pounds, what is the weight of container B?

Question #358
Tony is 70 inches tall. If Tony is 10% taller than George, how tall is George?

Question #359
Train A is 15% faster than train B. If Train A travels at 25 mph how fast does Train B travel?

Question #360
The blue car weighs 9% less than the white car. If the blue car weighs 1,000 pounds, how much does the white car weigh?

Question #361
The brown dog weighs 70% of the gray dog. If the gray dog weighs 100 pounds, how much does the brown dog weigh?

Question #362
If the diameter of pizza A is 5% less than the diameter of pizza B, and the diameter of pizza A is 20 inches, what is the diameter of pizza B?

Question #363
Circle A has an area of 15 square inches. Circle B has an area of 20 square inches. What is the area of circle A as a percent of circle B?

Question #364
In Question #363, what is the area of circle B as a percent of the area of circle A?

Question #365
In Question #363, circle A is what percent smaller than circle B?

Question #366
In Question #363, circle B is what percent bigger than circle A?

Question #367
Suppose $0 < x < {}^{\pi}/_{2}$, and Tan x = ${}^{4}/_{5}$. What is Sin x?

Question #368
Suppose ${}^{\pi}/_{2} < x < \pi$, and Tan x = $-{}^{3}/_{4}$. What is Cos x?

Question #369
Suppose $\pi < x < {}^{3\pi}/_{2}$, and Tan x = ${}^{3}/_{7}$. What is Sin x?

Question #370
Suppose ${}^{3\pi}/_{2} < x < 2\pi$, and Tan x = $-{}^{3}/_{4}$. What is Sin x?

Question #371
Triangle A and triangle B are similar such that the ratio of lengths of triangle A to triangle B is 3:5. If the perimeter of triangle B is 60 inches, what is the perimeter of triangle A?

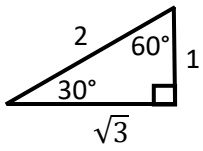
Question #372
Triangles A and B are similar such that the ratio of lengths is 3:5. If the perimeter of triangle A is 30 inches, what is the perimeter of triangle B?

Question #373
Triangle A and triangle B are similar such that the ratio of lengths is 3:5. If the area of triangle B is 150 square inches, what is the area of triangle A?

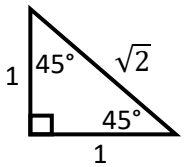
Question #374
Triangle A and triangle B are similar such that the ratio of lengths is 3:5. If the area of triangle A is 90 square inches, what is the area of triangle B?

Question #375
COMMIT TO MEMORY:

The ratios of side lengths of a 30-60-90 triangle are:



The ratios of side lengths of a 45-45-90 triangle are:

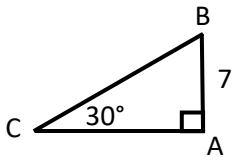


Question #376
Use the relationships of the sides for a 30-60-90 triangle, and for a 45-45-90 triangle to find the value of the trigonometric functions for the following angles:

x	Sin x	Cos x	Tan x
30°			
45°			
60°			
120°			
135°			
150°			
210°			
225°			
240°			
300°			
315°			
330°			

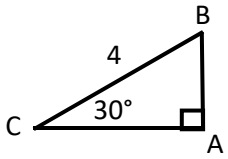
Question #377

Given the triangle with the angle measures and length given below, what is the length of $\overline{AC}$?



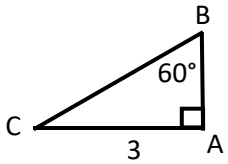
Question #378

Given the triangle with angle measures and length given below, what is the length of $\overline{AB}$?



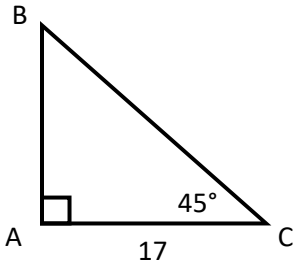
Question #379

Given the triangle with angle measures and length given below, what is the length of $\overline{BC}$?



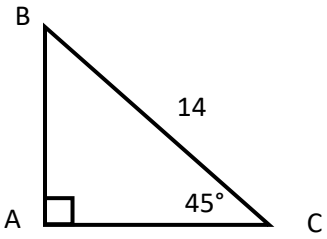
Question #380

Given the triangle with angle measure and length given below, what is the length of $\overline{AB}$?



Question #381

Given the triangle with angle measure and length given below, what is the length of $\overline{AB}$?



Question #382
Find the value of x that makes the following true:

$$2^{x+7} = 2^8$$

Question #383
Find the value of x that makes the following true:

$$3^{x^2+2} = 3^{3x}$$

Question #384
Find the value of x that makes the following true:

$$4^{3x+1} = 4^{x+7}$$

Question #385
Find the value of x that makes the following true:

$$7^{2x^2-8x} = 7^{-8}$$

Question #386
Find the value of x that makes the following true:

$$2^{x+1} = 4^{3x-2}$$

Question #387
Find the value of x that makes the following true:

$$3^{4x+22} = 9^{7x+1}$$

Question #388
Find the value of x that makes the following true:

$$3^{2x+30} = 27^{4x}$$

Question #389
Find the slope and y-intercept of the following equation:

$$3y - 6 = 24x$$

Question #390
Find the slope and y-intercept of the following equation:

$$-2y + 6x = 12$$

Question #391
Find the slope and x-intercept of the following equation:

$$7x - 3 = 14y$$

Question #392
Find the slope of the line perpendicular to the following equation:

$$4y - 8x + 12 = 8$$

Question #393
Find the slope and y-intercept of the line the passes through the point (3, -7) and is perpendicular to the following equation:

$$2x = 4y - 8$$

Question #394
Find the slope and x-intercept of the line that passes through the point (4, 7) and is parallel to the following equation:

$$3y - 6x + 8 = -1$$

Question #395
The determinant of a 2x2 matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is equal to *ad – bc*. What is the determinant of the following matrix?

$$\begin{bmatrix} 2 & 3 \\ 7 & 8 \end{bmatrix}$$

Question #396
The determinant of a 2x2 matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is equal to *ad – bc*. What is the determinant of the following matrix?

$$\begin{bmatrix} 5 & 6 \\ 1 & 4 \end{bmatrix}$$

Question #397
The determinant of a 2x2 matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is equal to *ad – bc*.

If the determinant of matrix A is three times the determinant of matrix B, find the value of k.

$$A = \begin{bmatrix} 1 & 3 \\ 3 & 6 \end{bmatrix} \qquad B = \begin{bmatrix} 4 & 10 \\ 2 & k \end{bmatrix}$$

Question #398

The determinant of a 2x2 matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is equal to *ad – bc*.

If the determinant of the matrix below is -6, what is the value of k?

$$\begin{bmatrix} 3k & 4 \\ -3k & 2k \end{bmatrix}$$

Question #399

The determinant of a 2x2 matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is equal to *ad – bc*.

Given the matrices A and B below, if the determinant of A x B is -2, what is the value of k?

$$A = \begin{bmatrix} 2 & 2 \\ 2 & 1 \end{bmatrix} \qquad B = \begin{bmatrix} k & 1 \\ 2 & 3 \end{bmatrix}$$

Question #400

A right cylinder with a radius of 3 units and height of 6 units is being shipped in a cube shaped box with side length of 6 units. What percent of the volume of the cube shaped box is not filled by the right cylinder (use 3.14 for π)?

Question #401

A right cone of with a radius of 3 units and a height of 6 units is being shipped in a cube shaped box with side length of 6 units. What percent of the volume of the cube shaped box is filled by the right cone (use 3.14 for π)?

Question #402

A company ships a spherical ball with a radius of 10 units in a cube shaped box with side length of 20 units and fills the unfilled portion of the cube shaped box with liquid packing material. What is the volume of liquid packing material used in the cube shaped box? Use 3.14 for π, and the formula for the volume of a sphere is $(^4/_3)\ \pi\ r^3$.

Question #403

A rectangular aquarium has length of 4 feet, height of 3 feet, and width of 2 feet. If there are 231 cubic inches in a gallon, how many gallons of water can three such aquariums contain?

Question #404

A company wants to ship cube shaped boxes with side length of 2 inches, in a rectangular shaped box that is 12 inches long, 6 inches wide, and 8 inches tall. How many cube shaped boxes can fit inside seven of the rectangular shaped boxes?

Question #405

Solve the inequality for x: $|x - 3| < 2$

Question #406
Solve the inequality for x: $|x - 7| \leq 4$

Question #407
Solve the inequality for x: $|x - 2| > 5$

Question #408
Solve the inequality for x: $|x - 3| + 4 > 19$

Question #409
Solve the inequality for x: $|2x - 7| + x - 3 > 14$

Question #410
Solve the inequality for x: $|5x - 12| - 2x + 4 > x + 8$

Question #411
Solve the inequality for x: $|8 - 4x| > 24$

Question #412
Solve the inequality for x: $|9 - 3x| + 7 > 19$

Question #413
The cost of a long-distance call to a certain city is $1.05 for the first minute, and $0.15 for each additional minute. What is the cost of a 15-minute call to this city?

Question #414
A taxi ride costs $5.00 for the first mile, $4.00 per mile for the next nine miles, and $2.50 per mile thereafter. How much would it cost for a 26 mile ride in a taxi?

Question #415
Baseballs cost $4 each for the first seven baseballs. The next eight baseballs cost $3 each. Each baseball thereafter costs $2.75. How much would two dozen baseballs cost?

Question #416
Cat food costs $1.50 a pound for the first five pounds. The next 12 pounds cost $1.25 a pound. The next four pounds cost $1.00 a pound. Each pound thereafter cost $0.75 a pound. How much would 100 pounds of cat food cost?

Question #417
What was the average cost per minute for the phone call in Question #413?

Question #418
What was the average cost per mile for the taxi ride in Question #414?

Question #419
What was the average cost per baseball in Question #415?

Question #420
What was the average cost per pound of cat food in Question #416?

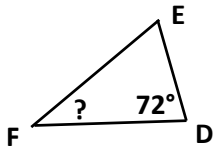
Question #421
Julie is saving money to buy a toaster that costs $150. Julie opens a savings account with $40. Then Julie deposits $20 each month. What is the minimum number of months Julie will need to make deposits until she has enough money in the account to buy the toaster?

Question #422
Charlie is saving money to buy a car that costs $15,000. Charlie opens a savings account with $5,000. Then Charlie deposits $1,650 each month. What is the minimum number of months Charlie will need to make deposits until he has enough money in the account to buy the car?

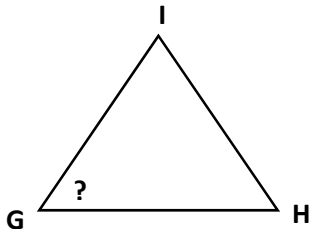
Question #423
Bill is saving money to buy a motorcycle that costs $7,500. Bill opens a savings account with $2,500. Then Bill deposits $250 each month. What is the minimum number of months Bill will need to make deposits until he has enough money in the account to buy the motorcycle?

Question #424
Tim is saving money to buy a jet that costs $4,500,000. Tim opens an account with $1,000,000. Tim makes deposits of $250,000 each month. What is the minimum number of months Tim will need to make deposits until he has enough to buy the jet?

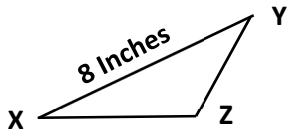
Question #425
In ΔDEF shown below, the measure of ∠D is 72° and $\overline{DE} \cong \overline{DF}$. What is the measure of ∠F?



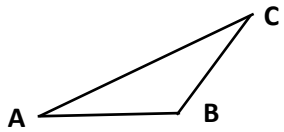
Question #426
In ΔGHI shown below, all three sides of the triangle are four inches long. What is the measure of ∠G?



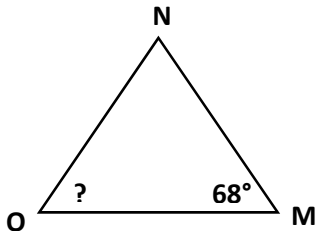
Question #427
In ΔXYZ shown below, the length of $\overline{XY}$ is 8 inches, and the perimeter of the triangle is 16 inches (not drawn to scale). If ∠X = ∠Y what is the length of $\overline{YZ}$?



Question #428
In ΔABC shown below, ∠B is equal to twice the sum of ∠A and ∠C. If $\overline{AB} \cong \overline{BC}$, then what is the measure of ∠B?



Question #429
In ΔMNO shown below, the measure of ∠M is 68°, and $\overline{MN} \cong \overline{MO}$. What is the measure of ∠O?



Question #430
Convert 60° to radians.

Question #431
Convert 20° to radians.

Question #432
Convert 280° to radians.

Question #433
Convert -30° to radians.

Question #434
Convert -80° to radians.

Question #435
Convert 180° to radians.

Question #436
Convert 235° to radians.

Question #437
A committee will be selected from a group of 7 women and 6 men. The committee will consist of 4 women and 4 men. How many different committees are possible.

Question #438
A dog show is to have 3 beagles, 14 chihuahuas, and 7 corgies. If the kennel has 8 beagles, 20 chihuahuas, and 10 corgies, which of the following expressions gives the number of different dog shows that could be selected from these 38 dogs?

a. $({}_8P_3)({}_{10}P_7)({}_{20}P_{14})$
b. $({}_{20}C_7)({}_{14}C_{10})({}_8C_3)$
c. $({}_8C_3)({}_{10}C_3)({}_{20}C_{14})$
d. $({}_8C_3)({}_{10}C_7)({}_{20}C_{14})$
e. $({}_{10}P_3)({}_8P_7)({}_{20}P_{14})$

Question #439
A kennel has 10 cats and 14 dogs. There are five pens. If the first three pens are to be used to hold one dog each, and the last two pens are to be used to hold on cat each, what expression below tells the different orders that are possible?

Dog Pen #1	**Dog Pen #2**	**Dog Pen #3**	**Cat Pen #4**	**Cat Pen #5**

a. $({}_{10}P_3)({}_{14}P_2)$
b. $({}_3P_{10})({}_2P_{10})$
c. $({}_3P_{14})({}_2P_{10})$
d. $({}_{14}P_3)({}_{10}P_2)$
e. $({}_{14}C_3)({}_{10}C_2)$

Question #440
Which of the following expressions is equal to (hint: multiply by the conjugate of the denominator):

$$\frac{7}{3+\sqrt{2}}$$

a. $3-\sqrt{2}$
b. $3+\sqrt{2}$
c. $\frac{21+5\sqrt{2}}{7}$
d. $\frac{21-5\sqrt{2}}{7}$
e. 7

Question #441
Simplify the following expression (hint: multiply by the conjugate of the denominator):

$$\frac{2+\sqrt{5}}{3-\sqrt{5}}$$

Question #442
Simplify the following expression (hint: multiply by the conjugate of the denominator):

$$\frac{6-\sqrt{8}}{4+\sqrt{2}}$$

Question #443
Simplify the following expression (hint: multiply by the conjugate of the denominator):

$$\frac{18+\sqrt{12}}{4-\sqrt{3}}$$

Question #444
Simplify the following expression (hint: multiply by the conjugate of the denominator):

$$\frac{2+\sqrt{7}}{1-\sqrt{7}}$$

Question #445
Simplify the following expression (hint: multiply by the conjugate of the denominator):

$$\frac{4}{3+\sqrt{5}}$$

Question #446
Simplify the following expression (hint: multiply by the conjugate of the denominator):

$$\frac{3}{4-\sqrt{5}}$$

Question #447
The perimeter of a square is 40 meters. What is the length of the square's diagonal?

Question #448
The length of a square's diagonal is 20 meters. What is the perimeter and area of the square?

Question #449
The length of a diagonal of a rectangle is $5\sqrt{5}$ feet. The length of the rectangle is twice that of the width. What is the perimeter and area of the rectangle?

Question #450
The perimeter of a rectangle is 80 cm. If the width of the rectangle is one-third of its length, what is the length of the rectangle's diagonal?

Question #451
An isosceles right triangle has area of 50 square inches. What is the perimeter of the triangle?

Question #452
An isosceles right triangle has perimeter of $16 + 8\sqrt{2}$ feet. What is the area of the triangle?

Question #453
An isosceles right triangle has perimeter of $20 + 10\sqrt{2}$ meters. What is the area of the triangle?

Question #454
Paul makes dog sweaters to sell. He spends $36 on a sewing machine. He spends $3 on the materials to make each sweater. If Paul sells each sweater for $5, what equation will represent his profit if he sells N dog sweaters? Let P be the symbol for profit in dollars.

Question #455
In Question #454, how many sweaters does Paul have to sell to breakeven?

Question #456
In Question #454, how many sweaters does Paul have to sell to make $100 in profit?

Question #457
Toyota makes automobiles to sell. The cost to build the factory is $50,000,000. The cost to make one car is $15,000. If Toyota sells each car for $40,000, what equation represents Toyota's profit if Toyota sells N cars? Let P be the symbol for profit in dollars.

Question #458
In Question #457, how many cars does Toyota have to sell to breakeven?

Question #459
In Question #457, if Toyota's profit is $1,000,000, how many cars did Toyota sell?

Question #460
Craig mows lawns. Craig bought a riding mower for $990. It costs Craig $50 to mow one acre. Craig charges $61 to mow one acre. What equation will represent Craig's profits if he mows A acres? Let P be the symbol for profits in dollars.

Question #461
In Question #460, how many acres does Craig have to mow to breakeven?

Question #462
In Question #460, how many acres does Craig have to mow to have profits of $1,100?

Question #463
Tony paints houses. Tony bought ladders for $450. If it costs Tony $100 to paint a house, and Tony charges $250 to paint a house, what equation will represent Tony's profit if he paints H houses? Let P be the symbol for profits in dollars.

Question #464
Jim grows hay for horse farms. Jim bought a hayfield and equipment for $1,000,000. It costs Jim $30 to grow one hay bale. If Jim sells each hay bale for $50, what equation will represent Jim's profits if he sales H hay bales? Let P be the symbol for profits in dollars.

Question #465
Commit to Memory:

$$y = A \bullet \sin(Bx + C) + D$$

$$y = A \bullet \cos(Bx + C) + D$$

|A| = amplitude (or height)
2π / B = period (or frequency)
- C / B = phase shift (or horizontal shift)
D = vertical shift

Question #466
Find the amplitude and frequency of the function given below.

$$y = 3\ (\sin x) + 4$$

Question #467
Find the amplitude and frequency of the function given below.

$$\frac{1}{3}y = 12\ (\cos 3x) + 6$$

Question #468
Find the amplitude and frequency of the function given below.

$$y = -4\ (\sin 2\pi x) + 6$$

Question #469
Find the amplitude and frequency of the function given below.

$$y = -3\ (\cos(3x + 2)) + 17$$

Question #470

Find the amplitude and frequency of the function given below.

$$\frac{1}{2}y = 2\ (\cos(6(\ 3x + 4))) + 12$$

Question #471

A class of 50 students had the following distribution of grades:

Grade Range	# of Students in Grade Range
0 – 75	5
76 – 80	15
81 – 85	6
86 – 90	12
91 – 100	12

Which grade range contains the median?

Question #472

Shown below are 49 vehicles are categorized by weight. In which weight category does the median exist?

Weight	# Vehicles
0 – 1,000 pounds	7
1,001 – 1,500 pounds	17
1,501 – 1,750 pounds	1
1,751 – 2,000 pounds	20
2,001 – 3,000 pounds	4

Question #473

The lengths of 71 lizards are categorized as shown below. In which length category does the median exist?

Length	# Lizards
0 – 5 inches	18
6 – 10 inches	1
11 – 15 inches	2
16 – 20 inches	10
21 – 25 inches	40

Question #474

The weights of 40 people are categorized as shown below. In which weight category does the median exist?

Weight	# Vehicles
50 – 75 pounds	27
76 – 125 pounds	5
126 – 200 pounds	3
200 – 250 pounds	5

Question #475

The speeds of 100 racecars are categorized as shown below. In which speed category does the median exist?

Speed	# Racecars
100 – 125 mph	10
126 – 150 mph	21
151 – 175 mph	9
176 – 200 mph	9
201 – 225 mph	2
226 – 250 mph	49

Question #476

For all real numbers a, b, and c, which of the following expressions is equivalent to: $|a + b – c|$?

a. $|a – b + c|$
b. $|a + b + c|$
c. $|– a – b + c|$
d. $3|a + b – c|$
e. $|– a – b – c|$

Question #477

For all real numbers a, b, and c, which of the following expressions is equivalent to: $|3a – 2b – c|$?

a. $|3a + 2b + c|$
b. $|– 3a + 2b – c|$
c. $|– 3a – 2b – c|$
d. $|2a – 3b – c|$
e. $|–3a + 2b + c|$

Question #478
For all real numbers a, b, and c, which of the following expressions is equivalent to: $|a - b + c|$?

a. $|2a - 2b + 2c| / 2$
b. $|-2a + 2b - 2c| / 3$
c. $|-a + b + c|$
d. $|-a - b - c|$
e. $|a + b + c|$

Question #479
For all real numbers a, b, and c, which of the following expressions is equivalent to: $|2a - 3b + 4c|$?

a. $|2a + 3b - 4c|$
b. $|-12a + 18b - 24c| / 12$
c. $|-12a - 18b + 24c| / 6$
d. $|-16a + 24b - 32c| / (-8)$
e. $|-16a + 24b - 32c| / 8$

Question #480
A circle with radius of 8 cm is divided into four congruent arcs. What is the length in centimeters of each of the 4 arcs?

Question #481
A circle with radius of 5 cm is divided into 11 congruent arcs. What is the length in centimeters of each of the 5 arcs?

Question #482
A circle has radius of 6 cm. The circle is divided into 3 arcs such that the ratio of the lengths of the three arcs is 3:2:1. What is the difference in length between the longest and the shortest arcs?

Question #483
A circle has radius of 16 cm. The circle is divided into 3 arcs such that the ratio of the lengths of the three arcs is 8:5:3. What is the length of the longest arc?

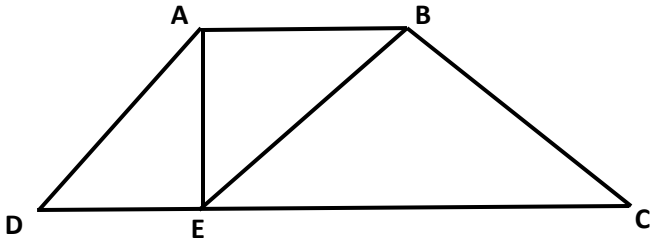
Question #484
A circle has radius of 16 cm. The circle is divided into 3 arcs:

Arc A,
Arc B, and
Arc C.

The length of Arc A is 20% less than the length of Arc B. The length of Arc C is 40% more than the length of arc B. How long is Arc C?

Question #485

In the figure below, ABCD is a trapezoid with $\overline{AE}$ perpendicular to $\overline{AB}$; $\overline{AE}$ is 10 units long; and $\overline{DC}$ is 28 units long. If the area of the right triangle ΔEBA is 60 square units, what is the area, in square units, of the trapezoid ABCD?



Question #486

Consider the number $0.\overline{2874}$. What digit is in the 300th decimal place of $0.\overline{2874}$? (Note: the digit in the 3rd decimal place of $0.\overline{2874}$ is 7).

Question #487

Consider the number $0.\overline{561438}$. What digit is in the 5,008th decimal place of $0.\overline{561438}$? (Note: the digit in the 5th decimal place of $0.\overline{561438}$ is 3).

Question #488

Consider the number $0.\overline{03417}$. What digit is in the 412th decimal place of $0.\overline{03417}$? (Note: the digit in the 3rd decimal place of $0.\overline{03417}$ is 4).

Question #489

Consider the number $0.412\overline{9783}$. What digit is in the 309th decimal place of $0.412\overline{9783}$? (Note: the digit in the 4th decimal place of $0.412\overline{9783}$ is 9).

Question #490

Consider the number $0.\overline{4129783}$. What digit is in the 251st decimal place of $0.\overline{4129783}$? (Note: the digit in the 5th decimal place of $0.\overline{4129783}$ is 7).

Question #491

What is the distance, in coordinate units, between 2 + 6i and –4 + 3i?

Question #492

What is the midpoint of 3 + 7i and –8 – 2i?

Question #493

What is the distance, in coordinate units, between 3 + 20i and 4 + 18i?

Question #494

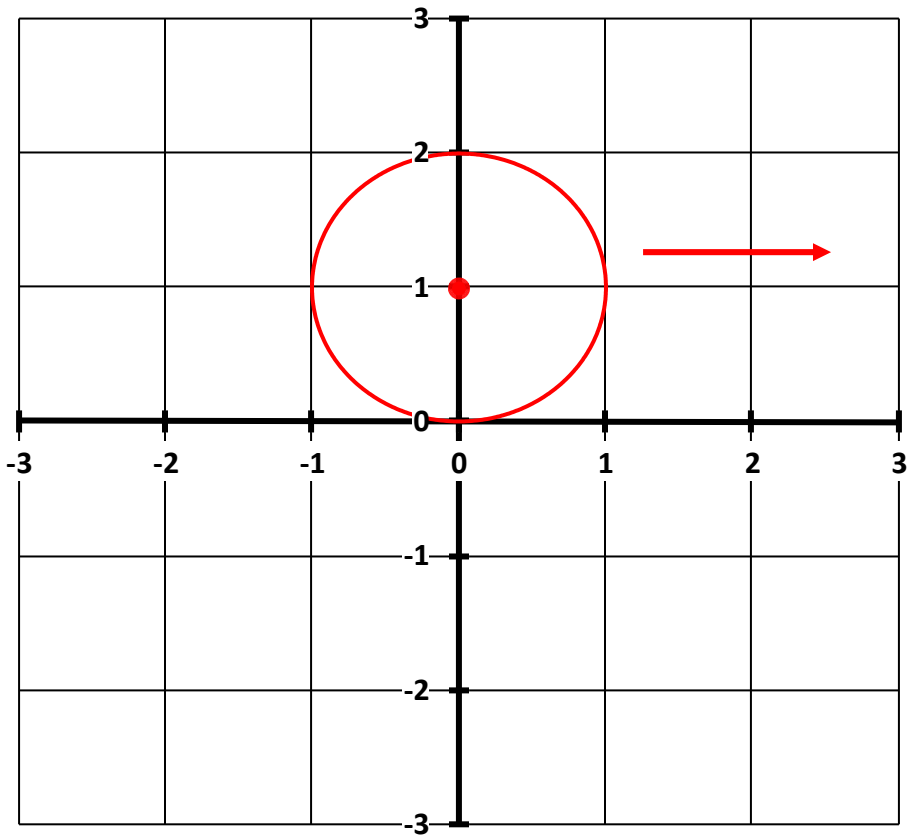
What is the midpoint of 2 + 8i and 7 – 3i?

Question #495

What is the distance, in coordinate units, between 3 + 4i and –3 – 4i?

Question #496
What is the midpoint of 4 + 3i and 2 + 7i?

Question #497
The circle with equation: $x^2 + (y - 1)^2 = 1$, is graphed in the standard (x, y) coordinate plane below. Suppose the circle rolls along the positive x-axis for 2 rotations and then stops. Which of the following is an equation of the circle in its new position?



a. $(x + 2)^2 + (y - 1)^2 = 1$
b. $(x + 2\pi)^2 + (y - 1)^2 = 1$
c. $(x + 4\pi)^2 + (y - 1)^2 = 1$
d. $(x - 2\pi)^2 + (y - 1)^2 = 1$
e. $(x - 4\pi)^2 + (y - 1)^2 = 1$

Question #498
The circle with equation: $x^2 + y^2 = 4$, rolls two rotations to the left (horizontally) and one rotation down (vertically). What is the equation of the circle in its new position?

Question #499
The circle with equation: $x^2 + y^2 = 9$, rolls two rotations up (vertically) and then three rotations to the left (horizontally). After the circle comes to rest, the radius is increased by two units. What is the equation of the resulting circle?

Question #500

The circle with equation: $x^2 + y^2 = 9$ has its radius increased by two units. After the radius is increased by two units, the circle is rolled two rotations down (vertically) and then rolled three rotations to the right (horizontally). What is the equation of the resulting circle?

Problem #	Answer	Problem #	Answer
1	99	**251**	24 inches
2	76	**252**	16π square inches
3	50	**253**	10π inches
4	18 and 24	**254**	16 miles
5	150	**255**	2 2/3 miles
6	8.33%	**256**	2,640 feet
7	10, 14, and 18	**257**	134,112 cm
8	16, 20, and 64	**258**	$72.\overline{6}$ quarts
9	30 and 45	**259**	(2/5)n
10	20 and 25	**260**	3t
11	$\begin{bmatrix} 4 & 16 \\ 5 & 15 \end{bmatrix}$	**261**	(2/15)t + 2
12	$\begin{bmatrix} -2 & -2 \\ 3 & 3 \end{bmatrix}$	**262**	(-10/3)D + 580/3
13	$\begin{bmatrix} 2 & 2 \\ -3 & -3 \end{bmatrix}$	**263**	36:25
14	Does not exist. Two matrices can only be added if they have the same number of rows and columns.	**264**	8:17
15	Does not exist. Two matrices can only be subtracted if they have the same number of rows and columns.	**265**	35:16
16	$\begin{bmatrix} 14 & 10 & 15 \\ 11 & 2 & 6 \end{bmatrix}$	**266**	29:4
17	$\begin{bmatrix} -4 & 4 & 1 \\ -5 & 0 & 2 \end{bmatrix}$	**267**	4:5
18	$\begin{bmatrix} 4 & -4 & -1 \\ 5 & 0 & -2 \end{bmatrix}$	**268**	16:9
19	x = 7 and y = 2	**269**	$13 + 3\sqrt{5}/5$
20	$\begin{bmatrix} 16 & 25 & 23 \\ 47 & 67 & 63 \\ 46 & 99 & 67 \end{bmatrix}$	**270**	11π
21	$\begin{bmatrix} 78 & 53 & 58 \\ 47 & 32 & 34 \\ 66 & 71 & 40 \end{bmatrix}$	**271**	Commit to Memory
22	# rows = 3 # columns = 2	**272**	All real numbers
23	# rows = 1 # columns = 3	**273**	The empty set (i.e., no solution exists)
24	# rows = 3 # columns = 1	**274**	x = 2
25	[44] notice when you multiply a 1x3 matrix by a 3x1 matrix, the product is a 1 x 1 matrix.	**275**	x = 1
26	[17 47] notice when you multiply a 1x3 matrix by a 3x2 matrix, the product is a 1x2 matrix.	**276**	All real numbers

Problem #	Answer	Problem #	Answer
27	20 x 30 the product of two matrices has the same number of rows as the first matrix being multiplied and the same number of columns as the second matrix being multiplied.	**277**	The empty set (i.e., no solution exists)
28	$\begin{bmatrix} 15 \\ 9 \\ 27 \end{bmatrix}$	**278**	7.50 hours
29	a = 19	**279**	7.00 hours
30	$\begin{bmatrix} 16 & 42 \\ 29 & 79 \\ 46 & 112 \end{bmatrix}$ notice when you multiply a 3x3 matrix with a 3x2 matrix, the product is a 3x2 matrix	**280**	3.20 hours
31	The product C x A does not exist because two matrices can only be multiplied if the number of columns in the first matrix (in this case C) equals the number of rows in the second matrix (in this case A). Since Matrix C has 2 columns and Matrix A has 3 rows, the product C x A does not exist (note that A x C does exist).	**281**	20 hours
32	$12x^5$	**282**	9.23 hours
33	$7x^2$	**283**	$16\ b^5 / a^5$
34	$32x^{15}$	**284**	$-4\ x^7\ y^{5/2} / 9$
35	$12x^{12}$	**285**	$-1 / (432\ y^{101/12}\ x^{31/5)}$
36	Commit to Memory: Alternate Interior Angles	**286**	$b^8\ c^4 / (4\ a^{12})$
37	Commit to Memory: Vertical Angles	**287**	$125\ p^3 / (27\ m^{15}\ n^6)$
38	(4 ½, 4)	**288**	$\begin{bmatrix} a & 0 & -a \\ 2a & 0 & -2a \\ 3a & 0 & -3a \end{bmatrix}$
39	(-4, -2)	**289**	[-2a]
40	(-5, -9)	**290**	1/24
41	(-1 ½, -½)	**291**	1/6
42	(5/8, 1)	**292**	676,000
43	28 inches	**293**	468,000
44	20	**294**	135,200
45	2, 6, 8, 14	**295**	(4x + 6) / 5
46	99 degrees	**296**	3 / (6x – 16)
47	90°	**297**	(48x – 18) / (8x – 15)
48	45°	**298**	$(5x^2 + 21) / 4$
49	73.21%	**299**	12 / 19
50	135°	**300**	b

Problem #	Answer	Problem #	Answer
51	180°	**301**	$\sin^{-1}[(^{15}/_{13})\sin 30°]$
52	60%	**302**	$\cos^{-1}(-\frac{10^2-17^2-12^2}{2(17)(12)})$
53	20%	**303**	$\sin^{-1}[(^{7}/_{13})\sin 100°]$
54	R + S = 120	**304**	49
55	50R + 25S = 900	**305**	¼
56	L + S = 95	**306**	358
57	50L + 30S = 12,000	**307**	79
58	S + C + M = 100	**308**	131
59	30,000S + 20,000C + 25,000M = 2,100,000	**309**	3
60	Commit to Memory: Central Angle	**310**	3 ½
61	135	**311**	7
62	624 inches	**312**	17
63	25π feet	**313**	7
64	140	**314**	42
65	20	**315**	14
66	$2.03	**316**	3
67	$0.02	**317**	12
68	18	**318**	2
69	3	**319**	-10
70	1, -3, -9	**320**	5
71	-2, -3	**321**	17π
72	2/3	**322**	26π
73	16/25	**323**	3
74	Width = 4 inches Length = 16 inches	**324**	4
75	64 square inches	**325**	21%
76	8 inches	**326**	72.8%
77	3/19	**327**	15.7%
78	½	**328**	189.3%
79	38	**329**	9.27%
80	12	**330**	-8.49%
81	1	**331**	e
82	1/3	**332**	a
83	1 ½	**333**	e
84	117	**334**	b
85	4 1/3	**335**	(1 + 7i) / 2 and (1 – 7i) / 2
86	1/18	**336**	4
87	5/12	**337**	18
88	1/3	**338**	168
89	¼	**339**	24
90	1/3	**340**	78

Problem #	Answer	Problem #	Answer
91	1/8	**341**	21
92	III	**342**	16,380
93	II, III, IV, V, VII, IX, X	**343**	6,048
94	III, V	**344**	120,450
95	¼	**345**	513,600
96	(5, 13)	**346**	2,561,600
97	-1	**347**	20
98	(-14/5, -11/5)	**348**	5 square inches
99	J	**349**	38.1 inches
100	D	**350**	4.59 inches
101	C	**351**	1 inch
102	B	**352**	233.33 inches
103	J	**353**	48 inches
104	C	**354**	16.7 mph
105	H	**355**	9.3 miles
106	D	**356**	76°
107	D	**357**	160 pounds
108	B	**358**	63.63 inches
109	D	**359**	21.7 mph
110	K	**360**	1,098.9 pounds
111	G	**361**	70 pounds
112	B	**362**	21.05 inches
113	D	**363**	75%
114	A	**364**	133.3%
115	C	**365**	25% smaller
116	D	**366**	33.3% bigger
117	A	**367**	$4/\sqrt{41}$
118	C	**368**	-4/5
119	E	**369**	$-3/\sqrt{58}$
120	B	**370**	-3/5
121	A	**371**	36 inches
122	C	**372**	50 inches
123	a. It is on the circle. b. It is not on the circle. c. It is on the circle. d. It is on the circle.	**373**	54 square inches
124	a. Center of circle = (-4, 3), length of the radius = 5. b. Center of circle = (1, -9), length of the radius = 3. c. Center of circle = (1, -4), length of the radius = $\sqrt{10}$.	**374**	250 square inches
125	3	**375**	Commit to Memory 30-60-90, and 45-45-90 triangles ratio of sides.

Problem #	Answer	Problem #	Answer
126	17/7	**376**	See Appendix #376
127	i (note every four terms sum to 0, so the 49^{th} term $i^{49} = (\sqrt{-1})^{48}i = (-1)^{24}i = i$.	**377**	$7\sqrt{3}$ or $7/\tan 30°$
128	c	**378**	2 or $4 \sin 30°$
129	e	**379**	$6/\sqrt{3}$ or $3/\sin 60°$
130	b	**380**	17 or $17 \tan 45°$
131	a	**381**	$14/\sqrt{2}$ or $14 \sin 45°$
132	e	**382**	x = 1
133	d	**383**	x = 2 or x = 1
134	100π	**384**	x = 3
135	25π	**385**	x = 2
136	4 square centimeters	**386**	x = 1
137	36 square centimeters	**387**	x = 2
138	$16\sqrt{3}$	**388**	x = 3
139	32	**389**	y-intercept (0, 2); slope = 8
140	7:27	**390**	y-intercept (0, -6); slope = 3
141	6	**391**	x-intercept (3/7, 0); slope = ½
142	24	**392**	-1/2
143	16 + 3π	**393**	y-intercept (0, -1); slope = -2
144	Perimeter = 48 + 4π; Area = 122 + 8π	**394**	x-intercept (1/2, 0); slope = 2
145	66 square feet	**395**	-5
146	c	**396**	14
147	a	**397**	k = 19/4 or k = 4.75
148	e	**398**	k = -1
149	c	**399**	k = 1
150	b	**400**	21.5% is not filled
151	e	**401**	26.2% is filled
152	b	**402**	3,813.33 cubic units
153	e	**403**	538.60 gallons
154	c	**404**	504 cube shaped boxes
155	a	**405**	$1 < x < 5$
156	432 square inches	**406**	$3 \leq x \leq 11$
157	2,592 square inches	**407**	$x < -3$ or $x > 7$
158	1,000,000 cubic centimeters	**408**	$x < -12$ or $x > 18$
159	2,000,000 square meters	**409**	$x < -10$ or $x > 8$
160	3 cubic meters	**410**	$x < 1$ or $x > 8$
161	23.15 square yards	**411**	$x < -4$ or $x > 8$
162	276 games	**412**	$x < -1$ or $x > 7$
163	10	**413**	$3.15
164	210	**414**	$81
165	8	**415**	$76.75
166	10	**416**	$85.75
167	7	**417**	$0.21 per minute
168	4,845	**418**	$3.12 per mile

Problem #	Answer	Problem #	Answer
169	Commit to Memory: Similar Triangles	**419**	$3.20 per baseball
170	3,960 meters	**420**	$0.86 per pound
171	11 meters	**421**	6
172	e	**422**	7
173	a	**423**	20
174	30 feet	**424**	14
175	60	**425**	54°
176	200	**426**	60°
177	1,000	**427**	4 inches
178	70	**428**	120°
179	50	**429**	56°
180	77	**430**	π/3 radians
181	191	**431**	π/9 radians
182	100	**432**	14π/9 radians
183	30	**433**	-π/6 radians
184	16	**434**	-4π/9 radians
185	120	**435**	π radians
186	20	**436**	47π/36 radians
187	120	**437**	525
188	120	**438**	d
189	720	**439**	d
190	840	**440**	a
191	(7, 0)	**441**	$(11 + 5\sqrt{5})/4$
192	(0, -1)	**442**	$2 - \sqrt{2}$
193	(3, 0)	**443**	$6 + 2\sqrt{3}$
194	y-intercept: (0, -10) x-intercept: (10, 0)	**444**	$-(3 + \sqrt{7})/2$
195	y-intercept: (0, 18) x-intercept: (6, 0)	**445**	$3 - \sqrt{5}$
196	y-intercept: (0, 4) x-intercept: (4, 0)	**446**	$(12 + 3\sqrt{5})/11$
197	y-intercept: (0, 4/3) x-intercept: (-4, 0)	**447**	$10\sqrt{2}$ meters
198	y-intercept: (0, 1/3) x-intercept: (-1/2, 0)	**448**	Perimeter = $40\sqrt{2}$ meters; Area = 200 square meters
199	y-intercept: (0, 9) x-intercept: (6, 0)	**449**	Perimeter = 30 feet; Area = 50 square feet
200	Commit to Memory: quadrants in which trigonometry functions are positive.	**450**	$10\sqrt{10}$ cm
201	$10/\sqrt{58}$	**451**	$20 + 10\sqrt{2}$
202	$-4/\sqrt{58}$	**452**	32 square feet
203	$-10/\sqrt{58}$	**453**	50 square meters

Problem #	Answer	Problem #	Answer
204	$4/\sqrt{58}$	**454**	P = 2N – 36
205	-1/2	**455**	18 sweaters
206	$3\sqrt{3}/2$	**456**	68 sweaters
207	$\sqrt{3}/2$	**457**	P = \$25,000N - \$50,000,000
208	$-3\sqrt{3}/2$	**458**	2,000 cars
209	-1/20	**459**	2,040 cars
210	31/20	**460**	P = \$11A - \$990
211	-31/20	**461**	90 acres
212	1/20	**462**	190 acres
213	$\sqrt{12^2 + 18^2 - 2(12)(18)\cos 40°}$	**463**	P = \$150H - \$450
214	$(25)\sin 105°/\sin 34°$	**464**	P = \$20H - \$1,000,000
215	$\sqrt{3^2 + 4^2 - 2(3)(4)\cos 20°}$	**465**	Commit to Memory: Amplitude, Period, Phase Shift, and Vertical Shift of Sine and Cosine functions.
216	$\sqrt{3^2 + 15^2 - 2(3)(15)\cos 10°}$	**466**	Amplitude = 3; Period = 2π
217	$(15)\sin 105°/\sin 45°$	**467**	Amplitude = 36; Period = 2π/3
218	BC = $(10)\sin 40°/\sin 80°$	**468**	Amplitude = 4; Period = 1
219	DE = $\sqrt{10^2 + 25^2 - 2(10)(25)\cos 75°}$	**469**	Amplitude = 3; Period = 2π/3
220	$\overline{AB}$ = $(10)\sin 85°/\sin 50°$	**470**	Amplitude = 4; Period = π/9
221	x = -7/3	**471**	Grade Range of 81 – 85
222	x = ± 1/2	**472**	1501 – 1750 Pounds
223	x^9	**473**	21 – 25 Inches
224	x^{16}	**474**	50 – 75 Pounds
225	$x^{10} + 3$	**475**	201 – 225 MPH
226	x = ±1	**476**	c
227	x = 2	**477**	e
228	144 square inches	**478**	a
229	5 inches	**479**	e
230	48 square inches	**480**	4π cm
231	5 inches	**481**	10π/11 cm
232	56.25%	**482**	4π cm
233	Length = 10 inches; Width = 5 inches	**483**	16π cm
234	660 square inches	**484**	14π cm
235	40 feet	**485**	200 square units
236	d	**486**	4
237	b	**487**	4
238	a	**488**	3
239	d	**489**	7
240	b	**490**	8
241	e	**491**	$3\sqrt{5}$
242	5/8	**492**	-5/2 + 5/2 i
243	3/8	**493**	$\sqrt{5}$
244	4/13	**494**	9/2 + 5/2 i

Problem #	Answer	Problem #	Answer
245	2/3	**495**	10
246	2/3	**496**	3 + 5i
247	-43° F	**497**	e
248	+33° F	**498**	$(x + 8\pi)^2 + (y + 4\pi)^2 = 4$
249	+5° F	**499**	$(x + 18\pi)^2 + (y - 12\pi)^2 = 25$
250	-11° F	**500**	$(x - 30\pi)^2 + (y + 20\pi)^2 = 25$

Appendix #376

x	$\sin x$	$\cos x$	$\tan x$
30°	$1/2$	$\sqrt{3}/2$	$1/\sqrt{3}$
45°	$1/\sqrt{2}$	$1/\sqrt{2}$	1
60°	$\sqrt{3}/2$	$1/2$	$\sqrt{3}$
120°	$\sqrt{3}/2$	$-1/2$	$-\sqrt{3}$
135°	$1/\sqrt{2}$	$-1/\sqrt{2}$	-1
150°	$1/2$	$-\sqrt{3}/2$	$-1/\sqrt{3}$
210°	$-1/2$	$-\sqrt{3}/2$	$1/\sqrt{3}$
225°	$-1/\sqrt{2}$	$-1/\sqrt{2}$	1
240°	$-\sqrt{3}/2$	$-1/2$	$\sqrt{3}$
300°	$-\sqrt{3}/2$	$1/2$	$-\sqrt{3}$
315°	$-1/\sqrt{2}$	$1/\sqrt{2}$	-1
330°	$-1/2$	$\sqrt{3}/2$	$-1/\sqrt{3}$