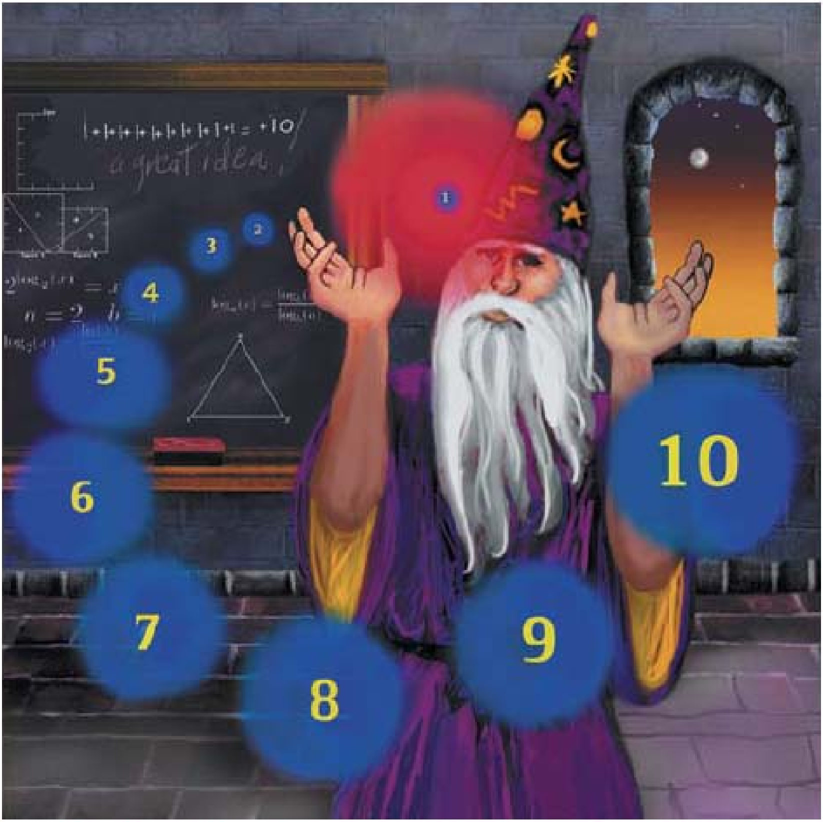
MATH B



QUESTION CATALOGUE

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Math B

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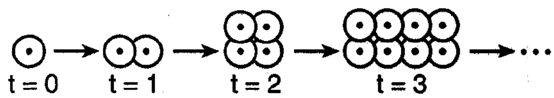
VI. Counting, Probability, and Statistics

5389. The accompanying diagram represents the biological process of cell division.



If this process continues, which expression best represents the number of cells at any time, t?

(1) $t + 2$ (3) t^2
(2) $2t$ **(4) 2^t**

5323. If $10^k = x$, then 10^{3k} is equal to

(1) x^3 (3) $3x$
(2) $3 + x$ (4) $1{,}000x$

5053. According to Boyle's Law, the pressure, p, of a compressed gas is inversely proportional to the volume, v. If a pressure of 20 pounds per square inch exists when the volume of the gas is 500 cubic inches, what is the pressure when the gas is compressed to 400 cubic inches?

(1) 16 lb/in^2 (3) 40 lb/in^2
(2) 25 lb/in^2 (4) 50 lb/in^2

5025. The time it takes to travel to a location varies inversely to the speed traveled. It takes 4 hours driving at an average speed of 55 miles per hour to reach a location. To the *nearest tenth of an hour*, how long will it take to reach the same location driving at an average speed of 50 miles per hour?

4.4

4915. The expression $\frac{7}{3-\sqrt{2}}$ is equivalent to

(1) $\frac{3+\sqrt{2}}{7}$
(2) $\frac{21+\sqrt{2}}{7}$
(3) $3 + \sqrt{2}$
(4) $3 - \sqrt{2}$

4605. Juan got a 95 on his last English test which consisted of 20 questions worth 2 points each and 20 questions worth 3 points each. How many possible ways could Juan have scored his 95?

(1) 0 (3) 2
(2) 1 (4) 4

4604. Jenny scored 17 points in a basketball game. She attempted 8 field goals and 3 free throws. Each successful field goal is 2 points and each successful free throw is 1 point. If she made all of her free throws, how many field goals did she miss?

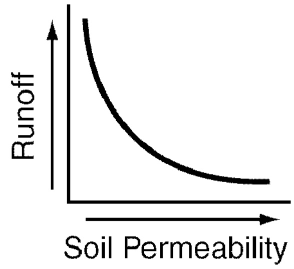
(1) 1 (3) 3
(2) 2 (4) 4

2760. Which equation is an illustration of the distributive law?

(1) $a(b + c) = ab + ac$ (3) $(ab)c = a(bc)$
(2) $(a + b) + c = a + (b + c)$ (4) $ab + ac = ac + ab$

5004. Which graph shows that soil permeability varies inversely to runoff?

(1)



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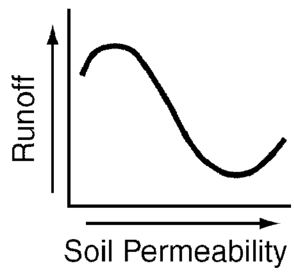

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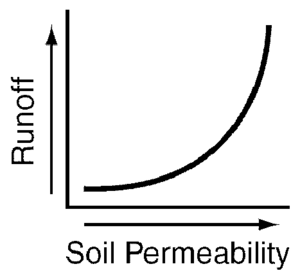
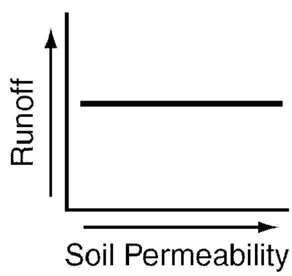


(4)



4593. Tom scored 23 points in a basketball game. He attempted 15 field goals and 6 free throws. If each successful field goal is 2 points and each successful free throw is 1 point, is it possible he successfully made all 6 of his free throws? Justify your answer.

No

3892. A rectangle is said to have a golden ration when $\frac{w}{h} = \frac{h}{w-h}$, where w represents width and h represents height. When $w = 3$, between which two consecutive integers will h lie?

1 and 2, $1 < x < 2$, or $1 < 1.854 < 2$

3850. Which is the correct arrangement of these terms in order of value, from smallest to greatest?

(1) $3\sqrt{2}$, $4\frac{1}{8}$, $|-4.24|$, $\sqrt[3]{75}$ **(3) $4\frac{1}{8}$, $\sqrt[3]{75}$, $|-4.24|$, $3\sqrt{2}$**
(2) $\sqrt[3]{75}$, $|-4.24|$, $4\frac{1}{8}$, $3\sqrt{2}$ (4) $4\frac{1}{8}$, $|-4.24|$, $\sqrt[3]{75}$, $3\sqrt{2}$

5419. Expressed in simplest form, $\frac{\sqrt{-20}}{\sqrt{5}}$ is equivalent to

(1) $-2i$
(2) $2i$
(3) $\sqrt{2}i$
(4) $\frac{2i}{\sqrt{5}}$

4613. What is the area of an imaginary circle of radius $1 - 5i$?

(1) $(-24 - 5i)\pi$
(2) $(-24 - 10i)\pi$
(3) $(26 + 5i)\pi$
(4) $(26 + 10i)\pi$

4612. What is the area of an imaginary triangle with a height of 2 and base of $2 + 4i$?

(1) $2 + 4i$
(2) $4 + 6i$
(3) $4 + 8i$
(4) 8

4610. What is the area of an imaginary rectangle with sides of $2 + 2i$ and $3i$?

(1) $6 + 6i$
(2) $-6 - 6i$
(3) $6 - 6i$
(4) $-6 + 6i$

4608. Bill and Melanie are partners playing a game with complex numbers. A team's score is equal to the product of its members' individual scores. Bill has a score of $3 + 7i$ and Melanie has a score of $3 - 7i$. What is their team score?

(1) -40
(2) $-40 - 7i$
(3) 58
(4) $58 + 49i$

4581. What is the product of $5 + \sqrt{-36}$ and $1 - \sqrt{-49}$, expressed in simplest $a + bi$ form?

(1) $-37 + 41i$
(2) $5 - 71i$
(3) $47 + 41i$
(4) $47 - 29i$

4539. The relationship between voltage, E, current, I, and resistance, Z, is given by the equation $E = IZ$. If a circuit has a current $I = 3 + 2i$ and a resistance $Z = 2 - i$, what is the voltage of this circuit?

(1) $8 + i$
(2) $8 + 7i$
(3) $4 + i$
(4) $4 - i$

4526. In an electrical circuit, the voltage, E, in volts, the current, I, in amps, and the opposition to the flow of current, called impedance, Z, in ohms, are related by the equation $E = IZ$. A circuit has a current of $(3 + i)$ amps and an impedance of $(-2 + i)$ ohms. Determine the voltage in $a + bi$ form.

$-7 + i$

4502. The relationship of distance, D, rate, r, and time, t, is given by the equation $D = rt$. If the rate = $4\text{-}3i$ and the time = $5\text{+}2i$, what is the distance?

$26\text{-}7i$

4303. Given $AB = C$, $A = 7 - i$, and $B = 3 + 3i$, what is the value of C?

(1) $18i + 18$
(2) $10 + 2i$
(3) $41i$
(4) $18i + 24$

4453. In an electrical circuit, the voltage, E, in volts, the current, I, in amps, and the opposition to the flow of current, called impedance, Z, in ohms, are related by the equation $E = IZ$. A circuit has a current of $(9 + 2i)$ amps and an impedance of $(-5 + 3i)$ ohms. Determine the voltage in $a + bi$ form.

$-51 + 17i$

4154. What is the reciprocal of $3 - \sqrt{5}$?

(1) $\frac{3 - \sqrt{5}}{4}$
(2) $\frac{3 + \sqrt{5}}{4}$
(3) $\frac{3 - \sqrt{5}}{14}$
(4) $\frac{3 + \sqrt{5}}{14}$

3887. The expression $(-1 + i)^3$ is equivalent to

(1) $-3i$
(2) $-2 - 2i$
(3) $-1 - i$
(4) $2 + 2i$

3675. Where i is the imaginary unit, expand and simplify completely $(3 - i)^4$.

$28 - 96i$

2486. The value of $(1 - i)^2$ is

(1) 0
(2) 2
(3) $-2i$
(4) $2 - 2i$

2345. Express the product of $4 - 3i$ and $2 + i$ in simplest $a + bi$ form.

$11 - 2i$

2311. The product of $5 - 2i$ and i is

(1) 7
(2) $2 + 5i$
(3) $5 - 2i$
(4) $-2 + 5i$

2265. Expressed in $a + bi$ form, $\frac{5}{3 + i}$ is equivalent to

(1) $\frac{15}{8} - \frac{5i}{8}$
(2) $\frac{5}{3} - 5i$
(3) $\frac{3}{2} - \frac{i}{2}$
(4) $15 - 5i$

2163. Express the $\frac{5}{2 - i}$ in simplest a + bi form.

$2 + i$

2129. The product of $(-2 + 6i)$ and $(3 + 4i)$ is

(1) $-6 + 24i$
(2) $-6 - 24i$
(3) $18 + 10i$
(4) $-30 + 10i$

2089. The expression $(3 - i)^2$ is equivalent to

(1) 8
(2) $8 - 6i$
(3) 10
(4) $8 + 6i$

5012. The speed of sound, v, at temperature T, in degrees Kelvin, is represented by the equation $v = 1087\sqrt{\frac{T}{273}}$. Which expression is equivalent to $\log v$?

(1) $1087 + \frac{1}{2}\log T - \log 273$
(2) $1087\left(\frac{1}{2}\log T - \frac{1}{2}\log 273\right)$
(3) $\log 1087 + \frac{1}{2}\log T - \frac{1}{2}\log 273$
(4) $\log 1087 + 2\log(T + 273)$

5331. If $2^{(16x^2 - 8x - 3)} = 1$, what does x equal?

(1) $\frac{1}{4}$, only
(2) $\frac{3}{4}$, only
(3) $\frac{1}{4}$ and $-\frac{3}{4}$
(4) $-\frac{1}{4}$ and $\frac{3}{4}$

5321. The expression $\frac{1}{2}\log m - 3\log n$ is equivalent to

(1) $\log\sqrt{m} + \log n^3$
(2) $\log \frac{1}{2}m - 3\log n$
(3) $\log \frac{m^2}{3\sqrt{n}}$
(4) $\log \frac{\sqrt{m}}{n^3}$

5292. If $2^{4x+1} = 8^{x+a}$, which expression is equivalent to x?

(1) $a - 1$
(2) $3a - 1$
(3) $\frac{a-1}{15}$
(4) $\frac{a-1}{3}$

5121. A black hole is a region in space where objects seem to disappear. A formula used in the study of black holes is the Schwarzschild formula,

$$R = \frac{2GM}{c^2}$$

Based on the laws of logarithms, $\log R$ can be represented by

(1) $2\log G + \log M - \log 2c$
(2) $\log 2G + \log M - \log 2c$
(3) $\log 2 + \log G + \log M - 2\log c$
(4) $2\log GM - 2\log c$

4943. If $\log a = x$ and $\log b = y$, what is

$$\log a\sqrt{b}$$

(1) $x + 2y$
(2) $2x + 2y$
(3) $\frac{x+y}{2}$
(4) $x + \frac{y}{2}$

4836. If $\log_b x = y$, then x equals

(1) $y \cdot b$
(2) $\frac{y}{b}$
(3) y^b
(4) b^y

4677. Which could be the sides of a rectangle whose perimeter is $\log(A^2B^2)$?

(1) $\log(A)$, $\log(B)$
(2) $2\log(A)$, $2\log(B)$
(3) $\log(AB)$, $\log(2)$
(4) $\log(AB^2)$, $\log(A)$

4676. What is the volume of a cube whose sides each have a perimeter of $\log(D^4)$?

(1) $3\log(D)$
(2) $\log(D^3)$
(3) $(\log(D))^3$
(4) $\log(3D)$

4675. Two runners are running in a race. The first place runner is $\log(16x)$ from the starting line, and the second place runner is $\log(4)$ from starting line. What is the distance between the two runners?

(1) $\log(4x)$
(2) $\log(64x)$
(3) $4\log(16x)$
(4) $16x(\log(4))$

4674. If the side of a square room is $\log(5x)$, which of the following could be the perimeter of the room?

(1) $\log(20x)$
(2) $(\log(5x))^4$
(3) $2\log(25x^2)$
(4) $625\log(x)$

4331. The expression $\log(10^{(7+x)}) - \log(10^{(x-2)})$ is equivalent to

(1) 9
(2) -9
(3) 5
(4) $2x + 5$

4204. The expression $2\log(x-3)\log(y)$ is equivalent to

(1) $\log \frac{2x}{3y}$
(2) $\log x^2y^3$
(3) $\log \frac{x^2}{y^3}$
(4) $\frac{2}{3}\log \frac{x}{y}$

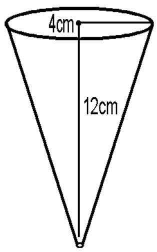
4114. If $A = \pi r^2$, $\log A$ equals

(1) $2\log \pi + \log r$
(2) $\log \pi + 2\log r$
(3) $2\log \pi + 2\log r$
(4) $2\pi \log r$

3820. If $\log 5 = a$, then $\log 250$ can be expressed as

(1) $50a$
(2) $2a + 1$
(3) $10 + 2a$
(4) $25a$

Base your answers to questions **4054** and **4055** on the diagram below.
Peter worked at an ice cream shop. He was filling up a cone with ice cream but he accidentally got a cone with a hole in the bottom. The rate of the ice cream being poured in was 110 milliters per second. The rate that the ice cream was flowing out was 68 milliliters per second. *note: 1 mL = 1 cm*^{3}



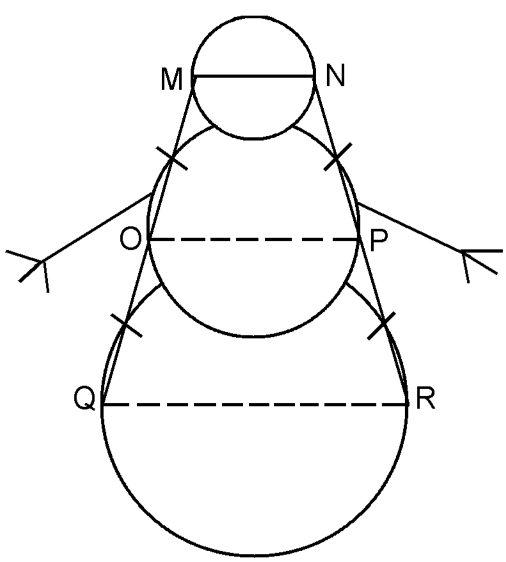
4054. What is the volume of the cone? *Round your answer to the nearest whole number.*

201cm^3 or 201 mL

4055. Estimate the time it will take for the cone to overflow. *Round your answer to the nearest second.*

5 seconds

4053. Claudio was making a snowman. The diameter of the head of the snowman, $\overline{MN}$, is 4ft. The base of the snowman, $\overline{QR}$, has a diameter of 12ft.



What is the diameter of the middle layer $\overline{OP}$?

8ft

3087. Solve for x: $\frac{x}{5} = -2$

–1

4052. Two balls are thrown into the air. The first ball follows that path represented by the equation $h = -x^2 - 2x + 6$. The path of the other ball is represented by the equation $h = x + 3$.

At what height do the paths of the two balls cross? *Round your answer to the nearest tenth of a foot.*

3.8 feet

Base your answers to questions **4041** and **4042** on the information below.

Michele was holding an ice cream cone for her brother. The ice cream would melt at a rate of $h(t) = -2.5t + 10$, where t represents the time the ice cream melts in minutes and h represents the height of the ice cream in centimeters.

4041. How long will it take for the whole ice cream cone to melt?

4 minutes

4042. How high was the ice cream originally?

10cm

Base your answers to questions **3994** and **3995** on the information below.

Shelly is going to a museum. She wants to take a taxicab and needs to decide what company to use. The Sunshine Taxicab Company charges $3.75 for their service and $2.35 for every mile after that. Tracy's Taxicab Company charges $5.25 for their service and $1.62 for every mile after that.

3994. After how many miles, will the charge of both cab companies be equal? *Round your answer to the nearest mile.*

2 miles

3995. If Shelly needs to travel 12 miles to get to the museum, which company should she choose and how much would it cost her?

Tracy's Cab Company and it would cost her $24.69.

3989. A new shoe store was just opened up. The cost of opening the store is represented by the equation, $C(x) = 36x + 1{,}500$, where x represents the number of pairs of shoes they start with. The revenue obtained by selling x pairs of shoes is represented by the equation, $R(x) = 42x$. The total profit earned by the shoe store is represented by they equation, $P(x) = R(x) - C(x)$. For the values of R(x) and C(x) given above, what is P(x)?

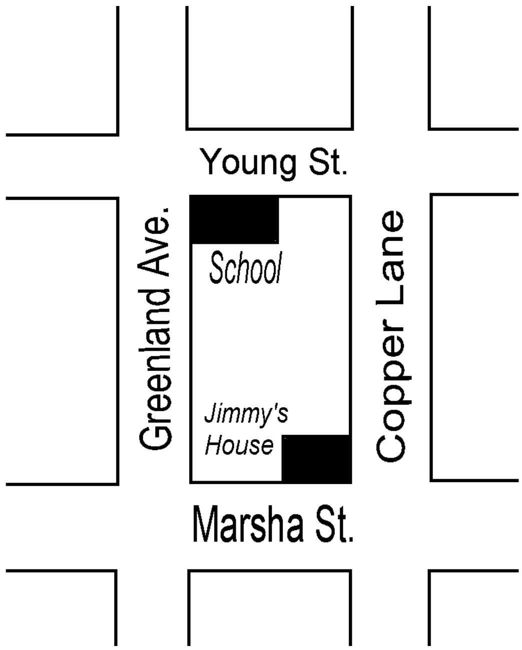
(1) $6x + 1{,}500$ **(3) $6x - 1{,}500$**
(2) $-6x - 1{,}500$ (4) $-6x + 1{,}500$

3935. At the local music store Gavin buys two CDs and one video for a total of $41.95. At the same time Morgan buys one CD and two videos for a total of $39.50. How much does it cost to buy a combination of one CD and one video?

$27.15

4040. Base your answer on the diagram below.

There are two ways for Jimmy to get to school. If Jimmy takes Copper Lane he travels $12x^2 - 3$ feet and then goes $3x + 4$ feet down Young St. If he takes Marsha St. to school he travels $11x + 6$ feet and then goes $9x^2 + 5$ feet down Greenland Ave.



If both ways take him the same distance, how far does Jimmy have to walk to the school? *Round your answer to the nearest tenth of a foot..*

167.3 feet

4038. Natalie is making a rectangular rug. The rectangle is said to have a golden ratio of $\frac{l-w}{w}=\frac{w}{l}$, where l equals the length of the rug and w equals the width of the rug.

If $w = 4$ than between what two consecutive integers will l lie?

6 and 7

3955. A rectangular patio is said to have a golden ratio when $\frac{w}{2h} = \frac{h}{w+2h}$, where w represents width and h represents height. When $w = 4$, between which two consecutive integers will h lie?

1 and 2

3890. Solve for x in simplest $a + bi$ form: $x^2 + 8x + 25 = 0$

$\mathbf{-4 \pm 3i}$

3865. Solve the equation $x^2 = 6x - 12$ and express the roots in simplest $a + bi$ form.

$\mathbf{3 + i\sqrt{3},\ 3 - i\sqrt{3}}$

3624. Express the roots of the equation $9x^2 = 2(3x - 1)$ in simplest $a + bi$ form.

$\mathbf{\frac{1}{3} \pm \frac{i}{3}}$

3804. A homeowner wants to increase the size of a rectangular deck that now measures 15 feet by 20 feet, but building code laws state that a homeowner cannot have a deck larger than 900 square feet. If the length and the width are to be increased by the same amount, find, to the *nearest tenth*, the maximum number of feet that the length of the deck may be increased in size legally.

12.6 ft

3746. Two toy rockets are launched ten seconds apart. The height in feet of the first rocket after $0 < t < 16$ seconds is given by $h(t) = -16t^2 + 256t$. The height of the second one after $10 < t < 20$ seconds is given by $g(t) = -16t^2 + 480t - 3200$. How many seconds after the first rocket is launched are the rockets at the same height?

14.286 seconds

3677. Solve for x and express your answer in simplest $a + bi$ form:

$$16x = 16 - \frac{13}{x}$$

$\mathbf{\frac{1}{2} \pm \frac{3}{4}i}$

3533. What are the values of x in the equation $x^2 + 4x - 1 = 0$?

(1) $-4 \pm \sqrt{5}$
(3) $-2 \pm \sqrt{5}$
(2) $-4 \pm \sqrt{3}$
(4) $-2 \pm \sqrt{3}$

3512. What are the roots of the equation $x^2 - 3x + 1 = 0$?

(1) $\frac{3 \pm \sqrt{5}}{2}$
(2) $\frac{-3 \pm \sqrt{5}}{2}$
(3) $\frac{3 \pm \sqrt{13}}{2}$
(4) $\frac{-3 \pm \sqrt{13}}{2}$

3504. What are the roots of the equation $3x^2 + 6x - 2 = 0$?

(1) $\frac{6 \pm \sqrt{60}}{6}$
(2) $\frac{-6 \pm \sqrt{60}}{6}$
(3) $\frac{6 \pm \sqrt{12}}{6}$
(4) $\frac{-6 \pm \sqrt{12}}{6}$

2609. Express the roots of the equation + $x = 2$ in simplest $a + bi$ form.

$\mathbf{1 \pm i\sqrt{2}}$

2604. Solve for x and express the roots in terms of i:
$ax^2 = 6x - 5$

$\mathbf{\frac{3 \pm i}{2}}$

5305. The accompanying table shows the amount of water vapor, y, that will saturate 1 cubic meter of air at different temperatures, x.

Amount of Water Vapor That Will Saturate 1 Cubic Meter of Air at Different Temperatures

Air Temperature (x) (°C)	Water Vapor (y) (g)
–20	1
–10	2
0	5
10	9
20	17
30	29
40	50

Write an exponential regression equation for this set of data, rounding all values to the *nearest thousandth.*

Using this equation, predict the amount of water vapor that will saturate 1 cubic meter of air at a temperature of 50°C, and round your answer to the *nearest tenth of a gram.*

$\mathbf{y = 4.194(1.068)^x}$

112.5

5281. Kathy deposits $25 into an investment account with an annual rate of 5%, compounded annually. The amount in her account can be determined by the formula $A = P(1 + R)^t$, where P is the amount deposited, R is the annual interest rate and t is the number of years the money is invested. If she makes no other deposits or withdrawals, how much money will be in her account at the end of 15 years?

(1) $25.75
(2) $43.75
(3) $51.97
(4) $393.97

5272. The number of houses in Central Village, New York, grows every year according to the function $H(t) = 540(1.039)^t$, where H represents the number of houses, and t represents the number of years since January 1995. A civil engineering firm has suggested that a new, larger well must be built by the village to supply its water when the number of houses exceeds 1,000. During which year will this first happen?

2011, and appropriate work is shown, such as solving a logarithmic equation or trial and error with at least three trials and appropriate checks.

4967. Solve for m:

$$3^{m+1} - 5 = 22$$

2

5275. Water is draining from a tank maintained by the Yorkville Fire Department. Students measured the depth of the water in 15-second intervals and recorded the results in the accompanying table.

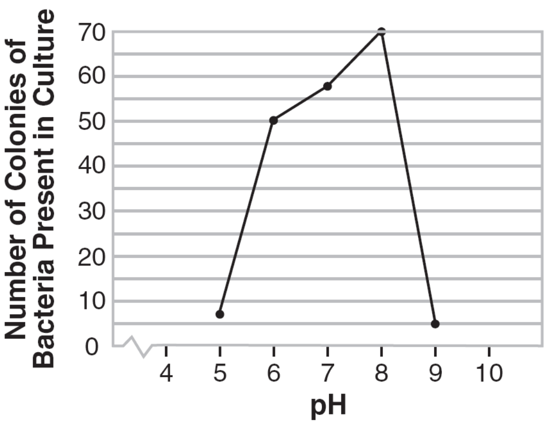
Time (x) (in seconds)	Depth of Water (y) (in feet)
15	11.8
30	9.9
45	8.2
60	6.3
75	5.9

Write the power regression equation for this set of data, rounding all values to the *nearest ten thousandth*.

Using this equation, predict the depth of the water at 2 minutes, to the *nearest tenth of a foot*.

$\mathbf{y = 42.2326x^{-0.4494}}$ **and 4.9, and appropriate work is shown.**

5364. The accompanying graph illustrates the presence of a certain strain of bacteria at various pH levels.



What is the range of this set of data?

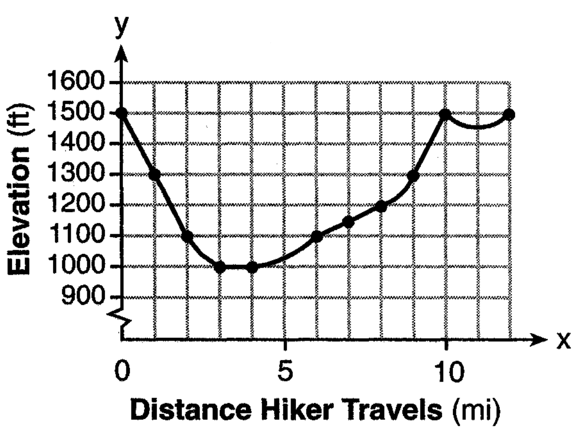
(1) $5 \le x \le 9$ (3) $0 \le y \le 70$
(2) $5 \le x \le 70$ **(4) $5 \le y \le 70$**

5335. Evaluate:

$$3\sum_{x=2}^{4}\left(x^2-5\right)$$

42

5282. The accompanying graph shows the elevation of a certain region in New York State as a hiker travels along a trail.



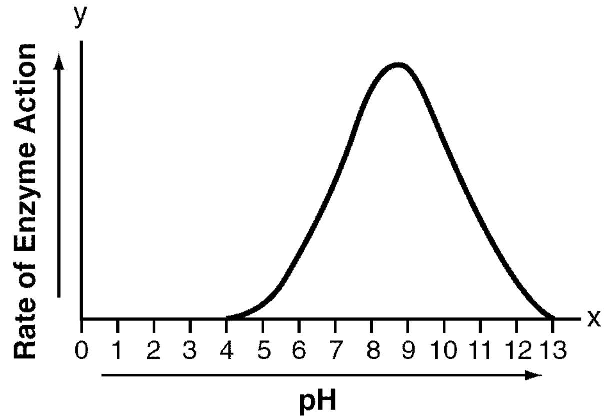
What is the domain of this function?

(1) $1{,}000 \le x \le 1{,}500$ **(3) $0 \le x \le 12$**
(2) $1{,}000 \le y \le 1{,}500$ (4) $0 \le y \le 12$

4260. What is the domain of $f(x) = 2^x$?

(1) all integers (3) $x \ge 0$
(2) all real numbers (4) $x \le 0$

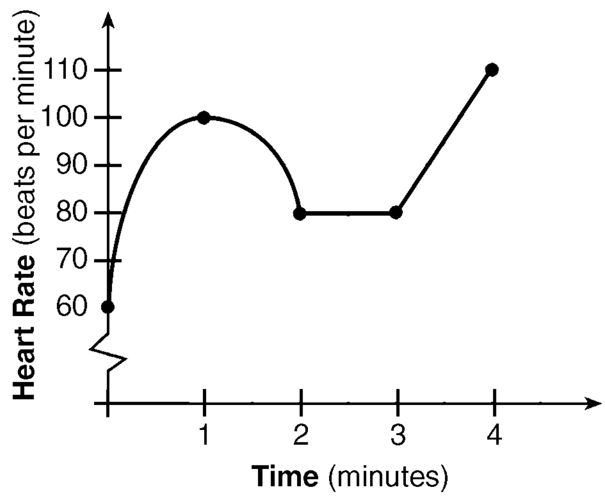
5003. The effect of pH on the action of a certain enzyme is shown on the accompanying graph.



What is the domain of this function?

(1) $4 \le x \le 13$ (3) $x \ge 0$
(2) $4 \le y \le 13$ (4) $y \ge 0$

4934. The accompanying graph shows the heart rate, in beats per minute, of a jogger during a 4-minute interval.



What is the range of the jogger's heart rate during this interval?

(1) 0 – 4 (3) 0 – 110
(2) 1 – 4 **(4) 60 – 110**

4834. What is the domain of the function below?

$$f(x) = \frac{2x^2}{x^2-9}?$$

(1) all real numbers except 0
(2) all real numbers except 3
(3) all real numbers except 3 and –3
(4) all real numbers

4728. A peach pie is made with 13 peaches which are evenly distributed throughout the pie. If Joe eats one slice of pie that is big enough so that he eats exactly 5 peaches, what was the angle of the slice to the nearest tenth of a degree?

138.5°

4727. An apple pie contains 17 whole apples which are evenly distributed throughout the pie. If Maria eats a section of the pie that accounts for 2 radians, how many apples did she eat to the nearest hundredth?

5.41

4726. A whole pizza has a circumference of 56 inches. If one slice of the pizza has an arc length of 10 inches, what is the measure of its angle in radians to the nearest hundreth?

1.12

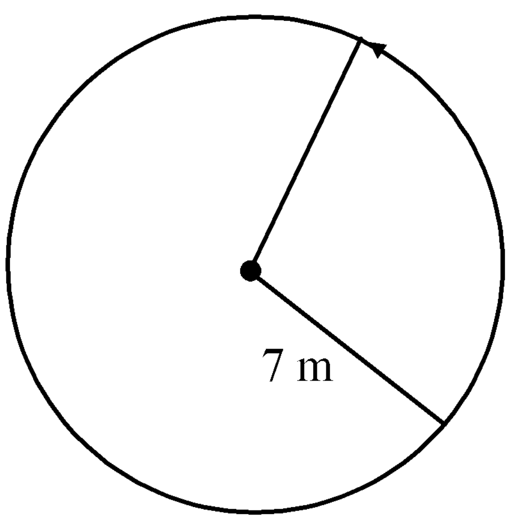
4725. A circular cake is cut into three sections so that the ratio of the sizes of the pieces is 4:2:1. What is the angle of the middle sized piece in radians?

(1) .9 **(3) 1.8**
(2) 1.5 (4) 3.14

4724. A wedge of cheese is cut from a wheel that has a radius of 6 inches. The arc of the wedge of cheese is 3 inches long. What is the angle of the wedge of cheese in radians?

(1) .5 (3) 2
(2) 1.57 (4) 3

4435. A car drives around a circular driveway that has a radius of 7 meters, as shown in the accompanying diagram. What distance has the car travelled when the arc it has made is 110°? Express your answer to the *nearest hundredth of a meter*.



13.44

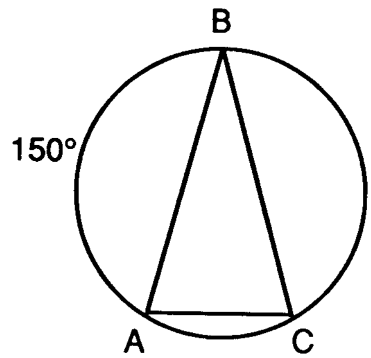
4378. A slice of a pizza pie has a radius of 6.46 inches and the measure of the edge around the crust of the slice is 2.15 inches. What is the angle measure of the pointed end of the slice of pizza, to the *nearest hundredth of a radian*?

.33

4384. Planet *Z* has a diameter of 6,500 miles. A moon rotates around Planet *Z* at a distance of 700 miles from the planet's surface. When the moon has traced an arc of 2,500 miles, how many radians, *to the nearest thousandth*, is the angle created from the rotation of the moon.

.633

4336. What is the measure of $\angle ABC$ if ΔABC is isosceles?

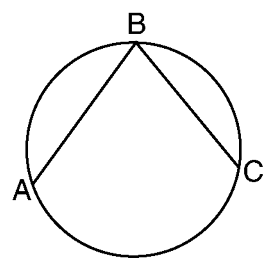


30°

4279. An art student wants to make a string collage by connecting six equally spaced points on the circumference of a circle to its center with string. What would be the radian measure of the angle between two adjacent pieces of string, in simplest form?

$\frac{\pi}{3}$

4225. In the accompanying diagram, the length of $\overset{\frown}{ABC}$ is $\frac{3\pi}{2}$ radians.



(Not drawn to scale)

What is $m\angle ABC$?

(1) 36 (3) 53
(2) 45 (4) 72

2694. In circle *O*, $\overline{PA}$ and $\overline{PB}$ are tangent to the circle from point *P*. If the ratio of the measure of major arc *AB* to the measure of minor arc *AB* is 5:1, then $m\angle P$ is

(1) 60 **(3) 120**
(2) 90 (4) 180

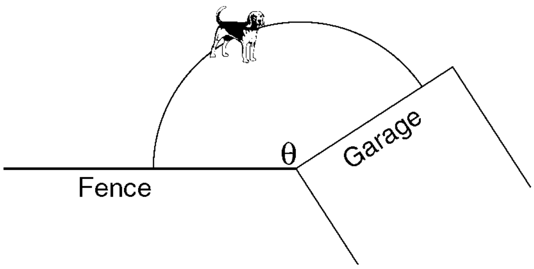
4732. Between the hours of 5 PM and 10 PM, the hour hand of a clock moves through an arc of length 17 in. What is the length of the hour hand to the nearest hundredth of an inch?

6.49 in

4731. A cake with a radius of 8 inches is cut into 6 equal pieces. What is the distance around the outer edge of each piece to the nearest hundredth of an inch?

8.38 in

4576. A dog has a 20-foot leash attached to the corner where a garage and a fence meet, as shown in the accompanying diagram. When the dog pulls the leash tight and walks from the fence to the garage, the arc the leash makes is 55.8 feet.



(Not drawn to scale)

What is the measure of angle θ between the garage and the fence, in radians?

(1) 0.36
(2) 2.79
(3) 3.14
(4) 160

4510. Ilana buys a large circular pizza that is divided into eight equal slices. She measures along the outer edge of the crust from one piece and finds it to be $5\frac{1}{2}$ inches. What is the diameter of the pizza to the *nearest inch*?

(1) 14
(2) 8
(3) 7
(4) 4

4485. Anthony buys a pizza pie for his friends, and cuts it into eight equal slices. The measure of the crust of each slice is 6 inches. Find the diameter of the pizza to the nearest tenth of an inch.

15.3 in

4380. A circular clock has two hands, each of which is the length of the radius of the clock. It is 5:00. The arc of the clock from the minute hand to the hour hand is 13 inches. What is the length of one hand of the clock, *to the nearest hundredth of an inch*?

4.97 inches

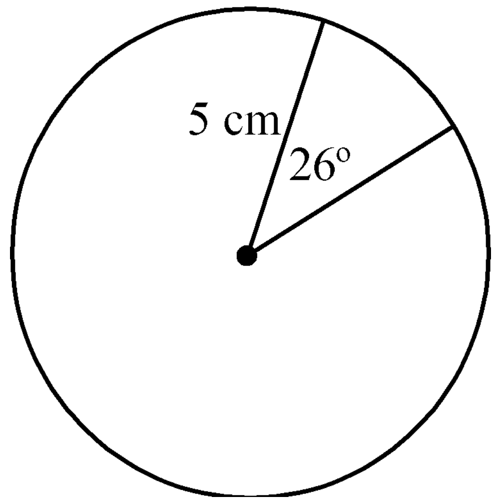
4101. In a circle with a radius of 4 centimeters, what is the number of radians in a central angle that intercepts an arc of 24 centimeters?

6

231. In a circle with radius 4.5 centimeters, find, in centimeters, the length of the arc intercepted by a central angle of 3 radians.

13.5

4468. The accompanying diagram represents a wheel of cheese. A wedge of 26º is cut out. What is the length of the arc of the wedge that is cut out? Round your answer to the *nearest tenth*.

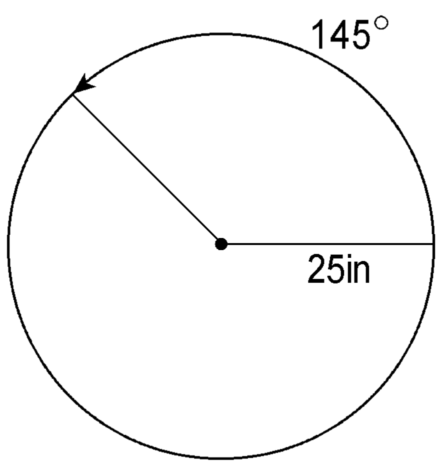


2.3 cm

4170. In a circle, an arc of length 5 is subtended by a central angle of $\frac{5}{3}$ radians. What is the radius of the circle?

(1) $\frac{25}{3}$
(2) $\frac{3}{25}$
(3) 3
(4) 5

3990. A merry-go-round rotates in a circle as shown in the diagram below. The radius of the circle made is 25in.



Lily is riding on the black horse. If the subtended arc is 145º, how far did her horse travel around the circle? *Express your answer to the nearest hundredth of an inch.*

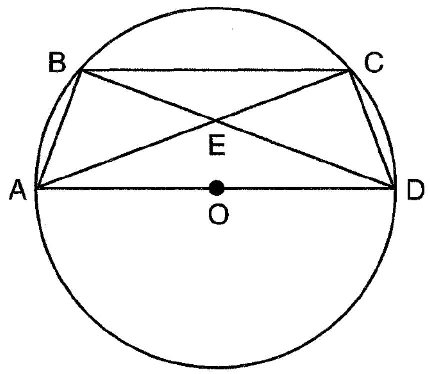
63.27 in

193. In a circle of radius 6, find the length of the arc intercepted by a central angle of 2 radians.

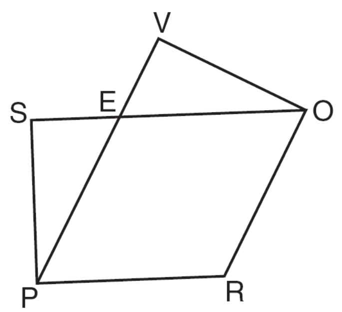
12

5414. In the accompanying diagram of circle O, $\overline{AD}$ is a diameter with $\overline{AD}$ parallel to chord $\overline{BC}$, chords $\overline{AB}$ and $\overline{CD}$ are drawn, and chords $\overline{BD}$ and $\overline{AC}$ intersect at E.

Prove: $\overline{BE} \cong \overline{CE}$.



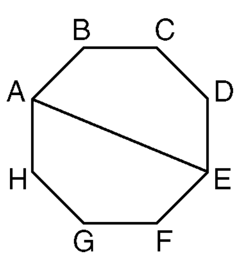
5380. Given: *PROE* is a rhombus, $\overline{SEO}$, $\overline{PEV}$, $\angle SPR \cong \angle VOR$



Prove $\overline{SE} \cong \overline{EV}$

A complete and correct proof that includes a conclusion is written.

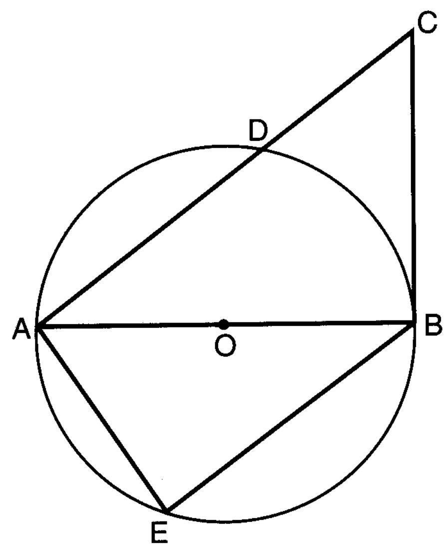
4531. A picnic table in the shape of a regular octagon is shown in the accompanying diagram. If the length of $\overline{AE}$ is 6 feet, find the length of one side of the table to the *nearest tenth of a foot*, and find the area of the table's surface to the *nearest tenth of a square foot.*



The side equals 2.3 and the area equals 25.5

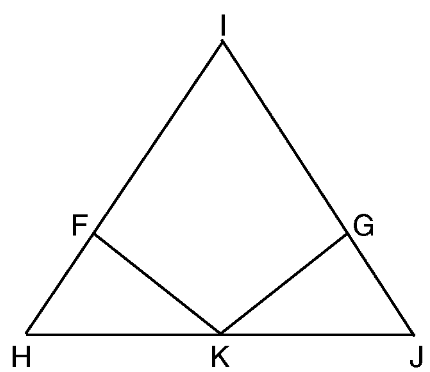
5097. In the accompanying diagram of circle O, diameter $\overline{AOB}$ is drawn, tangent $\overline{CB}$ is drawn to the circle at B, E is a point on the circle, and $\overline{BE} \parallel \overline{ADC}$.

Prove: $\Delta ABE \sim \Delta CAB$



A complete and correct proof that includes a concluding statement is written.

4094. Given: $\angle H \cong \angle J$, K is the midpoint of $\overline{HJ}$, and $\overline{IF} \cong \overline{IG}$.



Prove: $\overline{FK} \cong \overline{GK}$

Proof.

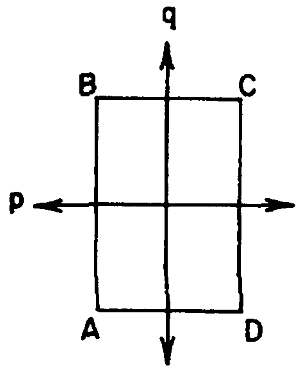
3681. For an isosceles triangle, *TRI*, $\angle T$ is the vertex angle, and U is the midpoint of $\overline{RI}$. Prove that median $\overline{TU}$ bisects $\angle T$.

proof

3680. For an isosceles triangle *ABC*, prove that the altitude to the base, $\overline{AD}$, is also the median.

proof

661. In the accompanying diagram, p and q are symmetry lines for rectangle $ABCD$.

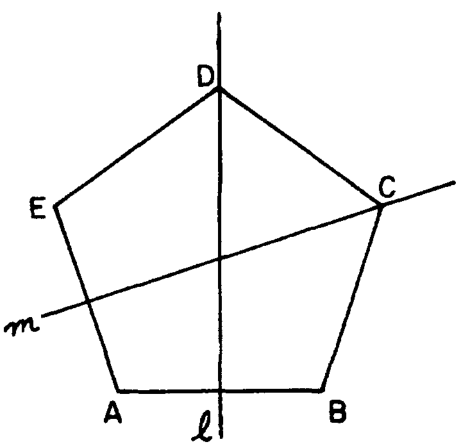


Find $r_p \circ r_q \circ r_p(A)$.
D

629. When point $A(-2,5)$ is reflected in the line $x = 1$, the image is

(1) (5,2) **(3) (4,5)**
(2) (–2,–3) (4) (0,5)

613. In the accompanying figure, ℓ and m are symmetry lines for regular pentagon $ABCDE$.



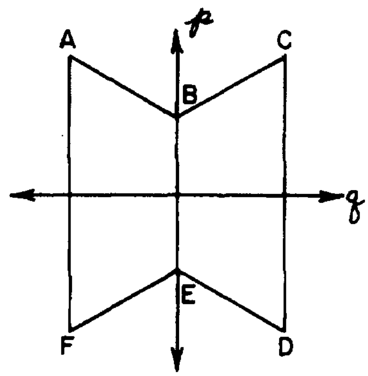
Find $r_\ell \circ r_m(A)$
C

583. A line reflection preserves
(1) distance and orientation
(2) angle measurement and orientation
(3) distance, but not angle measurement
(4) distance and angle measurement

210. If ℓ and m are parallel lines, then $r_\ell \circ r_m(\overline{AB})$ is equivalent to a

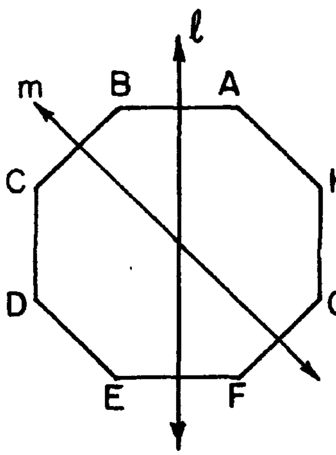
(1) rotation **(3) translation**
(2) dilation (4) glide-reflection

573. In the accompanying figure, p and q are symmetry lines for the figure $ABCDEF$.



Find $r_q \circ r_p \circ r_q(A)$.
C

530. In the accompanying figure, lines ℓ and m are lines of symmetry. What is $r_m \circ r_\ell(\overline{BC})$?



(1) $\overline{HA}$ **(3) $\overline{DE}$**
(2) $\overline{GF}$ (4) $\overline{BC}$

254. The equation $y = \tan x$ is graphed in the interval $0 \le x \le \pi/2$ and is reflected over the x–axis. On this reflection, point $(\pi/4, y)$ has which value for y?
(1) 1
(2) –1
(3) 0
(4) $\dfrac{\sqrt{3}}{3}$

189. Point $P(-1,-5)$ is reflected over the line $y = -x$. What are the coordinates of P', the image of P?
(5,1)

146. If $B(-2,5)$ is reflected over the line $y = x$, what are the coordinates of the image of B?
(5,–2)

1418. Which is the image of **A** under the transformation $r_{x\text{-axis}} \circ R_{90^\circ}$

(1) 
(3) 
(2) 
(4) 

1377. What is the image of (1,0) after a counterclockwise rotation of 60°?

(1) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
(3) $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$
(2) $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$
(4) $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

1158. Write the coordinates of *P'*, the image of *P*(5,–1) after a clockwise rotation of 180° about the origin.

(–5,1)

935. The point (–2,1) is rotated 180° about the origin in a clockwise direction. What are the coordinates of its image?

(2,–1)

779. Which transformation is equivalent to the composite line reflections $r_{y\text{-axis}} \circ r_{y=x}(\overline{AB})$?

(1) a rotation
(3) a translation
(2) a dilation
(4) a glide reflection

729. What are the coordinates of *M'*, the image of *M*(2,4), after a counterclockwise rotation of 90° about the origin?

(1) (–2,4)
(3) (–4,2)
(2) (–2,–4)
(4) (–4,–2)

668. If the letter P is rotated 180 degrees, which is the resulting figure?

(1) 
(3) 
(2) 
(4) 

528. Which rotation about the origin is equivalent to R_{-200°?

(1) R_{200°
(2) R_{-160°
(3) $\boldsymbol{R_{160^\circ}}$
(4) R_{560°

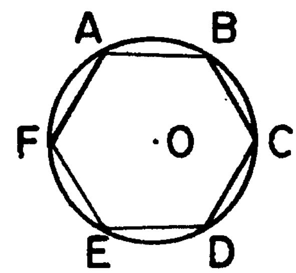
437. If the point (3,0) is rotated 270° counter-clockwise about the origin (R_{270°), its image is on the line

(1) $x = 0$
(3) $y = x$
(2) $y = 0$
(4) $y = -x$

249. Which geometric figure has 120° rotational symmetry?

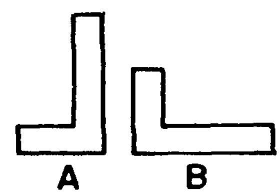
(1) square
(3) regular pentagon
(2) rhombus
(4) equilateral triangle

474. In the accompanying diagram, regular hexagon *ABCDEF* is inscribed in circle *O*. With *O* as the center of rotation find $R_{-120^\circ} \circ R_{240^\circ}(A)$.



E

398. Figure *B* is the image of figure *A* under which single transformation?



(1) line reflection
(3) rotation
(2) translation
(4) glide reflection

305. *a* On graph paper, graph and label triangle *ABC* whose vertices have coordinates *A*(4,0), *B*(8,1), and *C*(8,4).

b Graph and state the coordinates of $\Delta A'B'C'$, the image of ΔABC after the composite transformation $r_{x=0} \circ r_{y=x}(\Delta ABC)$.

c Which single type of transformation maps ΔABC onto $\Delta A'B'C'$?

(1) rotation
(3) glide reflection
(2) dilation
(4) translation

d Graph and state the coordinates of $\Delta A''B''C''$, the image of ΔABC after the composite transformation $r_{y=-4} \circ r_{y=0}(\Delta ABC)$.

e Which single type of transformation maps ΔABC onto $A''B''C''$?

(1) rotation
(3) glide reflection
(2) dilation
(4) translation

***b* A'(0,4) B'(–1,8) C'(–4,8)**
***c* 1**
***d* A''(4,–8) B''(8,–7) C''(8,–4)**
***e* 4**

101. What is the image of the point (2,–3) under a clockwise rotation of 90° about the origin?

(–3,–2)

3188. Which is an equation of the axis of symmetry of the graph of the equation $y = 2x^2 - 5x + 3$?

(1) $x = -\frac{5}{2}$

(2) $x = \frac{5}{2}$

(3) $x = -\frac{5}{4}$

(4) $x = \frac{5}{4}$

3166. Which is an equation of the axis of symmetry for the parabola whose equation is $y = 2x^2 - 3x + 4$?

(1) $x = \frac{3}{4}$ (3) $x = \frac{3}{2}$

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

3141. What is an equation of the axis of symmetry of the graph of the parabola $y = 2x^2 + 3x + 5$?

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

(2) $y = -\frac{3}{4}$ **(4) $x = -\frac{3}{4}$**

3138. The graph of the equation $y = x^2$ is a

(1) circle (3) point

(2) parabola (4) straight line

3128. Which is a point of intersection of the equations $y = x$ and $y = x^2 + x - 1$?

(1) (0,0) (3) (–1,0)

(2) (1,0) **(4) (–1,–1)**

3127. What is an equation of the axis of symmetry of the graph of the equation $y = 2x^2 - 3x - 1$?

(1) $x = \frac{3}{2}$ **(3) $x = \frac{3}{4}$**

(2) $y = -\frac{3}{2}$ (4) $y = \frac{3}{4}$

3114. *a* On graph paper, draw the graph of the equation $y = x^2 + 4$, including all values of x in the interval $-3 \le x \le 3$.
b Write the coordinates of the turning point of the graph drawn in part *a*.
c Indicate whether the point in part *b* is a minimum or a maximum point.
d On the same set of axes, draw the graph of the image of the graph drawn in part *a* after a reflection in the *x*-axis.

***b* 0, 4 *c* minimum**

3109. Which is an equation of the axis of symmetry for the parabola whose equation is $y = 2x^2 + 8x - 1$?

(1) $x = -2$ (3) $x = -4$

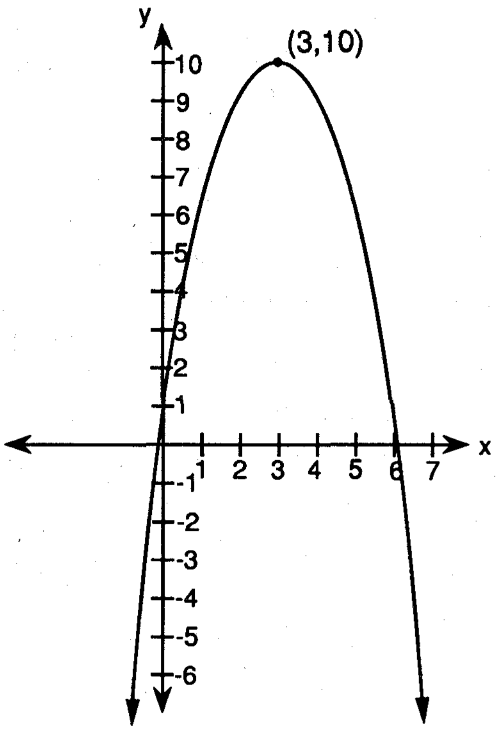
(2) $x = 2$ (4) $x = 4$

3091. Which is the axis of symmetry of the graph of the equation $y = -x^2 - 2x - 1$?

(1) $x = -1$ (3) $x = 1$

(2) $y = -1$ (4) $y = 1$

3093. Which equation defines the graph in the diagram below?



(1) $y = x^2 + 6x + 1$ (3) $y = x^2 + 3x$

(2) $y = -x^2 + 6x + 1$ (4) $y = -x^2 + 3x - 1$

3081. *a* On graph paper, draw the graph of. the parabola $y = x^2 + 6x + 5$, including all values of x in the interval $-6 \le x \le 0$.
b On the same set of axes, draw the image of the parabola drawn in part *a* after a translation of $(x + 3, y - 3)$.
c Using the graph, write the coordinates of the point of intersection of the parabolas drawn in parts *a* and *b*.

c (–2, –3)

3080. The turning point of the graph of the function of $y = 2x^2 + 4x + 3$ is

(1) (–1,1) (3) (1,–1)

(2) (–1,–1) (4) (1,1)

3058. What is the *y*-intercept of the parabola whose equation is $y = x^2 + 7x + 5$?

(1) $\frac{-7}{2}$

(2) 5

(3) 3

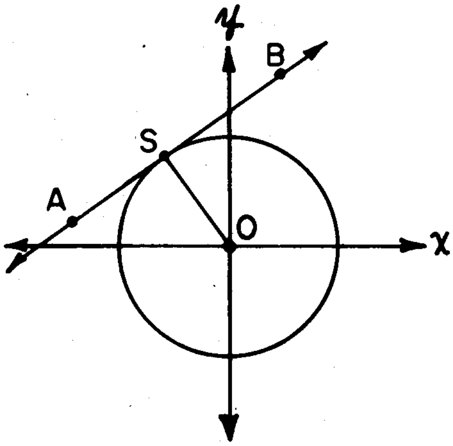
(4) $\frac{7}{2}$

3047. Which is the turning point of the parabola whose equation is $y = x^2 - 4x + 4$?

(1) (2,–4) (3) (–2,16)

(2) (2,0) (4) (–2,0)

2850. In the accompanying figure, point $S(-3,4)$ lies on circle O with center (0,0). Line $\overleftrightarrow{ASB}$ and radius $\overline{OS}$ are drawn.



a Find the length of $\overline{OS}$.
b Write an equation of circle O.
c If $\overleftrightarrow{AB} \perp \overline{OS}$, find the slope of $\overleftrightarrow{AB}$.
d Write an equation of line $\overleftrightarrow{ASB}$.
e Find the coordinates of any point on $\overleftrightarrow{AB}$ other than S.

a 5 b $x^2 + y^2 = 25$ c $\frac{3}{4}$
d $y - 4 = \frac{3}{4}(x + 3)$
or
$4y = 3x + 25$
or
$y = \frac{3}{4}x + \frac{25}{4}$

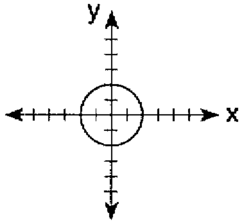
2785. Which point lies on the circle $x^2 + y^2 = 49$?
(1) (5,24) **(3) (–7,0)**
(2) (–4,3) (4) (0,0)

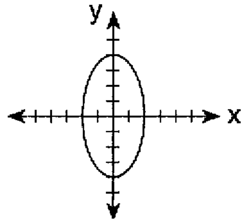
2776. Which is an equation of a circle whose center has coordinates (4,–3) and whose radius has length 6?
(1) $(x + 4)^2 + (y - 3)^2 = 36$ (3) $(x + 4)^2 + (y - 3)^2 = 6$
(2) $(x - 4)^2 + (y + 3)^2 = 36$ (4) $(x - 4)^2 + (y + 3)^2 = 6$

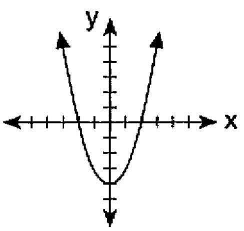
2768. What are the coordinates of the center of the circle whose equation is $(x - 3)^2 + (y + 2)^2 = 12$?
(3,–2) *or* $x = 3, y = -2$

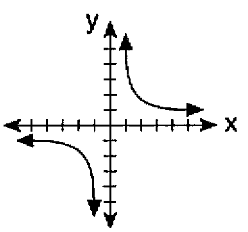
2763. An equation of a circle with center at (2,–3) and radius 5 is
(1) $(x - 2)^2 + (y + 3)^2 = 25$ (3) $(x + 2)^2 + (y - 3)^2 = 25$
(2) $(x - 2)^2 + (y + 3)^2 = 5$ (4) $(x + 2)^2 + (y - 3)^2 = 5$

2219. Which graph represents the equation $\frac{x^2}{4} + \frac{y^2}{4} = 1$?

(1)


(2)


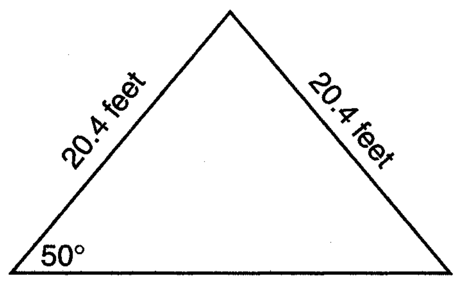
(3)


(4)


2186. The graph of the equation $\frac{x^2 + y^2}{2} = 5$ is
(1) a circle (3) a hyperbola
(2) an ellipse (4) a parabola

1881. The graph of the equation $y^2 = 4 - x^2$ is
(1) an ellipse **(3) a circle**
(2) a hyperbola (4) a parabola

5303. The accompanying diagram shows the peak of a roof that is in the shape of an isosceles triangle. A base angle of the triangle is 50° and each side of the roof is 20.4 feet. Determine, to the *nearest tenth of a square foot,* the area of this triangular region.



204.9

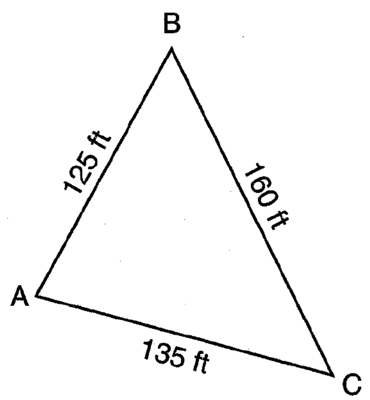
5448. Firefighters dug three trenches in the shape of a triangle to prevent a fire from completely destroying a forest. The lengths of the trenches were 250 feet, 312 feet, and 490 feet.

Find, to the *nearest degree,* the *smallest* angle formed by the trenches.

Find the area of the plot of land within the trenches, to the *nearest square foot*.

26 and 33,443, and appropriate work is shown. [Allow full credit if student uses 26 and finds A = 33,509.]

5413. The accompanying diagram shows a triangular plot of land located in Moira's garden.



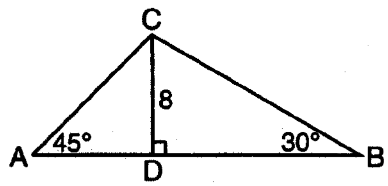
Find the area of the plot of land, and round your answer to the *nearest hundred square feet.*

8,200

4713. When designing a house, an architect forms a coordinate grid to use on his blueprints. A triangular room has two vertices at (1, 5) and (5, 12). If the room is to have an area of 14 and be in the shape of a right triangle, what are the coordinates of the third vertex?

(5,5)

5411. In the accompanying diagram, $\overline{CD}$ is an altitude of ΔABC. If $CD = 8$, $m\angle A = 45$, and $m\angle B = 30$, find the perimeter of ΔABC in simplest radical form.



$\mathbf{24 + 8\sqrt{2} + 8\sqrt{3}}$

4712. A homeowner's property consists of a coordinate grid. A triangular portion of the grid having vertices at (1,2), (3,10) and (7, 2) has been reserved for a garden. What is the area of the garden?

24

4060. What is the area of the triangle whose vertices are (3,1), (7,1), and (6,4)?

6

3492. Find the area of pentagon *CANDY* with vertices *C*(–6,8), *A*(3,8), *N*(6,–2), *D*(–4,–1), and *Y*(–7,4).

97.5

3465. The vertices of a pentagon are *A*(–2,–1), *B*(1,3), *C*(3,4), *D*(5,0), and *E*(3,–2). Find the area of pentagon *ABCDE*.

23.5

3420. Trapezoid *ABCD*, which has coordinates *A*(0,9), *B*(12,9), *C*(8,4), and *D*(0,4).

Find the perimeter of *ABCD* to the *nearest integer*.

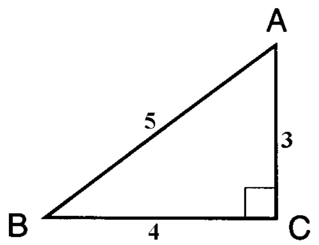
31

3419. Trapezoid *ABCD*, which has coordinates *A*(0,9), *B*(12,9), *C*(8,4), and *D*(0,4).

Find the area of trapezoid *ABCD*.

50

3274. In the accompanying diagram of right triangle *ABC*, the hypotenuse is $\overline{AB}$, *AC* = 3, *BC* = 4, and *AB* = 5.

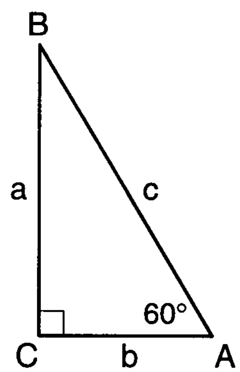


Sin *B* is equal to

(1) sin *A* (3) tan *A*

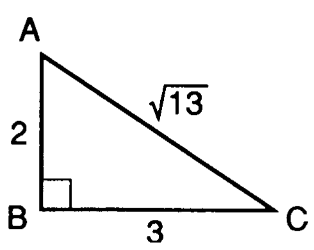
(2) cos *A* (4) cos *B*

3272. In the accompanying diagram of right triangle *ABC*, *b* = 40 centimeters, m∠*A* = 60º, and m∠*C* = 90º. Find the number of centimeters in the length of side *c*.



80 cm

3244. In the accompanying diagram of right triangle *ABC*, what is tan *C*?



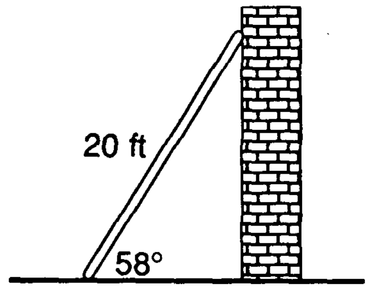
(1) $\mathbf{\frac{2}{3}}$

(2) $\frac{\sqrt{13}}{3}$

(3) $\frac{3}{2}$

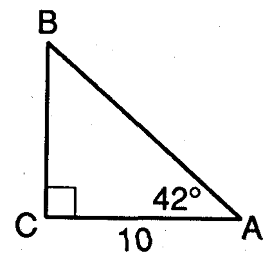
(4) $\frac{2}{\sqrt{13}}$

3240. A 20-foot ladder is leaning against a wall. The foot of the ladder makes an angle of 58° with the ground. Find, to the *nearest foot*, the vertical distance from the top of the ladder to the ground.



17 ft

3215. In the diagram below, m∠*C* = 90º, m∠*A* and *CA* = 10.

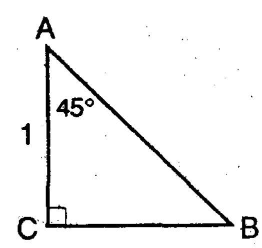


Which equation can be used to find *AB*?

(1) $\tan 42^\circ = \frac{10}{AB}$ (3) $\cos 42^\circ = \frac{AB}{10}$

(2) $\tan 42^\circ = \frac{AB}{10}$ **(4)** $\cos 42^\circ = \frac{10}{AB}$

3179. In the accompanying diagram of right triangle *ABC*, m∠*C* = 90º, m∠*A* = 45º, and *AC* = 1. Find, in radical form, the length of $\overline{AB}$.



$\sqrt{2}$

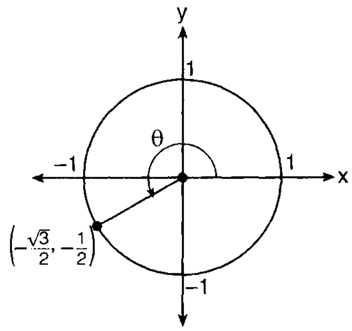
3177. If sin *A* = 0.3642, find the measure of ∠*A* to the *nearest degree*.

21°

5139. If $\sin x < 0$ and $\tan x > 0$, then x must be in Quadrant

(1) I **(3) III**
(2) II (4) IV

4977. In the accompanying diagram of a unit circle, the ordered pair $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$ represents the point where the terminal side of θ intersects the unit circle



(1) 210 (3) 233
(2) 225 (4) 240

4935. If $\sin\theta$ is negative and $\cos\theta$ is negative, in which quadrant does the terminal side of θ lie?

(1) I **(3) III**
(2) II (4) IV

4871. If the tangent of an angle is negative and its secant is positive, in which quadrant does the angle terminate?

(1) I (3) III
(2) II **(4) IV**

4636. A landscaper uses a coordinate grid to design gardens. He puts one row of plants along the *x*-axis and wants to put another row of plants so that the angle they form with the first row has a secant that is positive and a sine that is negative. In what quadrant of the garden must the second row of plants be placed?

IV

4537. If $\sin\theta > 0$ and $\sec\theta < 0$, in which quadrant does the terminal side of angle θ lie?

(1) I (3) III
(2) II (4) IV

4332. If $(\csc x - 7)(9\csc x - 5) = 0$, then x terminates in

(1) Quadrant I, only
(2) Quadrants I and II, only
(3) Quadrants I and IV, only
(4) Quadrants I, II, III, and IV

4198. Which trigonometric function is positive in Quadrant IV?

(1) $\sin x$ (3) $\csc x$
(2) $\sec x$ (4) $\cot x$

4162. If $\sin\theta$ is less than 0 and $\sec\theta$ is greater than 0, in which quadrant does the terminal side of θ lie?

(1) I (3) III
(2) II **(4) IV**

4111. If $\sin A = \frac{5}{13}$ and $\cos A > 0$, angle A terminates in Quadrant

(1) I (3) III
(2) II **(4) IV**

3831. If the sine of an angle is $\frac{3}{5}$ and the angle is *not* in Quadrant I, what is the value of the cosine of the angle?

–0.8

3644. If $\sin A < 0$ and $\tan A > 0$, in which quadrant does the terminal side of $\angle A$ lie?

(1) I **(3) III**
(2) II (4) IV

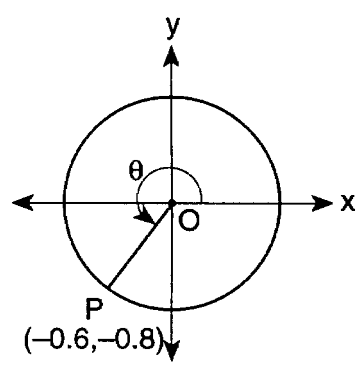
3548. In which quadrant are both tangent and cosecant negative?

IV

2746. If $\sec x < 0$ and $\tan x < 0$, then the terminal side of angle x is located in Quadrant

(1) I (3) III
(2) II (4) IV

2697. In the accompanying diagram, point $P(-0.6,-0.8)$ is on unit circle O.



What is the measure of angle θ to the *nearest degree*?

(1) 143 (3) 225
(2) 217 **(4) 233**

2675. If $\sin A < 0$ and $\cot A > 0$, in which quadrant does the terminal side of $\angle A$ lie?

III

2584. If θ is in Quadrant II and $\cos\theta = -\frac{3}{4}$, find an exact value for $\sin 2\theta$.

$\mathbf{\frac{-3\sqrt{7}}{8}}$

2561. If $\tan x = -\sqrt{3}$, in which quadrant could angle x terminate?

(1) I and III **(3) II and IV**
(2) II and III (4) III and IV

5273. Find all values of x in the interval $0° \leq x < 360°$ that satisfy the equation $3 \cos x + \sin 2x = 0$.

90° and 270°, and appropriate work is shown, such as solving the equation $3 \cos x + 2 \sin x \cos x = 0$ or sketching a graph and finding the x-intercepts.

5045. The expression

$$\frac{1 - \cos^2 x}{\sin^2 x}$$

is equivalent to

(1) 1 (3) $\sin x$
(2) –1 (4) $\cos x$

4880. The path traveled by a roller coaster is modeled by the equation $y = 27 \sin 13x + 30$. What is the maximum altitude of the roller coaster?

(1) 13 (3) 30
(2) 27 **(4) 57**

4811. If x is an acute angle and $\sin x = \frac{12}{13}$, then $\cos 2x$ equals

(1) $\frac{25}{169}$
(2) $\frac{119}{169}$
(3) $-\frac{25}{169}$
(4) $\mathbf{-\frac{119}{169}}$

4642. What is the length, to the nearest tenth of a foot, of the slope of a hill with an angle of inclination of 30° if the change in elevation from the top to the bottom is 47 feet

94.0 ft

4639. The electric current in a RC circuit oscillates according to the equation $I(t) = 5 \cos(3t)$, where I is the current and t is the time in seconds. What is the period of oscillation of the current?

2π/3 s

4638. A mass on a spring is oscillating according to the equation $x(t) = 3 \sin 3t$, where x is the distance from the equilibrium position in centimeters and t is the time in seconds. What is the distance from equilibrium when $t = \pi/6$?

3 cm

4637. A pendulum oscillates according to the equation $x = 3 \cos 4t$, where t is the time in seconds. What is the frequency of oscillation in s^{-1}?

(1) π/2 **(3) 2/π**
(2) 8π (4) 1/8π

3836. If $\sin x = .8$, where $0° < x < 90°$, find the value of $\cos (x + 180°)$.

–0.6 or an equivalent answer

4463. A gardener moves around the lawn following the equation $y = \sin x + 1$. A fly flies around the lawn according to the equation $y = 4 \cos 5x + 4$. For how many values of x on the intervals $0 \leq x \leq 2\pi$ do the gardener and the fly collide (intersect)?

(1) 5 (3) 9
(2) 8 **(4) 10**

3872. An object that weighs 2 pounds is suspended in a liquid. When the object is depressed 3 feet from its equilibrium point, it will oscillate according to the formula $x = 3 \cos 8t$, where t is the number of seconds after the object is released. How many seconds are in the period of oscillation?

(1) $\mathbf{\frac{\pi}{4}}$
(2) π
(3) 3
(4) 2π

3626. Find all values of θ in the interval $0 \leq \theta \leq 360°$ that satisfy the equation $\sin \theta = 2 + 3 \cos 2\theta$. Express your answer to the *nearest ten minutes* or *nearest tenth of a degree*.

56.4º, 123.6º, 270º
or
56º30′, 123º30′, 270º

3615. As angle θ increases from π radians to 2π radians, the cosine of θ

(1) increases throughout the interval
(2) decreases throughout the interval
(3) increases, then decreases
(4) decreases, then increases

2692. If $f(x) = \sin (\text{Arc} \tan x)$, the value of $f(1)$ is

(1) $\sqrt{2}$
(2) $\mathbf{\frac{\sqrt{2}}{2}}$
(3) $\frac{\sqrt{3}}{2}$
(4) $\frac{\sqrt{3}}{3}$

2689. As angle x increases from π/2 to π, the value of $\sin x$ will

(1) increase from –1 to 0 (3) decrease from 0 to –1
(2) increase from 0 to 1 **(4) decrease from 1 to 0**

2648. If $\sin \theta = -\frac{3}{5}$ and $\cos \theta > 0$, what is the value of $\tan \theta$?

(1) $\frac{3}{4}$ (3) $\frac{4}{3}$
(2) $\mathbf{-\frac{3}{4}}$ (4) $-\frac{4}{3}$

2542. If $f(x) = \sin x + \cos x$, evaluate $f(2\pi)$.

1

2505. If $f(x) = \sin \frac{1}{2}x + 2 \cos x$, evaluate $f(\pi)$.

–1

1882. *a* On the same set of axes, sketch and label the graphs of the equations $y = \sin \frac{1}{2}x$ and $y = 2 \cos x$ in the interval $0 \le x \le 2\pi$.
b Use the graphs sketched in part *a* to determine the number of points in the interval $0 \le x \le 2\pi$ that satisfy the equation $\sin \frac{1}{2}x = 2 \cos x$.

***b* 2**

1835. *a* Graph the equation $y = 3 \sin x$ in the domain $-\pi/2 \le x \le \pi/2$.
b On the same set of axes, reflect the graph drawn in part *a* in the line $y = x$, and label the graph *b*.
c (1) Is the relation graphed in part *b* a function?
(2) State a mathematical justification for your answer.
d Write an equation that represents the graph drawn in part *b*.

***c* (1) Yes *d* $x = 3 \sin y$**

1793. *a* On the same set of axes, sketch and label the graphs of the equations $y = 2 \sin \frac{1}{2}x$ and $y = \cos 2x$ in the interval $0 < x < 2\pi$.
b Use the graphs from part *a* to determine how many values of *x* in the interval $0 < x < 2\pi$ satisfy the equation $2 \sin \frac{1}{2}x = \cos 2x$.

***b* 2**

1790. For which value of *u* is the expression below undefined?

$$\tan \frac{(3u + 30)^\circ}{2}$$

(1) 0
(2) 45
(3) 50
(4) 110

1749. *a* On the same set of axes, sketch and label the graphs of the equations $y = \sin \frac{1}{2}x$ and $y = \frac{1}{2} \cos x$ for the values of *x* in the interval $-\pi \le x \le \pi$.
b In which interval is $\sin \frac{1}{2}x$ *always* greater than $\frac{1}{2} \cos x$?
(1) $-\pi \le x \le \pi/2$
(2) $-\pi/2 \le x \le 0$
(3) $0 \le x \le \pi/2$
(4) $\pi/2 \le x \le \pi$

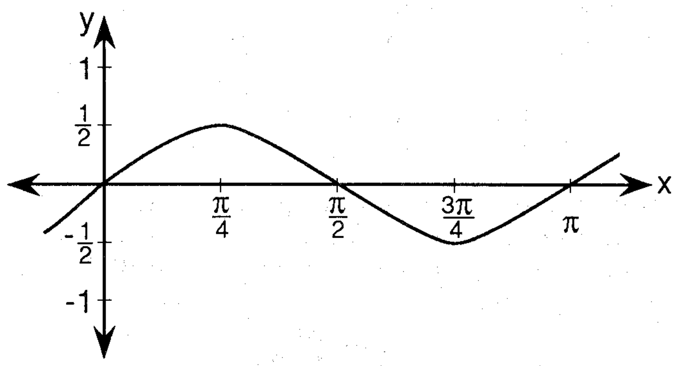
***b* 4**

1661. *a* On the same set of axes, sketch and label the graphs of the equations $y = 2 \cos x$ and $y = \sin 2x$ as *x* varies from $-\pi$ to π radians.
b Use the graphs drawn in part a to determine all values of *x* in the interval $-\pi \le x \le \pi$ that satisfy the equation $2 \cos x = \sin 2x$.

***a* Graph *b* $-\frac{\pi}{2}, \frac{\pi}{2}$**

287. As θ increases from π/2 to π, which statement is true?
(1) sin θ decreases from 0 to –1
(2) cos θ decreases from 0 to –1
(3) cos θ increases from –1 to 0
(4) sin θ increases from –1 to 0

1694. Which equation is represented by the graph below?



(1) $y = 2 \sin \frac{1}{2}x$
(2) $y = \frac{1}{2} \sin \frac{1}{2}x$
(3) $y = \frac{1}{2} \sin 2x$
(4) $y = -\frac{1}{2} \cos 2x$

1622. *a* Sketch the graph of the equation $y = 2 \sin x$ in the interval $-\pi \le x \le \pi$.
b On the same set of axes, reflect the graph draw in part *a* in the *y*-axis and label the graph *b*.
c Write an equation of the graph drawn in part *b*.
d Using the equation from part *c*, find the value of *y* when $x = {}^{\pi}/_{6.}$

***c* $y = -2 \sin x$ *d* –1**

1573. *a* On the same set of axes, sketch the graphs of the equations $y = 2 \cos \frac{1}{2}x$ and $y = -\sin x$ in the interval $0 \le x \le 2\pi$.
b From the graphs drawn in part *a*, find all values of *x* that satisfy the equation $2 \cos \frac{1}{2}x = -\sin x$.

***b* π**

1478. *a* Graph the equation $y = \cos \frac{1}{2}x$ for values of *x* on the interval $-\pi \le x \le \pi$.
b On the same set of axes, sketch the transformation of the graph drawn in part *a* under $T_{(\pi,0)}$ and label it *b*.
c If $64 \cos x = -14$ and *x* is in the second quadrant, find $\cos \frac{1}{2}x$ and express in simplest form.

***c* $\frac{5}{8}$**

1438. *a* On the same set of axes, sketch and label the graphs of $y = 2 \sin x$ and $y = \cos 2x$ for the values of *x* in the interval $-\pi \le x \le \pi$.
b Based on the graphs drawn in part *a*, which value of *x* in the interval $-\pi \le x \le \pi$ satisfies the equation $2 \sin x - \cos 2x = 3$?

***b* $\frac{\pi}{2}$**

1378. As θ increases from $\frac{\pi}{2}$ to $\frac{3\pi}{2}$, the value of cos θ
(1) decreases, only
(2) increases, only
(3) decreases and then increases
(4) increases and then decreases

2066. The sides of a triangle have lengths 58, 92, and 124.

a Find, to the *nearest ten minutes*, the largest angle of the triangle.
b Find, to the *nearest integer*, the area of the triangle.

***a* 109º 30' *b* 2515**

2054. If $a = 5\sqrt{2}$, $b = 8$, and $m\angle A = 45$, how many distinct triangles can be constructed?

(1) 1 (3) 3
(2) 2 (4) 0

2022. *a* Find, to the *nearest degree*, the measure of the largest angle of a triangle whose sides measure 22, 34, and 50.
b Find, to the *nearest integer*, the area of the triangle described in part *a*.

***a* 125 *b* 306**

2017. If $a = 5$, $b = 7$, and $m\angle A = 30$, how many distinct triangles can be constructed?

(1) 1 (3) 3
(2) 2 (4) 4

2009. The sides of a triangle measure 6, 7, and 9. What is the cosine of the largest angle?

(1) $-\frac{4}{84}$
(2) 81
(3) $\frac{4}{84}$
(4) $-\frac{1}{81}$

1971. In ΔABC, $m\angle A = 42°20'$, $AC = 2.0$ feet, and $AB = 18$ inches.

a Find *BC* to the *nearest tenth*.[Indicate the unit of measure.]
b Find the area of ΔABC to the *nearest tenth*. [Indicate the unit of measure]

***a* 16.2 in *or* 1.3 ft**
***b* 145.5 in^2 or 1.0 ft^2**

1918. In ΔABC if $a = 8$, $b = 5$, and $c = 9$, then cos *A* is

(1) $\frac{7}{15}$
(2) $-\frac{7}{15}$
(3) $\frac{1}{4}$
(4) $-\frac{1}{4}$

1826. In ΔABC, $m\angle A = 30$, $a = 4$, and $b = 6$. Which type of angle is $\angle B$?

(1) either acute or obtuse (3) acute, only
(2) obtuse, only (4) right

1885. In parallelogram *ABCD*, $AD = 11$, diagonal $AC = 15$, and $m\angle BAD = 63°50'$.

a Find, to the *nearest ten minutes*, the measure of $\angle ACD$.
b Find, to the *nearest integer*, the area of parallelogram *ABCD*.

***a* 41°10' *b* 64**

1810. In ΔABC, $a = 5$, $b = 6$, and $c = 8$. Find cos *A*.

$\frac{75}{96}$

1747. In ΔABC, $a = 1$, $b = 1$, and $c = \sqrt{2}$. What is the value of cos *C*?

(1) 1 (3) $\frac{1}{2}\sqrt{2}$
(2) $\sqrt{2}$ **(4) 0**

1709. A side of rhombus *ABCD* measures 100 feet. The measure of $\angle ABC = 110°20'$.

a Find, to the *nearest foot*, the measure of diagonal $\overline{AC}$.
b Find, to the *nearest square foot*, the area of rhombus *ABCD*.

***a* 164 *b* 9377**

1664. Two forces act on a body at an angle of 120º. The forces are 28 pounds and 35 pounds.

a Find the magnitude of the resultant force to the *nearest tenth* of a pound.
b Find the angle formed by the greater of the two forces and resultant force to the *nearest degree*.

***a* 32.1 *b* 49**

1646. In ΔABC, $a = 6$, $b = 5$, and $c = 8$. Cos *A* equals

(1) $\frac{75}{80}$
(2) $\frac{53}{80}$
(3) $\frac{-3}{80}$
(4) $\frac{53}{60}$

1623. One angle of a rhombus measures 100°, and the longer diagonal measures 5.8 meters.

To the *nearest tenth* of a meter, find the length of
a each side of the rhombus
b the shorter diagonal

***a* 3.8 *b* 4.9**

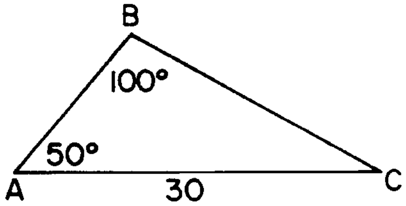
1576. In parallelogram *ABCD*, $AD = 10$, $AB = 12$, and diagonal $BD = 18$. Find the measure of angle *A* to the *nearest ten minutes*.

109°30'

1157. In ΔABC, $a = 6$, $b = 8$, and $\sin C = \frac{1}{4}$. Find the area of ΔABC.

6

1149. In the accompanying diagram of ΔABC, $AC = 30$ centimeters, $m\angle B = 100$, and $m\angle A = 50$. Find the area of ΔABC to the *nearest square centimeter*.



175

1138. The area of ΔABC is 100 square centimeters. If $c = 20$ centimeters and $m\angle A = 30$, then b is equal to

(1) 20 cm
(2) 500 cm
(3) $20\sqrt{3}$ cm
(4) $10\sqrt{2}$ cm

1083. Find the area of ΔABC if $m<A = 30$, $b = 10$, and $c = 5$.

$12\frac{1}{2}$

991. In ΔPQR, $PQ = 5$ cm, $QR = 6$ cm, and $m\angle Q = 30$. Find the area of ΔPQR in square centimeters.

7.5

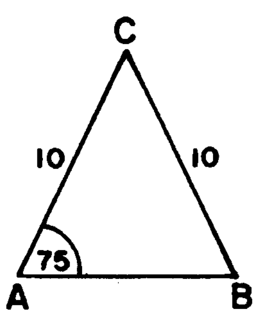
865. Two sides of a triangle measure 6 and 8, and the measure of the included angle is 150°. The area of the triangle is

(1) $24\sqrt{3}$
(2) 24
(3) $12\sqrt{3}$
(4) 12

690. *a* In ΔABC, $AB = 15$ cm, $BC = 10$ cm, and $AC = 6$ cm. Find the measure of angle B to the *nearest degree*.
b Using the answer to part *a*, find the area of ΔABC to the *nearest square centimeter*.

***a* 16º**
***b* 21**

104. In the accompanying figure of ΔABC, $a = 10$, $b = 10$, and $m\angle A = 75$. Find the area of ΔABC.



25

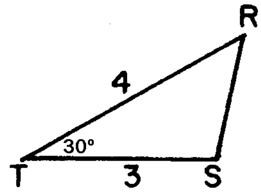
520. In ΔABC, $m\angle A = 150$, $b = 8$, and $c = 10$. Find the number of square units in the area of ΔABC.

20

438. In triangle ABC, $a = 20$, and $m\angle C = 30$. For which value of b is the area of triangle ABC equal to 100 square units?

(1) 10
(2) 20
(3) $\frac{20\sqrt{3}}{3}$
(4) 25

376. In the accompanying diagram of ΔRST, $ST = 3$ and $RT = 4$. If $m\angle T = 30$, find the area of ΔRST.



3

282. Find, to the *nearest integer*, the area of parallelogram $ABCD$ if $AB = 10$, $BC = 8$, and $m\angle A = 50$.

61

236. In triangle ABC, $m\angle C = 90$, side $c = 13$ centimeters, and side $a = 5$ centimeters. Find the area of the triangle in square centimeters.

30

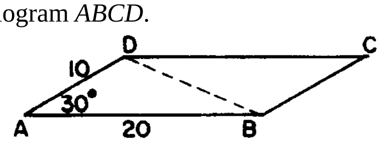
219. *a* Two sides of a triangular plot measure 30 meters and 18 meters, respectively. If the angle opposite the 30-meter side measures 58°, find, to the *nearest degree*, the measure of the angle opposite the 18-meter side.
b Using the answer to part *a*, find the area of the triangle to the *nearest square meter*.

***a* 31 *b* 270**

149. In triangle ABC, $m\angle A = 30$, side $b = 10$, and side $c = 20$. Find the area of triangle ABC.

50

64. In the accompanying diagram, $ABCD$ is a parallelogram with $AB = 20$, $AD = 10$, and $m\angle A = 30$. Find the area of parallelogram $ABCD$.



100

655. In triangle ABC, $a = 6$, $b = 8$, and $\sin C = \frac{1}{4}$. Find the area of triangle ABC.

6

616. In ΔABC, $a = 6$, $c = 4$, and $m\angle B = 150$. Find the number of square units in the area of the triangle.

6

4794. The expression cos 40° cos 10° + sin 40° sin 10° is equivalent to
(1) cos 30° (3) sin 30°
(2) cos 50° (4) sin 50°

4583. If sin $x = \frac{12}{13}$, cos $y = \frac{3}{5}$, and x and y are acute angles, the value of cos $(x - y)$ is
(1) $\frac{21}{65}$
(2) $\mathbf{\frac{63}{65}}$
(3) $-\frac{14}{65}$
(4) $-\frac{33}{65}$

4110. The value of sin 170° cos 20° – cos 170° sin 20° is
(1) $\mathbf{\frac{1}{2}}$
(2) $-\frac{1}{2}$
(3) $\frac{\sqrt{3}}{2}$
(4) $\frac{-\sqrt{3}}{2}$

3643. The expression cos 80° cos 70° + sin 80° sin 70° is equivalent to
(1) cos 10° (3) sin 10°
(2) cos 150° (4) sin 150°

3629. When sin $x = -\frac{8}{17}$ and x lies in Quadrant III and cos $y = -\frac{4}{5}$ and y lies in Quadrant II, what is cos $(x - y)$?
$\mathbf{\frac{36}{85}}$

2702. The expression cos (270º – A) is equivalent to
(1) cos A (3) sin A
(2) – cos A **(4) – sin *A***

2471. The expression cos 70º cos 10º + sin 70º sin 10º is equivalent to
(1) cos 60º (3) sin 60º
(2) cos 80º (4) sin 80º

2433. The expression $\cos^2 40 - \sin^2 40$ has the same value as
(1) sin 20 **(3) cos 80**
(2) sin 80 (4) cos 20

2293. Express sin 75º cos 15º – cos 75º sin 15º as a single trigonometric function of a positive acute angle.
sin 60º

2216. The expression cos 80° cos 20° – sin 80° sin 20° is equivalent to
(1) cos 60° (3) sin 100°
(2) cos 100° (4) sin 60°

1861. If $A = -2 + 4i$ and $B = 3 - 2i$, in which quadrant does the graph of $(A - B)$ lie?
II

1559. If A and B are acute angles, sin $A = {}^{1}/_{2}$, and sin $B = {}^{\sqrt{3}}/_{2}$, what is the value of sin $(A - B)$?
(1) 1 (3) $\frac{1}{2}$
(2) –1 **(4)** $\mathbf{-\frac{1}{2}}$

1920. If cos $x = \frac{12}{13}$ and sin $y = \frac{4}{5}$, then sin$(x - y)$ equals
(1) $\frac{72}{65}$
(2) $\frac{56}{65}$
(3) $\frac{-16}{65}$
(4) $\mathbf{\frac{-33}{65}}$

1606. The value of sin 60° cos 45° – sin 45° cos 60° is
(1) 1
(2) 0
(3) $\mathbf{\frac{\sqrt{6} - \sqrt{2}}{4}}$
(4) $\frac{1}{2}$

1520. If sin $A = \frac{3}{5}$, sin $B = \frac{2}{3}$, and $\angle A$ and $\angle B$ are acute angles, what is the value of cos $(A - B)$?
(1) $-\frac{2}{3}$ (3) $\frac{4\sqrt{5}+2}{5}$
(2) $\frac{4\sqrt{5}-6}{15}$ **(4)** $\frac{4\sqrt{5}+6}{15}$

1390. Find the exact value for cos 15º using the formula for cos$(x - y)$. (Hint: m$\angle x$ = 45º, m$\angle y$ = 30º)
$\mathbf{\frac{\sqrt{6} + \sqrt{2}}{4}}$

1345. If A and B are both acute angles, sin $A = \frac{5}{13}$ and sin $B = \frac{4}{5}$, then sin $(A - B)$ is
(1) $\mathbf{-\frac{33}{65}}$
(2) $\frac{63}{65}$
(3) $\frac{33}{65}$
(4) $\frac{43}{65}$

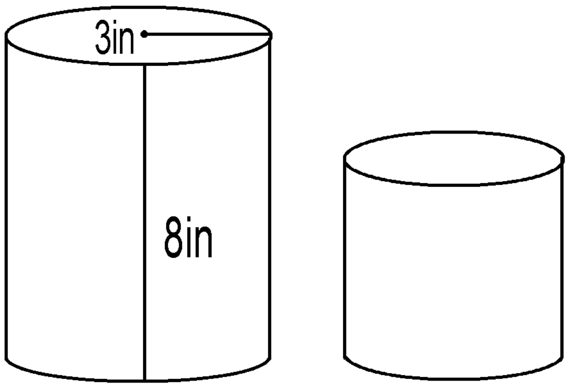
1238. Express in radical form:
sin 90º cos 30º – cos 90º sin 30º
$\mathbf{\frac{\sqrt{3}}{2}}$

963. The expression cos y (csc y – sec y) is equivalent to
(1) cot *y* – 1 (3) 1 – tan y
(2) tan y – 1 (4) –cos y

821. The expression sin (90º – θ) is equivalent to
(1) cos θ (3) –cos θ
(2) sin θ (4) –sin θ

Base your answers to questions **4046** through **4048** on the picture below.

Katalina has two cans. One can is a soda pop can and has a height of 8 inches. The radius of its top is 3 inches. The other can is a soup can. Its raduis is $\frac{3}{4}$ the radius of the soda can, and it has half the height.



4046. What is the diameter and height of the soup can?

diameter = 4.50 height = 4in

4047. What are the volumes of the two cans? *Round your answer to the nearest whole number.*

volume of soda can = 226 square inches
volume of soup can = 64 square inches

4048. How many times bigger is the soda can then the soup can? *Round your answer to the nearest tenth.*

3.5 times bigger

4045. the information below.

Every year less and less people use audio tape players. The equation $P(t)=7(5.6)^{.23t}$ represents the decline of audio tape players in one state since 1990, where t is time in years and P represents the number of tape players in use in ten thousands.

In what year, did the number of audio tape players in use decrease to below 5,000?

1997

3982. Terrianne had a rectangular deck. Its length was three times its width. She decided to rebuild her deck so that it was 4 feet longer and 4 feet wider than her first deck. If x represents the original width of the deck, which expression represents the difference between the area of her new deck and the area of the original deck?

(1) $3x^2$ (3) 13
(2) $x^2 + 13x + 16$ **(4) $16x + 16$**

3981. Shelly bought a shirt for $24.95 with a 20% discount. How much did Shelly pay for the shirt?

(1) $19.96 (3) $19.95
(2) $4.99 (4) $4.95

3957. Rick fills a square box with six inch sides with his rock collection. He wants to move his collection into a cylinder container that has a radius of 3 inches and a height of 5 inches. Will all of his rock collection fit into the cylinder container? Explain your answer.

No, because the volume of the box is greater then the volume of the cylinder container.

3943. Juan and Leah are building triangle picture frames out of popsicle sticks. They have one 4-inch popsicle stick, one 5-inch popsicle stick, one 6-inch popsicle stick, and one 7-inch popsicle stick. What is the maximum number of different picture frames that can be made using these popsicle sticks as sides?

(1) 1 **(3) 3**
(2) 2 (4) 4

3940. On the way to a rock concert, John drove 50 miles per hour for 3 hours and then drove 30 miles per hour for 1 hour. What is John's average speed, in miles per hour, for the whole trip?

(1) 35 **(3) 45**
(2) 40 (4) 50

3868. If an arc of 60° on circle A has the same length as an arc of 45° on circle B, what is the ratio of the area of circle B to the area of circle A?

16:9

3829. If Jamar can run $\frac{3}{5}$ of a mile in 2 minutes 30 seconds, what is his rate in miles per minute?

(1) $-\frac{4}{5}$ (3) $-3\frac{1}{10}$

(2) $-\frac{6}{25}$ (4) $-4\frac{1}{6}$

3821. On a trip, a student drove 40 miles per hour for 2 hours and then drove 30 miles per hour for 3 hours. What is the student's average rate of speed, in miles per hour, for the whole trip?

(1) 34 (3) 36
(2) 35 (4) 37

3782. The circumference of a circular plot of land is increased by 10%. What is the best estimate of the total percentage that the area of the plot increased?

(1) 10% (3) 25%
(2) 21% (4) 31%

Base your answers to questions **4056** through **4058** on the information below.

Kylie is outside watching a meteor shower for 1 hour. The probability of her seeing a shooting star is $\frac{2}{5}$.

4056. If there are 6 shooting stars within the hour Kylie is outside, what is the probability she will see *at most* 3 shooting stars?

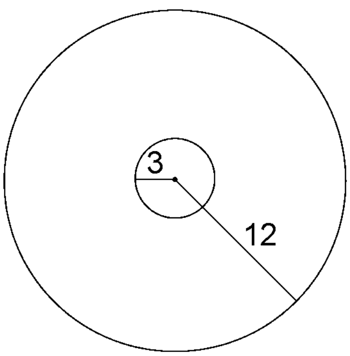
$\frac{12,825}{15,625}$

4058. What is the probability she will see *at least* 4 shooting stars?

$\frac{2800}{15,625}$

4008. Base your answer to the following question on the diagram below.

Antonio was at a carnival playing a game at the dunk machine. He had to throw the ball and hit the bull's-eye of the target to dunk the person who was sitting in the machine. There were two circles, an outer one with a radius of 12 inches and an inner one with a radius of 3 inches. He gets three chances to try and hit the inner target.



If he hits the area within the outer circle each time what is the probablility that *at most* two of his balls would hit the bulls eye.

$\frac{46}{4096}$

4007. Base your answer to the following question on the information below.
Five kids from Bayview school were trying out for a travel soccer team. The probability of each of them making the team is 1 out of 3.

What is the probability that at least four of the kids from Bayview school make the team?

$\frac{11}{243}$

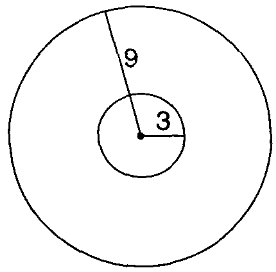
3951. Two soccer teams, the Fury and the Ladyhawks, have a strong rivalry. The probability that the Fury will win each game is $\frac{1}{2}$. If they play each other six times, what is the probability that the Fury will win *at least* 4 games?

$\frac{22}{64}$

3897. Team *A* and team *B* are playing in a league. They will play each other five times. If the probability that team *A* wins a game is $\frac{1}{3}$, what is the probability that team *A* will win *at least* three of the five games?

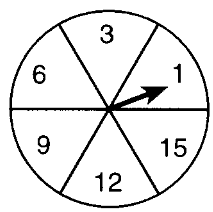
$\frac{51}{243}$

3838. As shown in the accompanying diagram, a circular target with a radius of 9 inches has a bull's-eye that has a radius of 3 inches. If five arrows randomly hit the target, what is the probability that *at least* four hit the bull's-eye?



$\frac{41}{59,049}$

3632. The circle in the accompanying diagram is divided into six regions of equal area and has a spinner. The regions are labeled 1, 3, 6, 9, 12, and 15. If the spinner is spun five times, what is the probability that it will land in an even-numbered region *at most* two times?



$\frac{192}{243}$

3585. In a baseball game, the probability that Peter gets on base safely is $\frac{3}{7}$. If he comes to bat four times, what is the probability that he will get on base safely *at least* three times?

$\frac{513}{2401}$

2750. Five marbles are in a jar. Two are red and three are white. Four marbles are selected at random with replacement.

(1) Find the probability that *at most* two red marbles are selected.

(2) Find the probability that *at least* three red marbles are selected.

(1) $\frac{513}{625}$ **(2)** $\frac{112}{625}$

4775. Car engine life is normally distributed for large samples. The mean life time is 50,000 miles and the standard deviation is 5,000 miles. Approximately what percentage of engines last between 45,000 and 55,000 miles?

(1) 19% **(3) 68%**
(2) 34% (4) 81%

4774. Light bulb life is normally distributed for large samples. The mean lifetime in 900 hours and the standard deviation is 50 hours. Approximately what percentage of light bulbs last less than 800 hours?

(1) 2% (3) 80%
(2) 6% (4) 98%

4771. A student has an average of 95 on her math tests and 90 on her English tests. She took 4 tests in math and 7 tests in English. Which of the following is true of the standard deviations for her test scores?

(1) The standard deviation for the English scores is greater than the standard deviation for the math scores.
(2) The standard deviation for the math scores is greater than the standard deviation for the English scores.
(3) The standard deviations for both sets of scores are equal.
(4) More information is needed to determine the relationship between the standard deviations.

4528. A shoe manufacturer collected data regarding men's shoe sizes and found that the distribution of sizes exactly fits the normal curve. If the mean shoe size is 11 and the standard deviation is 1.5, find:
a the probability that a man's shoe size is greater than or equal to 11
b the probability that a man's shoe size is greater than or equal to 12.5
c $\dfrac{P(\text{size} \geq 12.5)}{P(\text{size} \geq 8)}$

a $\mathbf{\frac{1}{2}}$
b $\mathbf{\dfrac{159}{1000}}$
c $\mathbf{\dfrac{159}{977}}$

4415. The amount of time it takes for a high school student to get ready for school in the morning is normally distributed. If the average time taken is 35 minutes, with a standard deviation of 4 minutes, what is the probability of a high school student getting ready for school in between 29 and 41 minutes?

.866 or 86.6%

4366. The scores an exam are normally distributed. If the interval from 84 to 88 contain approximately 68% of the scores, which value can be the standard deviation?

(1) 8 **(3) 2**
(2) 4 (4) 1

4365. On a quiz, there is a mean score of 83 and a standard deviation of 2.7. Which of the following score can be expected to occur less than 5% of the time?

(1) 77 (3) 83
(2) 80 (4) 87

4364. The amount of money that college students make per hour at summer jobs is normally distributed. If the mean amount is \$7.75 and an amount of \$8.25 represents the 84th percentile, which value best approximates the standard deviation for this distribution?

(1) \$0.05 (3) \$0.25
(2) \$0.15 **(4) \$0.50**

4348. A chair company produces a chair that can be adjusted to accomodate different preferences for the height of the chair. Research into the preferences has produced the following data, in inches: 30, 24, 21, 18, 20, 36, 32, 26, 28, 35. What is the mean and standard deviation of this data?

mean, 27; standard deviation, 3

4341. On the first test of the quarter, the mean score was 80 and the standard deviation was 3. On the second test of the quarter, the mean score was 85 and the standard deviation was 2. On which test was there greater consistency of scores? Explain how you arrived at your answer.

There was greater consistency of scores on the second test of the quarter because the standard deviation is lower than on the first test.

4320. At Lauren's new job, the ages of all of the current employees are normally distributed. Within this curve, 68.2% of the ages, centered about the mean, are between 28.7 and 45.3 years. Find the standard deviation of the data.

(1) 4.15 (3) 12.45
(2) 8.3 (4) 16.6

4319. At Lauren's new job, the ages of all of the current employees are normally distributed. Within this curve, 68.2% of the ages, centered about the mean, are between 28.7 and 45.3 years. Find the mean age, in years.

(1) 35 **(3) 37**
(2) 36 (4) 38

4296. The class mean for a math test was 80. The standard deviation was 8. What percentage of the class scored between a 76 and 84?

(1) 68.2% (3) 26.4%
(2) 52.8% **(4) 38.2%**

4278. The amount of time that a teenager plays video games in any given week is normally distributed. If a teenager plays video games an average of 15 hours per week, with a standard deviation of 3 hours, what is the probability of a teenager playing video games between 15 and 18 hours a week?

0.341 or 34.1%