

2025 SAT Summer Class

Week 5

Jaehoon Song (Lecturer)

SAT/DSAT/SSAT

Hans edu LLC (Columbia Academy)

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Written by Jaehoon Song (Lecturer)

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Math

22 QUESTIONS
(TIME: 35 MIN)

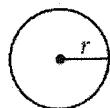
DIRECTIONS

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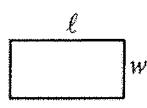
NOTES

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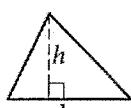
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- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

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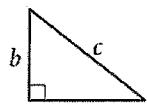
$$\begin{aligned} A &= \pi r^2 \\ C &= 2\pi r \end{aligned}$$



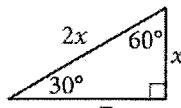
$$A = \ell w$$



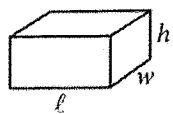
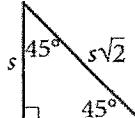
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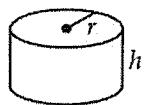
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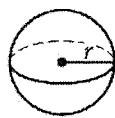
Special Right Triangles



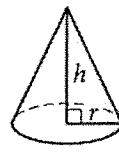
$$V = \ell wh$$



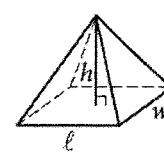
$$V = \pi r^2 h$$



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



$$V = \frac{1}{3} \pi r^2 h$$



$$V = \frac{1}{3} \ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.



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1

A survey was conducted by ABC engineering company for future marketing plan on two brands. The survey indicated that 70% of respondents favor Brand A over Brand B with a 2% margin of error. In this situation, which of the following statements best describes margin of error?

- A) The actual percentage that prefers Brand A likely falls within the range of 68-72%.
- B) The actual percentage that prefers Brand A likely falls within the range of 70-72%.
- C) The actual percentage that prefers Brand A likely falls within the range of 68-70%.
- D) The actual percentage that prefers Brand B could be $\pm 2\%$.

3

$$\frac{-3}{x^2} = \frac{1}{2x} - \frac{1}{2}$$

In a rational equation shown above, where $x \neq 0$, what is the value of the sum of all solutions of the equation?

- A) -1
- B) 0
- C) 1
- D) 2

4

ICE CREAM PREFERENCE FOR VALENCIA SCHOOL

Items	Like	Neutral	Dislike	Total
Pistachio	23	120	57	200
Strawberry	186	12	2	200
Vanilla	120	57	23	200
Total	329	189	82	600

2

$$a_n = a_1 + (n - 1)d$$

The nth-term of arithmetic sequence is shown above. Which of the following equations correctly solved for d ?

- A) $d = \frac{n-1}{a_n - a_1}$
- B) $d = \frac{a_1 - a_n}{1-n}$
- C) $d = \frac{a_n}{a_1} - (n - 1)$
- D) $d = \frac{a_n}{n-1} + a_1$

The table shows the distribution of a survey for three different flavors of ice cream. Each of 200 participants was asked for their thought for each flavor and the results are shown above. If one of these participants is selected at random, what is the probability of choosing "Like" and the person is asked about vanilla flavor?

- A) $\frac{120}{600}$
- B) $\frac{120}{329}$
- C) $\frac{120}{200}$
- D) $\frac{300}{600}$

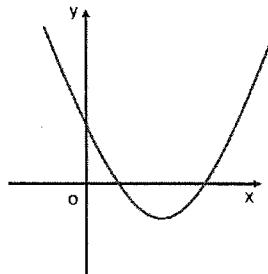
7

$$r = \frac{1}{2x} - 1$$

The annual interest rate in decimal, r , is given above, which is for your money to be double in x years. If it takes 12 years for your deposit to be double, what is the annual interest rate in percent approximately?

- A) 0.06%
- B) 6%
- C) 0.27%
- D) 27%

6



The graph of a quadratic function, f , is shown above in the XY-plane. If the function $f(x) = x^2 + bx + 2$ is solved for zeros using a quadratic formula. The zeros are as follows.

$$x = \frac{-b \pm \sqrt{b^2 - 8}}{2}$$

What could be the value of b in the equation above?

- A) 0
- B) -2
- C) 2
- D) -3

$$\begin{aligned}x^2 + 31 &= 7y \\x &= y - 3\end{aligned}$$

In the system of equations above, which of the followings could be the solution to the system?

- A) (2, 5)
- B) (5, -8)
- C) (-2, 1)
- D) (-5, -2)

8

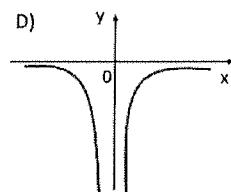
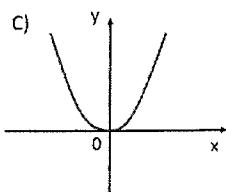
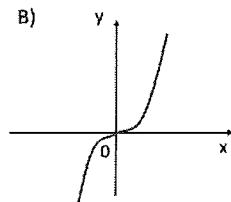
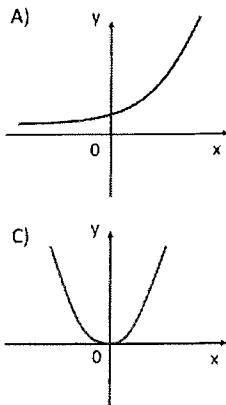
The amount spent on lunch for college students was recorded for a sample of 250 college students. The mean expenditure was computed to \$15 and the median expenditure was computed to \$17. Which of the following interpretation of median is correct?

- A) 50% of the students sampled had lunch costs equal to \$17.
- B) 50% of the students sampled had lunch costs that were less than or equal to \$17.
- C) 50% of the students sampled had lunch costs that were less than or equal to \$15.
- D) The most occurring lunch cost in the sample was \$17.

9

x	f(x)
-1	a
0	b
1	c

For the function f , the table shows some values of x and their corresponding $f(x)$ values, where a, b , and c are positive constants. If $a < b < c$, which of the following could be the graph of $y = f(x)$ in the XY-plane?



11

A rectangular solid has a volume of $2x^3 - 2x^2 - 4x$ and a height of $2x$. Which of the following expressions represents the area of the base of the solid?

- A) $(x + 2)(x - 1)$
- B) $(x - 2)(x + 1)$
- C) $x(x - 1)$
- D) $x(x + 1)$

12

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

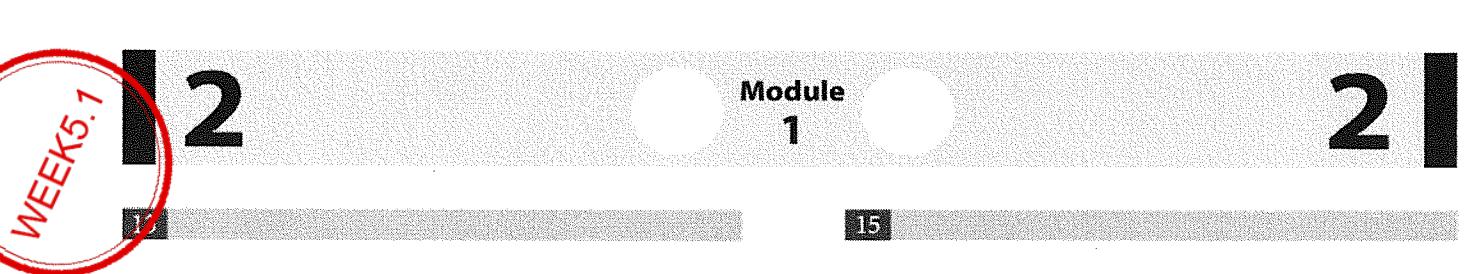
If $x \neq 2$, which expression represents the equivalent to the expression above?

- A) $\frac{x^2-x+7}{x-2}$
- B) $\frac{x^2-x-7}{x-2}$
- C) $\frac{x-2}{x^2+x-5}$
- D) $\frac{x-2}{x^2+x-7}$

10

Adrian's group plans a survey for their project in economics class. Which of the following best characterizes a simple random sample?

- A) All participants in the sample could provide information voluntarily.
- B) Some participants in the sample are allowed to communicate with each other.
- C) Everyone in the population has an equal possibility of being chosen.
- D) Some participants in the sample could participate more than once in the survey.



2

Module
1

2

1

15

$$\frac{x^{-\frac{2}{3}}(x^3)^3}{x^5}$$

Which of the following expressions is equivalent to the expression above, where $x > 0$?

- E) x^3
- F) $x^{3\sqrt[3]{x}}$
- G) $\sqrt[3]{x^{11}}$
- H) $x^3\sqrt{x^3}$

14

A salesperson's compensation consists of basic monthly pay (\$500) plus $m\%$ of the selling price of cars as commission. If the salesperson sold 12 cars which are \$25,000 each. Which expression correctly represents the amount of monthly paycheck in this situation?

- A) $500 + \frac{m}{100} \cdot 12 \cdot 25,000$
- B) $500 + m \cdot 12 \cdot 25,000$
- C) $\frac{m}{100} \cdot 500 \cdot (12 \cdot 25,000)$
- D) $500 + \frac{m \cdot 25,000}{12}$

$$h(t) = -16t^2 + 32t + 25$$

The function, h , modeled the height of an object from the ground, in feet, t seconds after it was launched from the building. Based on the function given above, how long did the object stay 32ft above from the ground after it was launched?

- A) 0.25 sec
- B) 1.25 sec
- C) 1.50 sec
- D) 1.75 sec

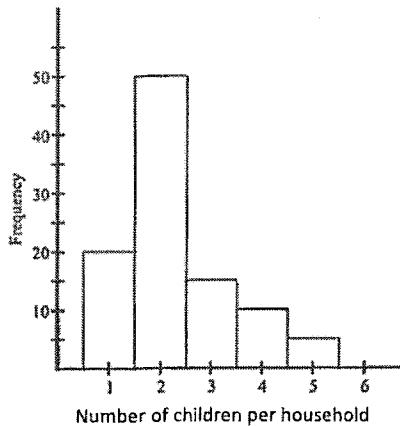
16

$$\begin{aligned}y &> x \\y &< x + 2\end{aligned}$$

Which ordered pair (x, y) could be a solution to the given system of inequalities above in the XY-plane?

- A) (0, 2)
- B) (1, 2)
- C) (1, 3)
- D) (-1, 2)

17

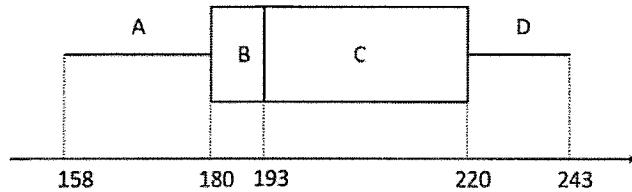


The histogram above represents the number of children per household for a sample of a certain high school. What is the median number of children of the data shown above?

- E) 1
- F) 2
- G) 3
- H) 4

19

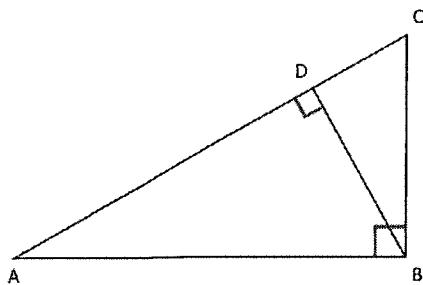
The players' Weight in pounds



A college football team has 24 players in total. The distribution of the players' weight is shown in the box plot above. Approximately, what is the number of players weighing greater than or equal to 193 pounds?

- A) 12
- B) 13
- C) 14
- D) 15

18



In the figure above, if $CD = 2$ and $CB = 4$, what is the value of $\cos \angle A$?

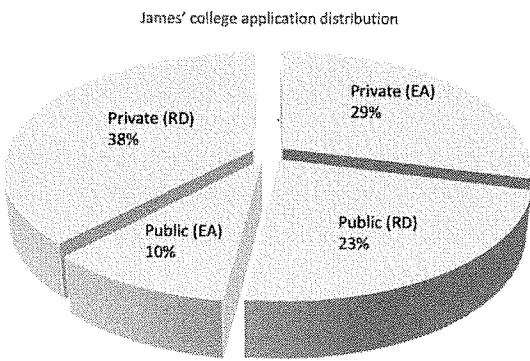
- A) $\frac{\sqrt{3}}{2}$
- B) $\frac{2\sqrt{3}}{3}$
- C) $\frac{\sqrt{3}}{3}$
- D) $\frac{1}{2}$

20

Elliott received \$100 for his monthly allowance in 2020. His monthly allowance was raised to \$144 after two years in 2022. What was the annual percent increase if the increasing rate was constant yearly for the last two years?

- E) 0.20%
- F) 2%
- G) 20%
- H) 25%

22



The pie chart above shows the distribution of James's college application. If he applied for both private or public colleges through Early Action (EA) or Regular Decision (RD) process. The percentage of each category is shown above. If there are 28 colleges he applied in total, what is the fraction of the number of public colleges to the number of private colleges?

- A) $\frac{67}{33}$ B) $\frac{23}{38}$ C) $\frac{33}{67}$ D) $\frac{29}{33}$

$$4x^2 - 8x = -4y^2 + 8$$

In the circle equation above, what is the area of the circle?

- A) 12π
B) 6π
C) 4π
D) 3π

STOP

If you finish before time is called, you may check your work on this module only. Do not turn to any other module in the test.

Math

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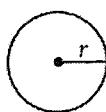
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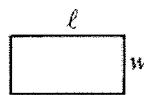
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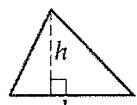
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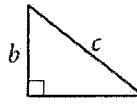
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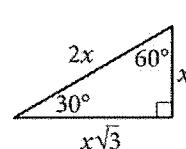
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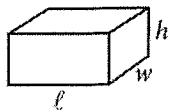
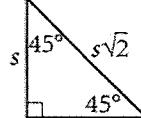
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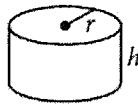
$$c^2 = a^2 + b^2$$



Special Right Triangles



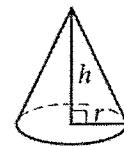
$$V = \ell wh$$



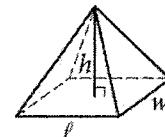
$$V = \pi r^2 h$$



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



$$V = \frac{1}{3} \pi r^2 h$$



$$V = \frac{1}{3} \ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

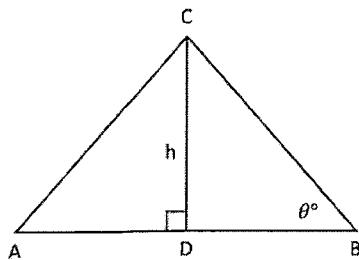
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1



The isosceles triangle ABC is shown above. Which of the following expressions represents the length of AB?

- A) $\frac{h}{\tan\theta}$
- B) $\frac{2h}{\tan\theta}$
- C) $\frac{2h}{\sin\theta}$
- D) $\frac{2h}{\cos\theta}$

3

A concrete water storage tank (reservoir) in a mountain has a crack on the wall. It was filled up to the max capacity, 200 gallons, of the tank before it had the crack on the wall but it started to leak water at a constant rate. After 30 minutes, it retained only 40% of its capacity. Which of the following describes correctly the amount of water remaining in the tank m minutes after it started to leak?

- A) $200 - 4m$
- B) $200 - 2.67m$
- C) $200(1 - .4)^m$
- D) $200(1 - .4)^{m/30}$

2

$$\begin{aligned}y &> -x + 4 \\-2x &> 4\end{aligned}$$

In the system of inequalities above, which of the following consists of the y-coordinates of all points that satisfies the system?

- A) $y > 6$
- B) $y < 6$
- C) $y > 3.5$
- D) $y < 3.5$

4

There 110 members in a certain club. $\frac{5}{11}$ of the members are males and the ratio of the number of members who have kids to the number of members who don't is 3:2. If $\frac{3}{5}$ of the male members don't have kids, how many female members have kids?

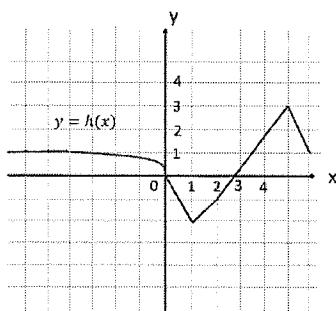
5

Age	Frequency
17	2
18	1
19	6
20	5
21	2
25	1

The table above shows the distribution of ages of students who enrolled for a certain college class. Which of the following gives the correct order for the median, mean, and mode of the data?

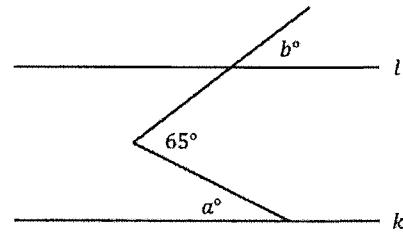
- A) mean = mode = median
- B) mode = median < mean
- C) mean < mode = median
- D) median < mode < mean

6



The complete graph of the function $y = h(x)$ and a table of some values for the function $y = f(x)$ are shown above. If the minimum value of $h(x)$ is a , what is the value of $f(-a)$?

7



In the figures shown above, Lines l and k are parallel. What is the value of $m\angle a + m\angle b$?

- A) 40
- B) 45
- C) 55
- D) 65

8

x	f(x)
-2	2
-1	1
0	6
1	5
2	2
3	1

$$(x - 1)^2 + (1 - y)^2 = 25$$

$$2x^2 - 4x + 2y^2 - 4y = a$$

In the two circle equations above, if two equations are equivalent, what is the value of a ?

- A) 21
- B) 25
- C) 46
- D) 50

9

$$f(x) = 3 \cdot 1.1^{x-1}$$

The exponential function above was formulated for the exponential growth model on the demand of a certain brand tires. If x represents the number of years after the brand was launched and $f(x)$ represents the amount of demand of the tires in millions, what does 1.1 mean in this situation?

- A) The demand of the brand tires is increasing 110% every year.
- B) The demand of the brand tires is increasing 10% every year.
- C) The demand of the brand tires is increasing 1.1 million tires every year.
- D) The demand of the brand tires is increasing 1.1% every year.

10

Population of Valencia, CA in thousands

Year	Population
1990	124
2000	156

The table above shows the population of a county for the years 1990 and 2000. If the relationship between year and population is a linear, which of the following functions correctly represents the population model t years after 1990?

- A) $124 + 32(t - 1990)$
- B) $124 + 32t$
- C) $124 + 3.2(t - 1990)$
- D) $124 + 3.2t$

11

Which of the following is a value of x for which the expression $\frac{2x-2}{x^2-x-2}$ is undefined?

- A) -2
- B) 2
- C) 1
- D) 3

12

$$k = \frac{4}{7}m + 10$$

The equation above shows the relationship between k and m . If the value of m increased by 3, how much does the value of k increase by?

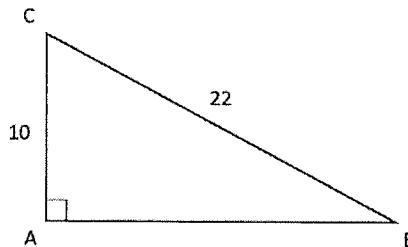
- A) $\frac{4}{7}$
- B) $\frac{110}{7}$
- C) $\frac{12}{7}$
- D) $\frac{98}{7}$

13

In order to find the average hours of studying a day for children, Sam visited a local library and surveyed 30 children randomly. For 20 children surveyed, the average hour of studying a day was 4. Which of the following statements best describes this survey?

- A) The average number of hours of studying a day for children is not valid in this survey because the sample size is way too small.
- B) The average number of hours of studying a day for children in the community is 4.
- C) The sampling method was flawed and it may produce a biased result of the survey.
- D) The sampling method was fair and unbiased because the survey was at random.

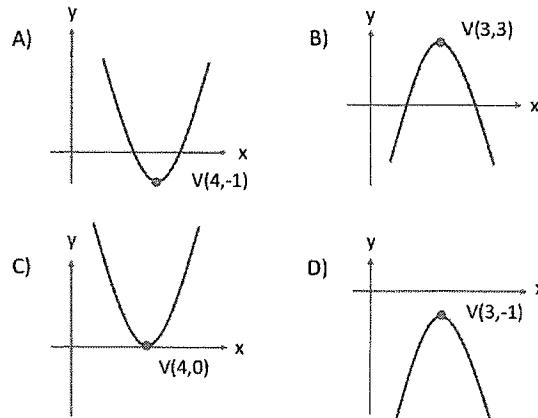
14



In triangle ABC above, point D is located on the segment BC. What is the value of $\sin(\angle CAD) - \cos(\angle BAD)$?

15

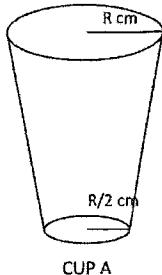
The zeros of the quadratic function, f , are 1 and 5. If the range of the function is less than or equal to 3, which of the following graphs could represent the graph of $y = f(x)$?



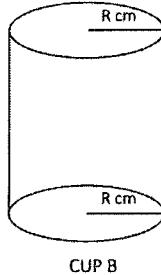
16

In a triangle XYZ, the measure of $\angle X$ is a right angle. If $\cos \angle Y = \frac{1}{5}$, then what is the value of $\sin \angle Z$?

17



CUP A



CUP B

Two different cups A and B, with same heights are shown above. If water is being poured at the same constant rate into both cups at the same time, which of the following statements must be true?

- The height of both cups will go up at the same rate.
- The rate of change in the height of cup A is non-linear but the rate of change in the height of cup B is linear.
- The rate of change in the height of cup B is non-linear but the rate of change in the height of cup A is linear.

- A) I only
- B) II only
- C) I and II only
- D) I and III only

18

$$f(x) = -300x^2 + 40,000x$$

The profit $f(x)$, in dollars that a company makes from the sales of a certain product is given above, where x is the unit price of the product, in dollars. The graph of f forms a parabola open downward. The graph has two zeros at 0 and m . Then what does m could represent in the context?

- A) The unit price, in dollars, which will result in the maximum profit.
- B) The unit price, in dollars, which will result in \$0 profit.
- C) The profit, in dollars, when the company can make the most.
- D) The profit, in dollars, when the unit price of the product is \$0.

19

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

In the rational equation above, which of the following is (are) an x -intercept of the graph?

- (-2, 0)
- (-3, 0)
- (1, 0)

- A) I only
- B) II only
- C) I and III only
- D) I, II, and III

20

22

$$\sqrt[3]{ax^x}, \text{ where } a, x > 0$$

In the expression above, x is a constant. If the expression is equivalent to a^3 , what is the value of x ?

- 3 Pennies
- 2 Nickels
- 4 Dimes
- 3 Quarters

Suppose you reach into a jar which contains the fair coins as above. What is the probability that you grab a dime and then, without replacement, another dime?

21

$$6x^2 - 5x - 12 = 0$$

In the quadratic equation above, if a and b are two solutions of the equation. What is the value

$$\frac{1}{b} + \frac{1}{a}$$

- A) $-\frac{5}{6}$ B) $-\frac{5}{12}$ C) $-\frac{2}{5}$ D) $-\frac{12}{5}$

STOP

If you finish before time is called, you may check your work on this module only. Do not turn to any other module in the test.



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Math**35 MINUTES, 22 QUESTIONS****DIRECTIONS**

The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

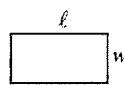
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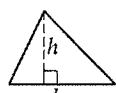
REFERENCE

$$A = \pi r^2$$

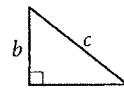
$$C = 2\pi r$$



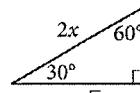
$$A = lw$$



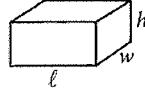
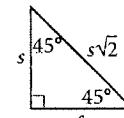
$$A = \frac{1}{2}bh$$



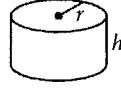
$$c^2 = a^2 + b^2$$



Special Right Triangles



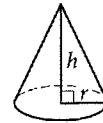
$$V = lwh$$



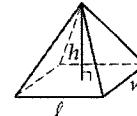
$$V = \pi r^2 h$$



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



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.



For multiple-choice questions, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

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Practice Test 7

2

Module 1

2

1

$$(6k - 4) - (3k - 2) = 3 - 2k$$

What value of k satisfies the given equation?

- A) -2
- B) 1
- C) 5
- D) $\frac{9}{5}$

2

Which of the following is equivalent to $9x^2 \geq 36$?

- A) $12 \leq x$
- B) $x \geq 2$ or $x \leq -2$
- C) $-2 \leq x \leq 2$
- D) $x \leq 2$ or $x \geq -2$

3

What is 110% of 629?

- A) 691.9
- B) 566.1
- C) 314.5
- D) 125.8

4

David decided to work at a part-time job for 3 hours after school every day to save up money for a new computer. The part-time job pays j dollars per hour and the bus fare for the commute is 4 dollars per day. If the price of the new computer is y dollars, how many days, x , does David need to work to pay for the new computer?

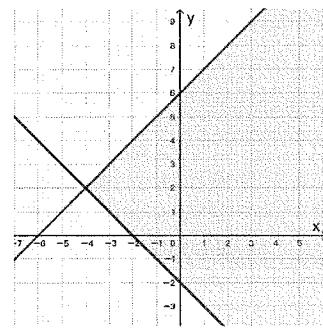
- A) $x = \frac{y}{(3 - 4)j}$
- B) $x = \frac{y}{3j}$
- C) $x = \frac{y}{3j - 4}$
- D) $x = \frac{y}{3j + 4}$

5

$$x^3 + (a - 5)x^2 + c = bx^3 + x^2 - 5$$

In the equation above, a , b , and c are constants. What is the value of $(a + b + c)$?

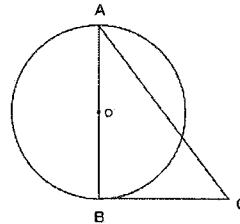
- A) 2
- B) 12
- C) 0
- D) 10

6


In the x - y -plane, which of the following inequality systems does the shaded region represent?

- A) $y \leq 2x + 6$
 $y \geq -x - 2$
- B) $y \leq x + 6$
 $y \leq -x - 2$
- C) $y \geq x + 6$
 $y \geq -x - 2$
- D) $y \geq x + 6$
 $y \leq -x - 2$

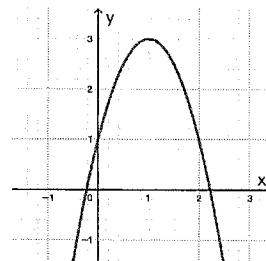
7



In the figure above, AB, the diameter of the circle, is equal to 12. For the right triangle ABC, AC=15. What is the perimeter of the right triangle?

- A) 27
- B) 30
- C) 36
- D) 40

8



The figure above shows the graph of a quadratic function on the x - y -plane. Which of the following quadratic functions satisfies the graph?

- A) $f(x) = -2(x - 1)^2 - 3$
- B) $f(x) = -2(x + 1)^2 + 3$
- C) $f(x) = -2(x - 1)^2 + 3$
- D) $f(x) = -2(x + 1)^2 - 3$

9

A circle in the x - y -plane has center $(-2, -4)$ and radius R . If the circle passes through the point $(5, 2)$, what is the value of R^2 ?

10

A store has 50 gift-bags. On the first day, 30% of the bags were sold, and on the second day, 20% of the remaining bags were sold. How many bags were left on the third day?

- A) 25
- B) 28
- C) 22
- D) 21

11

A car travels 6 hours at a constant speed of 60 kilometers per hour. What is the distance, in kilometers, the car travels?

- A) 360
- B) 36
- C) 10
- D) 30

12

	Girls	Boys	Total
Business	50	50	100
Science	30	60	90
Health	50	20	70
Others	20	20	40
Total	150	150	300

A school conducted a survey on seniors to investigate which major they plan to study in college. If a senior is selected randomly, what is the probability of selecting a boy who is planning to study business?

- A) $\frac{1}{6}$
- B) $\frac{1}{2}$
- C) $\frac{1}{3}$
- D) $\frac{1}{4}$

Practice Test 7

2

Module
1

2

13

The median of a set of 10 consecutive odd integers is 20. What is the smallest number in the set?

14

$$4x^2 - 16 = 84$$

What is the one possible solution to the given equation?

- A) 100
- B) 17
- C) -5
- D) 25

15

$$|4x + 8| = 16$$

What is the negative solution to the given equation?

- A) -2
- B) -6
- C) -24
- D) -8

16

A restaurant bought 100 plates that include large and small sizes for a total of \$600. Each large plate L costs \$5.5 and each small plate S costs \$3.5. Which of the following systems of equations represents this situation?

- A) $L + S = 100$
 $5.5L + 3.5S = 600$
- B) $L + S = 100$
 $5.5L + 3.5S = 100$
- C) $L + S = 600$
 $5.5S + 3.5L = 600$
- D) $L + S = 100$
 $(5.5S + 3.5)L \cdot S = 600$

17

A standard barrel of beer can hold 31 gallons. How many liters of beer can this barrel hold? (round to the nearest whole number; 1 gallon \approx 3.79 liters)

18

Daniel bought a refrigerator for a total price of \$1,071. If the total price included a 5% sales tax, how much sales tax, in dollars, did Daniel pay?

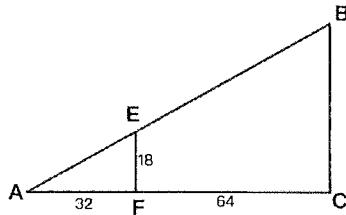
- A) 1020
- B) 51
- C) 53.55
- D) 63

19

Which expression is equivalent to $\sqrt[3]{x} \cdot \sqrt[3]{x^2}$?

- A) $x^{\frac{1}{5}}$
- B) $x^{\frac{1}{3}}$
- C) x
- D) $x^{\frac{1}{2}}$

20



Right triangle ABC and right triangle AEF are shown above. If $AF=32$, $FC=64$, and $EF=18$, what is the length of BC ?

- A) 54
- B) 36
- C) 18
- D) 16

21

If the height of a cuboid is increased by 4 centimeters, it becomes a cube with sides of 10 centimeters. What is the volume, in cubic centimeters, of the original cuboid?

22

Minna plans to produce m number of bracelets. If Minna makes 12 bracelets everyday, there will be 4 less than m bracelets after 8 days. If Minna makes 15 bracelets everyday, there will be 5 more than m bracelets after x days. What is the value of x ?

- A) 30
- B) 20
- C) 40
- D) 15



No Test Material On This Page

Math**35 MINUTES, 22 QUESTIONS****DIRECTIONS**

The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

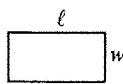
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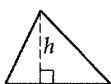
REFERENCE

$$A = \pi r^2$$

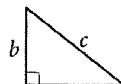
$$C = 2\pi r$$



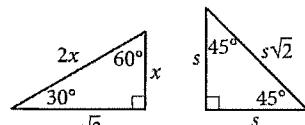
$$A = lw$$



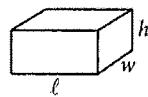
$$A = \frac{1}{2}bh$$



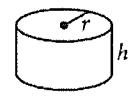
$$c^2 = a^2 + b^2$$



Special Right Triangles



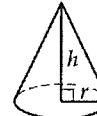
$$V = lwh$$



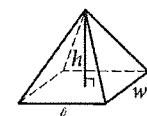
$$V = \pi r^2 h$$



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



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}lwh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.



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1

If $3a + 8b = 2b$, what is the value of $\frac{a}{b}$?

2

If $f(x) = 5x + 2$ and $f(x + 1) - f(x - 1) = 2x$, then x is equivalent to?

- A) $-\frac{1}{2}$
- B) 5
- C) $\frac{2}{3}$
- D) 3

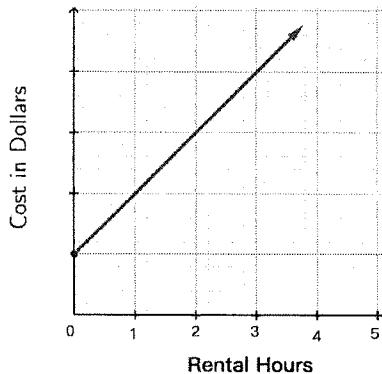
3

$$\begin{aligned} 2x - y &= 7 \\ x + 2y &= -4 \end{aligned}$$

The system of equations is given. What is the value of $x^3 + y^3$?

- A) 11
- B) 35
- C) -19
- D) -11

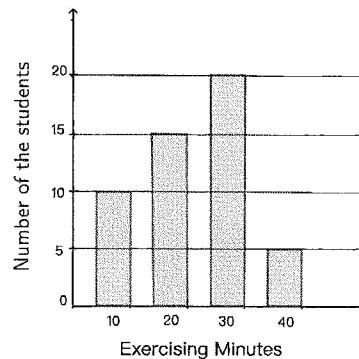
4



The graph shows the cost for renting a bike. The shop charges a flat fee plus a daily cost. Based on the graph, what does the slope of the graph represent?

- A) The flat fee of renting a bike
- B) The daily cost of renting the bike
- C) The total cost of renting the bike
- D) The maximum cost of renting the bike

5



The histogram above shows the time that students spend exercising after school every day. What is the mean exercising time, in minutes, of the 50 students?

Practice Test 7

2

Module
2

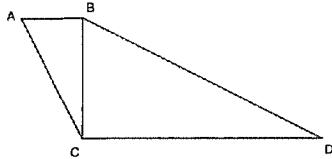
2

6

If $3x^2 + 4x - 32 = 0$ and $x < 0$, what is the value of x^3 ?

- A) -16
- B) -64
- C) 64
- D) 16

7



In the figure above, $CD=8$ and $BC=4$. If the right triangles ABC and BCD are similar, what is the length of AB ?

- A) 6
- B) 2
- C) 3
- D) 8

8

During the holidays, the ratio of those who stayed home to those who chose to travel is 3:2, and the ratio of females to males who chose to stay at home is 3:5. What is the percentage of females who chose to stay at home?

- A) 15%
- B) 37.5%
- C) 25%
- D) 22.5%

9

$$P(h) = 500(2)^{\frac{h}{4}}$$

The number of flies in a population doubles every 4 hours. If there are initially 500 flies, how many hours will it take for the number of flies to reach 8 times the initial number?

10

The function f is defined by $f(x) = -\frac{1}{n}x - \frac{1}{2}$, where n is a constant. The x -intercept of the graph of $y = f(x)$ in the xy -plane is $(4, 0)$. What is the value of n ?

- A) 8
- B) $\frac{1}{8}$
- C) -8
- D) $-\frac{1}{8}$

11

A gardening supply company sells sod, a patch of grass, at a rate of \$18 per square yard. What price does the company charge for 36 square feet of sod? (1 yard = 3 feet)

- A) \$72
- B) \$216
- C) \$24
- D) \$648

12

$$\frac{3}{2}k - \frac{1}{2}k = 18$$

What is the solution to the given equation?

- A) 9
- B) 6
- C) 36
- D) 18

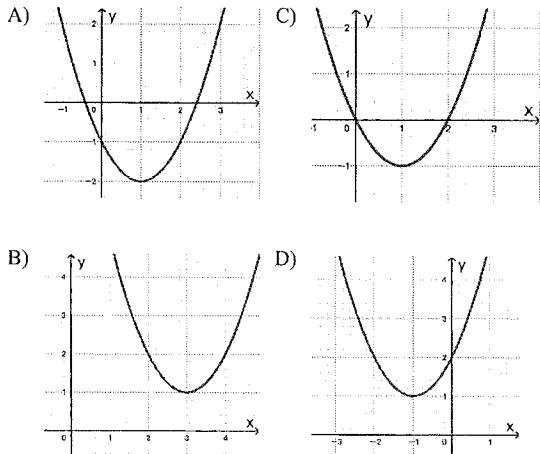
13

Georgia travels the first 16 miles at a rate of 6 mph and the next 16 miles at a rate of 12 mph. What is the average speed, in mph, for the 32 mile trip?

- A) 9
- B) 8
- C) 3
- D) 5

14

Which of the following graphs represents the graph of $y = x^2 - 2x + 2$ in the xy -plane that has been shifted down 2 units?



15

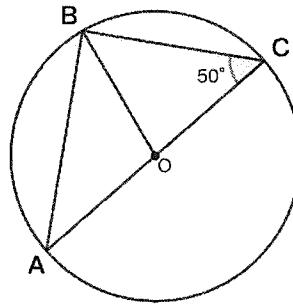
$$y = x^2 - 8x + 40$$

$$y = 6x - 8$$

If (x, y) is a solution to the system of equations above, which of the following is a possible value of the product $x \cdot y$?

- A) 240
- B) 224
- C) 320
- D) 48

16



In the figure above, point O is the center of the circle and the radius of the circle is 9. What is the length, in radians, of minor arc BC?

- A) 2π
- B) 4π
- C) $\frac{5}{2}\pi$
- D) 3π

Practice Test 7

2

Module
2

2

17

A sports team bought \$2700 worth of energy drinks. Some of the energy drinks cost \$35 per dozen and the others cost \$20 per dozen. If 2 times as many \$35-energy drinks as \$20-energy drinks were bought, how many dozens of energy drinks were bought in total?

18

$$(5x^6 - a) - (bx^6 + 2) - (x^5 + 6) = 3x^6 + cx^5 - 15$$

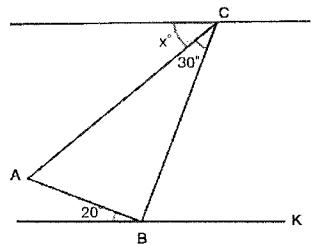
In the equation above, a , b , and c are constants. If the equation is true for all values of x , what is the value of $(a + b + c)$?

19

Which expression is equivalent to $b^{\frac{1}{2}} \cdot (b^{\frac{1}{2}})^{\frac{1}{3}}$?

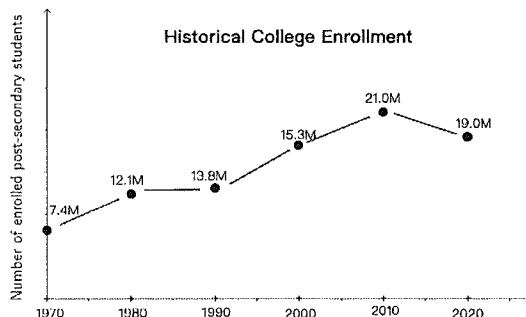
- A) $\sqrt[3]{b^4}$
- B) $\sqrt[3]{b^2}$
- C) $\sqrt[12]{b}$
- D) $\sqrt[3]{b}$

20



In the figure above, triangle ABC is a right triangle and lines j and K are parallel. What is the value of x° ?

21



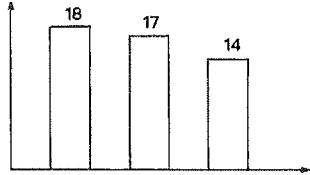
The total number of enrolled post-secondary students from 1970–2020 is shown above, according to the College Enrollment Statistics. During which 10-year period was there negative growth in post-secondary student enrollment?

- A) 1980–1990
- B) 1990–2000
- C) 2000–2010
- D) 2010–2020

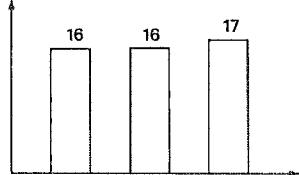
22

Which of the following data sets has the least standard deviation?

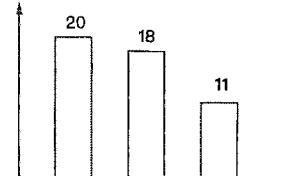
A)



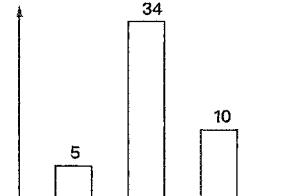
B)



C)



D)



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Math

22 QUESTIONS
(TIME: 35 MIN)

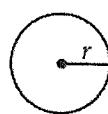
DIRECTIONS

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NOTES

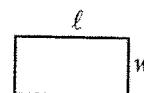
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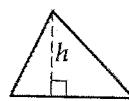
REFERENCE

$$A = \pi r^2$$

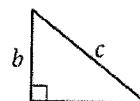
$$C = 2\pi r$$



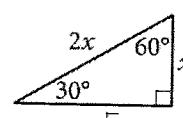
$$A = l w$$



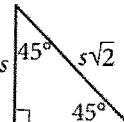
$$A = \frac{1}{2} b h$$



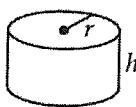
$$c^2 = a^2 + b^2$$



Special Right Triangles



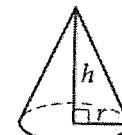
$$V = l w h$$



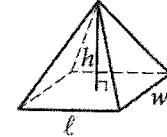
$$V = \pi r^2 h$$



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



$$V = \frac{1}{3} \pi r^2 h$$



$$V = \frac{1}{3} l w h$$

The number of degrees of arc in a circle is 360.

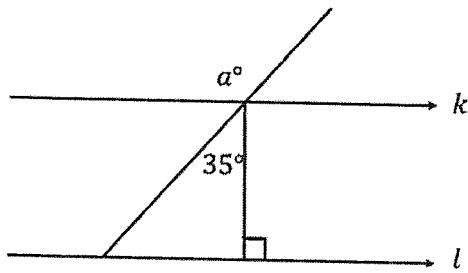
The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.

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- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.



In the figure above, $l \parallel k$. What is the value of measure of $\angle\alpha^\circ$?

2

A meal set in a fast-food restaurant consists of a drink, a chip, and a sandwich. There are 5 types of drinks, 4 types of chips, and 3 types of sandwiches to choose from. How many different sets are possible?

3

$$E(m) = 68 - 1.76m$$

The linear function above shows how much battery kWh left in the Electric Vehicle after m miles traveled. The capacity of this car battery is 68 kWh. What does 1.76 mean in the context?

- A) The EV will take 1.76 hours to travel every mileage.
- B) The EV battery will use 1.76 kWh for m miles.
- C) The EV battery will use 1.76 kWh per mile.
- D) The EV will take 1.76 hours to recharge the battery.

4

$$y = k(x - 1)(x - 3)(x - 5)$$

In the equation above, where k is a positive constant. If the graph passes through the point (a, b) , where $1 < a < 3$, which of the following is NOT a possible value of b ?

- A) 0
- B) 1
- C) 2
- D) -1

5

$$6K - 18L = 24M$$

From the given equation above, it can be rewritten as $L = aK + bM$, where a and b are constants. What is the value of a ?

7

GPA	Frequency
2.0-2.4	1
2.5-2.9	3
3.0-3.4	4
3.5-4.0	3

A GPA distribution of Mr. Peter's class is shown in the table above. What percent of the students in Mr. Peter's class got a GPA of 3.0 or above to the nearest tenth?

- A) 0.6%
- B) 0.7%
- C) 63.6%
- D) 63.7%

6

$$x^2 + 1 = 4x$$

The equation has solutions $x = k \pm \sqrt{m}$, where k and m are positive constants. What is the value of $m - k$?

- A) -1
- B) 0
- C) 1
- D) 2

8

$$\begin{aligned}f(x) &= x^2 - 3 \\h(x) &= 2f(x) - 1\end{aligned}$$

In the two functions above, if $h(k) = 1$, where k is a positive constant, what is the value of k ?

9

x	f(x)
-2	3
4	0
6	-1
8	-2

The table above shows some values of x and their corresponding values of a linear function $f(x)$. What is the y-intercept of the graph of $y = f(x)$?

- A) (0, 4)
- B) (0, 2)
- C) (0, 1)
- D) (0, 0.5)

10

FAVORITE SNACK	GRADES			
	9th	10th	11th	Total
COOKIES	25	18	25	68
VEGGIE STICKS	5	7	17	29
CUPCAKES	21	15	17	53
Total	51	40	59	150

The table above shows the distribution of favorite snacks for 150 students, 9th-11th graders in a certain high school. If one of the students is selected at random, what is the probability of selecting a student whose favorite snack was a cupcake?

- A) $\frac{21}{53}$
- B) $\frac{21}{51}$
- C) $\frac{53}{150}$
- D) $\frac{68}{150}$

11

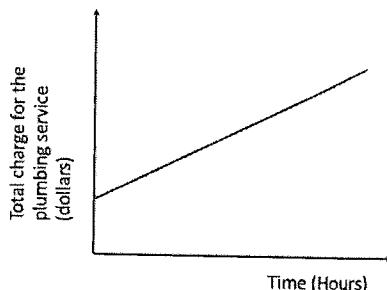
$$8^{a-b} = 16^3$$

$$27^{a+b} = 9^3$$

In the system of equations above, what is the value of $b^2 - a^2$?

- A) 8
- B) -8
- C) 16
- D) -16

12



The graph represents the total charge for the plumbing service for x hours of job. The plumber charges a one-time basic charge plus hourly rate charge for the hours worked. Which of the following best interpret the slope of the graph above?

- A) The plumber's one-time fee.
- B) The plumber's total charge for x hours of job.
- C) The plumber's hourly rate.
- D) The trend of plumber's inconsistent hourly rate.

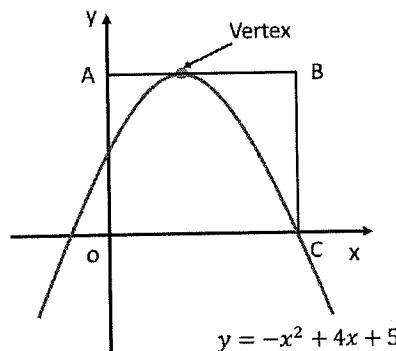
13

$$\frac{x^{\frac{5}{3}}(x^4)^3}{x^{-\frac{2}{3}}}$$

Which of the following expressions is equivalent to the expression above, where $x > 0$?

- I) x^{14}
- J) $x^{14}\sqrt[3]{x}$
- K) $\sqrt[3]{x^{14}}$
- L) $x^3\sqrt{x^{14}}$

15



The graph of $y = -x^2 + 4x + 5$ is in XY-plane. If the horizontal \overline{AB} goes through the vertex of the graph and vertical \overline{BC} goes through the x intercept, Point C, of the graph as shown above, what is the area of rectangle OABC?

14

In the graph of $3x^2 - 6x + 3y^2 + 12y = 2$ in the xy-plane, what is the circumference of the circle?

- A) $\frac{2\sqrt{51}\pi}{3}$
- B) $2\sqrt{17}\pi$
- C) $\frac{2\sqrt{17}\pi}{3}$
- D) $\frac{17}{3}\pi$

16

A scale drawing of a bookcase shows the scale 1 cm = 2 feet. A bookcase has a dimension of the base 2.5 cm by 3 cm in the drawing. What is the actual area of the base, in square feet, of this bookcase?

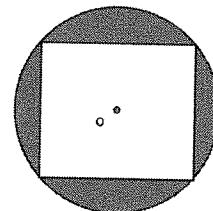
- A) 7.5 ft^2
- B) 15 ft^2
- C) 30 ft^2
- D) 45 ft^2

7

19

In a group of 50 tourists, 20% of them have never been abroad. If three tourists are selected at random and are asked about their past travel experience, what is the probability that at least one person has been abroad?

- A) $\frac{487}{490}$ B) $\frac{3107}{3125}$ C) $\frac{243}{490}$ D) $\frac{1643}{3125}$



In the figure shown above, point O is the center of the circle. If all four vertices of the square are on the circle and the area of circle is 16π , what is the area of the shaded region?

- A) $16\pi - 32$
 B) $16\pi - 16$
 C) $16\pi - 20$
 D) $16\pi - 36$

18

$$g(x) = \sqrt{\frac{2x}{3}}$$

$$h(x) = 2g(x) + k$$

In the system of equations above, where k is a constant, if $h(6) = 8$, then what is the value of k?

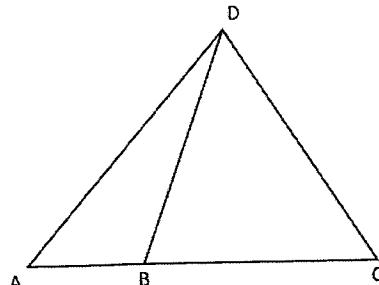
20

$$f(x) = 1500 \cdot 1.05^x$$

In the exponential function above, $f(x)$ represents the balance x years after deposit on a certificate of deposit account (CD). If the CD accounts offers p percent annual interest rate, what is the value of p in the function above?

- A) 1.05
 B) 0.05
 C) 0.5
 D) 5

21

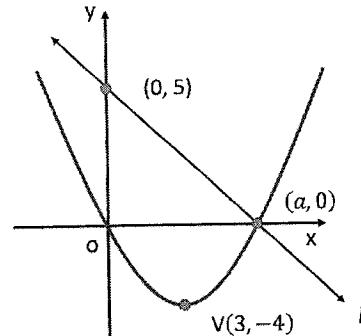


Note: Not drawn to scale.

In the figure above, the ratio of \overline{AB} to \overline{BC} is 3:7. If the area of triangle ABD is 210, what is the area of triangle BCD?

- A) 210
- B) 420
- C) 490
- D) 630

22



Two graphs of linear function l , and quadratic function are shown above. One of intersections of two functions is $(a, 0)$, where $a > 0$. What is the equation of line l ?

- A) $y = -\frac{5}{4}x + 5$
- B) $y = -x + 5$
- C) $y = -\frac{5}{6}x + 5$
- D) $y = -\frac{3}{2}x + 5$

STOP

If you finish before time is called, you may check your work on this module only. Do not turn to any other module in the test.

Math

22 QUESTIONS
(TIME: 35 MIN)

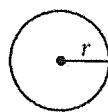
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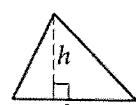
REFERENCE

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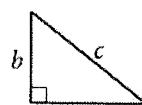
$$C = 2\pi r$$



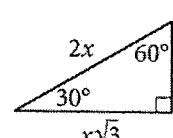
$$A = lw$$



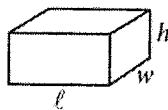
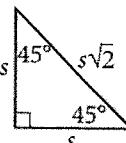
$$A = \frac{1}{2}bh$$



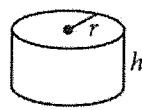
$$c^2 = a^2 + b^2$$



Special Right Triangles



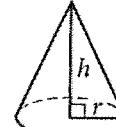
$$V = lwh$$



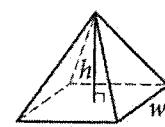
$$V = \pi r^2 h$$



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



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{2}lwh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.

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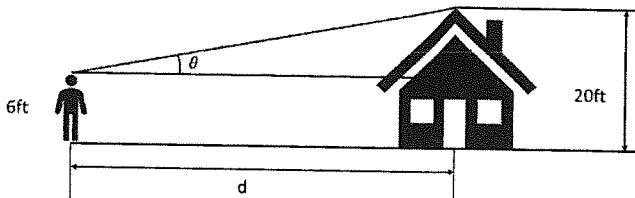
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Which of the following is equivalent to the expression $x^4 - 1$?

- I. $(x^2 - 1)(x^2 + 1)$
- II. $(x - 1)(x + 1)(x^2 + 1)$
- III. $(x - 1)^2(x + 1)^2$

- A) I only
- B) I and II only
- C) I and III only
- D) I, II, and III

3



A 6ft tall person looks at the top of the roof as shown above. If the height of the house from the ground to the top of the roof is 20ft and he knows the angle of elevation (θ°), which of the following expression can be used to find the distance (d ft) from the person to the house?

- A) $d = \frac{14}{\sin\theta}$
- B) $d = \frac{14}{\tan\theta}$
- C) $d = \frac{20}{\tan\theta}$
- D) $d = 14 \cdot \tan\theta$

2

$$\begin{aligned}\frac{1}{2}y &= x - \frac{3}{2} \\ 2x - y &= 3\end{aligned}$$

In the system of equations above, how many solutions does the system have?

- A) One
- B) Two
- C) Zero
- D) Infinitely many

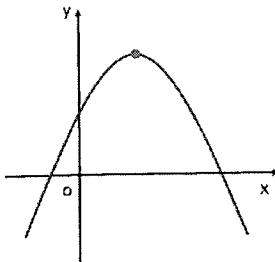
4

In a triangle ABC, which of the following must be true if $\sin\angle A = \cos\angle B$?

- I. Triangle ABC is a right triangle.
- II. Triangle ABC is an isosceles right triangle.
- III. Triangle ABC is an obtuse triangle.

- A) I only
- B) I and II only
- C) I and III only
- D) I, II, and III

5

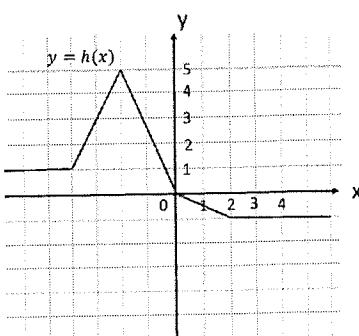


In the quadratic function in the XY-plane above, if the equation of the function is $y = ax^2 + bx + c$, where a , b , c are constants. Which of the followings must be true?

- I. $a < 0$
- II. $b > 0$
- III. $c > 0$

- A) I only
- B) I and II only
- C) I and III only
- D) I, II, and III

6



The complete graph of the function $y = h(x)$ and a table of some values for the function $y = f(x)$ are shown above. If the maximum value of $h(x)$ is m , what is the value of a if $f(a) = m$?

7

Concrete structures such as bridges, buildings, or stadiums have some safety gap between sections to allow for temperature expansion or contraction. The size of gap, $g(t)$, in inches, is a linear function of temperature t , in degrees Fahrenheit ($^{\circ}\text{F}$) where the temperature is between 32°F and 115°F . For a certain building, the gap is 2.58 inches at 45°F and 1.12 inches at 85°F . What is the size of gap expected in inches when the temperature is at 110°F ?

- A) 0.2075
- B) 0.6425
- C) 0.8135
- D) 0.7375

8

$$\frac{f(2x)}{3} = -h(x) + 6$$

In the equation above, if $h(3) = 4$, What is the value of $f(6)$?

- A) 9
- B) 8
- C) -6
- D) 6

x	f(x)
-2	2
-1	1
0	6
1	5
2	2
3	1

9

$$\frac{2x + 4^2}{a} = 144$$

In the equation above, a is a constant. If $x = 1$ is one of the solutions, what could be the value of a ?

- A) 2
- B) $-\frac{1}{2}$
- C) 8
- D) $\frac{1}{8}$

10

A survey was conducted for 500 people at random if they want to go back a cheaper phone without internet service after using a phone with internet service for a while. Of those surveyed, 97% won't go back to a cheaper phone without internet service. Which of the following inferences best interpret the result of this survey?

- A) At least 97% of people who used a phone with internet service won't buy a cheaper phone even with internet service.
- B) At least 97% of people who used a phone without internet service will change to use a phone with internet service in the future.
- C) Most people who used a phone with internet service won't go back to a cheaper phone without internet service.
- D) Most people who used a cheaper phone without internet service will change to use a phone with internet service in the future.

11

	CAT	DOG	TOTAL
ADOPTED	5	6	11
PURCHASED	12	23	35
TOTAL	17	29	46

The table above shows the distribution of ways to get a pet for 46-households surveyed at random. What fraction of the cats were purchased in the households surveyed?

- A) $\frac{12}{17}$
- B) $\frac{12}{46}$
- C) $\frac{35}{46}$
- D) $\frac{12}{35}$

12

The dimensions of a rectangular box for shipping in a local shipping center were restricted for the size of the box. The sum of the perimeter of base of the box plus the height of the rectangular box CANNOT exceed 120 inches. If the area of the square base of a certain box is 289 in^2 , what is the maximum height of the box could be allowed, in inches?

- A) 64 inches
- B) 52 inches
- C) 86 inches
- D) 48 inches

13

Which of the following expressions is equivalent to

$$\frac{-2x^2+x-4}{x+2}$$

- A) $-2x + 5 - \frac{14}{x+2}$
- B) $-2x + 5 + \frac{14}{x+2}$
- C) $-2x - 5 + \frac{-14}{x+2}$
- D) $-2x - 5 + \frac{14}{x+2}$

15

$$f(x) = a(x + 1)(x - 4)$$

The graph of the function f is parabola in the xy -plane, where a is a constant. Which of the following x intervals could contain the x coordinate of the vertex?

- A) $-4 < x < 1$
- B) $-4 < x < -1$
- C) $-1 < x < 4$
- D) $-1 < x < 1$

14

$$F = \frac{9}{5}C + 32$$

The equation shown above can be used to convert the temperature from degree Celsius to degree Fahrenheit. If the degree Celsius were changed from $5^\circ C$ to $15^\circ C$, How much degrees in Fahrenheit will change accordingly?

- A) $\frac{9}{5}$
- B) $\frac{5}{9}$
- C) 10
- D) 18

16

In the equation $ax^3 + bx^2 + cx + d$, where a, b, c , and d are constants. If the equation has zeros at $-2, 0$, and 7 , which of the following is a factor of the equation?

- A) x
- B) $x - 2$
- C) $x + 7$
- D) $x - 1$

17

Edward needs to recruit at least 12 students, consisting of juniors and seniors only to do science group project. The project requires at least 3 juniors and at least 5 seniors for the project members. He knows that each senior is allowed to spend 2 hours only and each junior is allowed to spend 3 hours only and he also found out that the project should not take more than 180 hours in total. Which of the inequalities best represents all the constraints described if x is the number of juniors and y is the number of seniors?

- A) $\begin{cases} x + y \leq 12 \\ x \geq 3 \\ y \geq 5 \\ 3x + 2y < 180 \end{cases}$
- B) $\begin{cases} x + y \geq 12 \\ x \geq 3 \\ y \geq 5 \\ 2x + 3y < 180 \end{cases}$
- C) $\begin{cases} x + y \geq 12 \\ x \geq 3 \\ y \geq 5 \\ 3x + 2y \leq 180 \end{cases}$
- D) $\begin{cases} x + y \geq 12 \\ x \geq 3 \\ y \geq 5 \\ 2x + 3y \leq 180 \end{cases}$

18

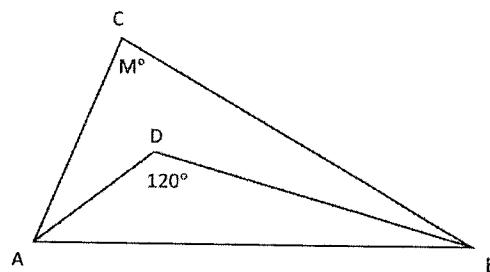
Result of the number of defective light bulbs for a sample of 15 boxes at random

Number of boxes	2	3	6	4
Number of defective light bulbs per box	3	1	2	3

The table shows the result of the number of defective light bulbs per box for a sample of 15 boxes. What is the average of defective light bulbs per box for the results in the table above?

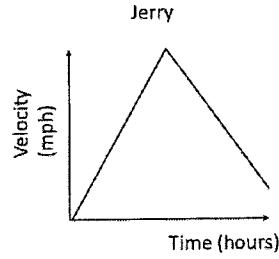
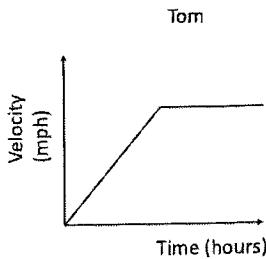
- A) 1.8
 B) 2.0
 C) 2.2
 D) 2.6

19



In the figure shown above, $m\angle ADB = 120^\circ$ and \overline{AD} and \overline{BD} are angle bisectors of $\angle CAB$ and $\angle CBA$, respectively. What is the measure of angle M in the figure?

20

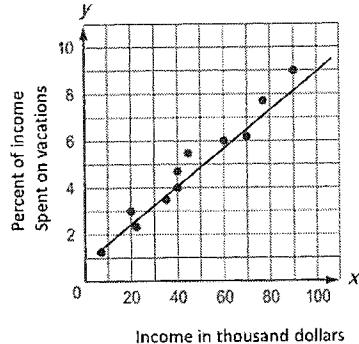


The two graphs above show time vs velocity profiles for two people, Tom and Jerry. The areas under the curves are same on both graphs. If two people started and ended their journeys at the same time, which of the following statements is valid for the graphs shown above?

- A) Both people traveled the same distance in total.
- B) Jerry's average speed is higher in value than Tom's average speed.
- C) Tom stopped for a while along the journey.
- D) Jerry must have turned around at some point along the journey.

21

Income vs percent of income spent on vacations



The scatterplot above shows several data for the relationship between income and percent of income spent on vacations. Which of the following is closest to the difference of the actual percent and the predicted percent by the line of best fit for the person whose income is \$45,000?

- A) 0.5
- B) 1
- C) 1.5
- D) 2

22

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

The volume of a cylinder can be calculated by the equation above. If the radius increased by 100 percent and the length of height decreased by 50 percent, what is the percent change in the volume of the cylinder?

- A) The volume increases by 100%.
- B) The volume increases by 200%.
- C) The volume decreases by 100%.
- D) The volume doesn't change.

STOP

If you finish before time is called, you may check your work on this module only. Do not turn to any other module in the test.

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2

Module
1

35:00

Section 2, Module 1: Math



⋮

1

Mark for Review

In order to maximize its size, a club wants to track its growth over time. The club starts with 20 students in the initial month, and observes that its size triples every 2 months. After 4 months from the initial month, what will be the size of the club?

(A) 60 students

 A

(B) 120 students

 B

(C) 180 students

 C

(D) 360 students

 D

IV

TEST QUBE

Question 1 of 22 >

Section 2, Module 1: Math



⋮

2

Mark for Review

James and Tommy are trying to fill a tank with a capacity of 20 liters. James can fill the tank at a rate of 2 liters per minute, while Tommy can fill the tank at a rate of 1 liter per minute. If x represents the number of minutes James fills the tank and y represents the number of minutes Tommy fills the tank, which equation represents the situation?

(A) $2x + y = 20$ A(B) $2x - y = 20$ B(C) $x + 2y = 20$ C(D) $x - 2y = 20$ D

VI

TEST QUBE

Question 2 of 22 >

Section 2, Module 1: Math



⋮

Section 2, Module 1: Math



⋮

3

Mark for Review

Jimmy is curious if he can earn a total grade of 80 or above in his class. The class grade is made up of three components: homework (20%), the final exam (30%), and projects (50%). If Jimmy earns 80 points in homework and 100 points in projects, what is the minimum number of points he needs to obtain in the final exam to achieve a total grade of 80 or above? (Note: Each assessment criteria has a full score of 100 points.)

(A) 47

 A

(B) 46

 B

(C) 45

 C

(D) 40

 D

VII

TEST QUBE

Question 3 of 22 >



⋮

Section 2, Module 1: Math

4

Mark for Review

Suppose you have a 10-liter tank of saltwater that contains 2 kilograms of salt. If you add 3 liters of fresh water to the tank and mix it thoroughly, which choice best approximates the concentration, kilograms per liter, of salt in the tank?

(A) 0.1 kg/L

 A

(B) 0.15 kg/L

 B

(C) 0.13 kg/L

 C

(D) 0.2 kg/L

 D

TEST QUBE

Question 4 of 22 >



Next

2

Module
1

2

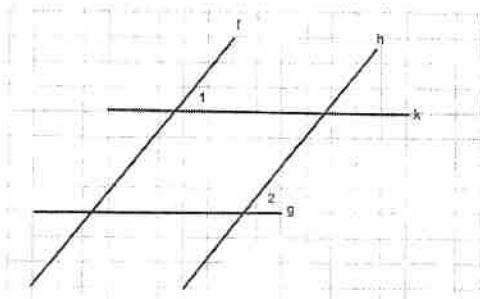
Section 2, Module 1: Math

Annotate

5

Mark for Review

In the figure below, lines k and g are parallel and lines f and h are parallel. If the measure of $\angle 2$ is 30° , what is the measure of $\angle 1$, in degrees?



Section 2, Module 1: Math

Annotate

6

Mark for Review

Consider the equation $y = x^2 - 26x + 169$ in the xy -plane. If the equation intersects the line $y = 0$ at exactly one point, what is the coordinate of that point?

(A) (13, 0)

A

(B) (0, 13)

B

(C) (26, 0)

C

(D) (0, 26)

D

II

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VII

2

Module
1

2

Section 2, Module 1: Math



7

Mark for Review

If $5x + 6y = 30$ and $x + 4 = 4$, what is the value of y ?

III

IV

TEST QUBE

Question 7 of 22 >

V

Section 2, Module 1: Math



8

Mark for Review

James rolls a fair six-sided dice two times. What is the probability that the second number he rolls is 6?

- (A) $1/36$
- (B) $1/18$
- (C) $1/12$
- (D) $1/6$

VI

VII

TEST QUBE

Question 8 of 22 >

Section 2, Module 1: Math



9

Mark for Review

Jenny wants to put a gift inside a box with a length of 10 inches, a width of 8 inches, and a height of 6 inches. However, she realizes that the gift is slightly larger than the box and decides to increase the length of the box by 10% to make it fit. What is the volume of the new box?

(A) 480 cubic inches

(B) 528 cubic inches

(C) 5280 cubic inches

(D) 40 cubic inches

TEST QUBE

Question 9 of 22 >

Section 2, Module 1: Math



10

Mark for Review

For the function g defined below, a is a constant and $g(2) = 24$. What is the value of a ?

$$g(x) = ax^3 + 8$$

TEST QUBE

Question 10 of 22 >

Back Next

2

Module
1

2

Section 2, Module 1: Math



11

Mark for Review

What is the volume, in cubic centimeters, of a cone with three times the radius and half the height of a cone whose volume is 30 cubic centimeters?

- (A) 15 cubic centimeters
- (B) 45 cubic centimeters
- (C) 90 cubic centimeters
- (D) 135 cubic centimeters



TESTQUBE

Question 11 of 22 >

II

Section 2, Module 1: Math



13

Mark for Review

Find one value of x where the equation $|x^2 - 2x + 1| = 1$ equal to 0.

III

Section 2, Module 1: Math



12

Mark for Review

Alice works a total of 12 hours per week, x hours as an engineer and y hours as a tutor. She earns \$12 per hour as an engineer and \$20 per hour as a tutor. Alice wants to earn at least \$300 per week. Which of the following systems of inequalities represents this situation?

- (A) $x + y \geq 12, 12x + 20y = 300$
- (B) $x + y \geq 12, 12x + 20y \geq 300$
- (C) $x + y = 12, 12x + 20y \leq 300$
- (D) $x + y = 12, 12x + 20y \geq 300$



TESTQUBE

Question 12 of 22 >

IV

Section 2, Module 1: Math



14

Mark for Review

If $2x - y = 4$, what is the value of $4^x \div 2^y$?

- (A) 16
- (B) 8
- (C) 4
- (D) 2



VI

VII

TESTQUBE

Question 14 of 22 >

Back

Next

2

Module
1

2

Section 2, Module 1: Math



15

Mark for Review

Eve wants to rent an apartment. The monthly rental cost is \$1600, and she needs to pay a \$300 deposit. Eve wants to keep her rental expenses under \$12,000, and the apartment rental must be for a whole number of months. What is the maximum number of months she can rent the apartment for?

(A) 6 months

(A)

(B) 7 months

(B)

(C) 8 months

(C)

(D) 9 months

(D)

II

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VII

Section 2, Module 1: Math



17

Mark for Review

In the given system of equations, a is a positive constant. If the system has no solution, what is the value of a ?

$$6x + 8y = 15$$

$$3x - 6 = ay$$

(A) 4

(A)

(B) -4

(B)

(C) 8

(C)

(D) -8

(D)

TESTQUBE

Question 15 of 22 >

Section 2, Module 1: Math



16

Mark for Review

James runs at a constant speed of 2 kilometers per hour. How many hours will it take for him to travel 52 kilometers?

IV

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VI

VII

TESTQUBE

Question 16 of 22 >

TESTQUBE

Question 17 of 22 >

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Module
1

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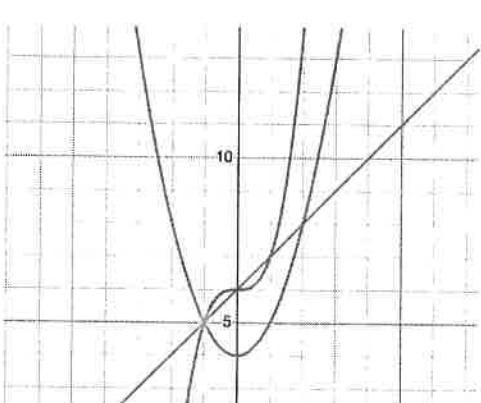
Section 2, Module 1: Math



⋮

18

Mark for Review



- (A) 1 (B) 2 (C) 3 (D) 4

IV

V

Section 2, Module 1: Math



⋮

19

Mark for Review

The given equation relates the numbers c , b , and a . Which of the equations correctly expresses c in terms of a and b ?
 $2c^2 - 6b = 8a$

(A) $c = (4a + 3b)$

Ⓐ

(B) $c = (4a + 3b)^2$

Ⓑ

(C) $c = (4a + 3b)^{1/2}$

Ⓒ

(D) $c = (4a + 3b)^{\sqrt{2}}$

Ⓓ

III

VII

2

Module
1

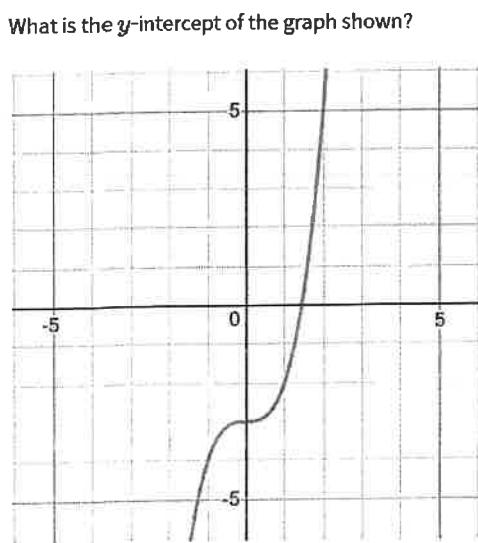
2

Section 2, Module 1: Math



20

Mark for Review



II

III

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V

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VII

Section 2, Module 1: Math



21

Mark for Review

Which of the following is equivalent to $8^{2/3}$?

(A) 16

(A)

(B) 4

(B)

(C) 8

(C)

(D) 32

(D)

(A) -1

(A)

(B) -4

(B)

(C) 1.5

(C)

(D) None of the above

(D)

2

Module
1

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Section 2, Module 1: Math

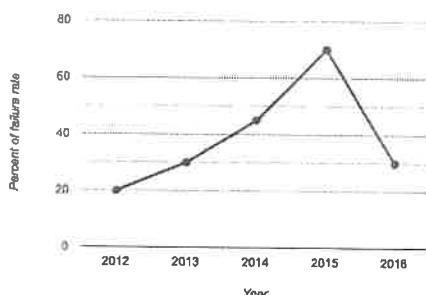


⋮

22

Mark for Review

The line graph illustrates the percentage of students who failed a class over the years. Which interval on the graph represents the greatest percentage change?



(A) 2012 – 2013

Ⓐ

(B) 2013 – 2014

Ⓑ

(C) 2014 – 2015

Ⓒ

(D) 2015 – 2016

Ⓓ

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VII



2

Module
2

2

35:00

Section 2, Module 2: Math

Annotate

1

Mark for Review

The function f is defined by the equation $f(x) = 6x - 3$. What is the value of x when $f(x) = -9$?

(A) 3

(A)

(B) 1

(B)

(C) -1

(C)

(D) -3

(D)

IV

TESTQUBE

Question 1 of 22 >

Section 2, Module 2: Math

Annotate

3

Mark for Review

What is the value of y that satisfies the two systems of equations given below?

$$\begin{aligned} -2x + 3y &= 11 \\ y &= 2x + 1 \end{aligned}$$

V

TESTQUBE

Question 2 of 22 >

Section 2, Module 2: Math

Annotate

2

Mark for Review

The total cost, in dollars, it takes for James to rent a room consists of a monthly fixed \$1250 rent fee and \$0.5 per hour fee for electricity. This April, he used electricity for 180 hours. What is the total cost James must pay for this month?

(A) \$1250

(A)

(B) \$1340

(B)

(C) \$1430

(C)

(D) \$1520

(D)

VI

TESTQUBE

Question 2 of 22 >

Section 2, Module 2: Math

Annotate

4

Mark for Review

m is a constant and x and y are variables given in the system of equations below. For which value of m does the system of equations have infinitely many solutions?

$$\begin{aligned} 4x - y &= -6 \\ -10x + my &= 15 \end{aligned}$$

VII

TESTQUBE

Question 4 of 22 >

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Module
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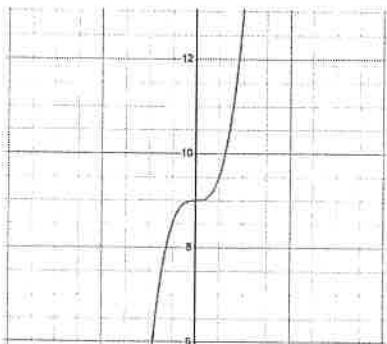
Section 2, Module 2: Math



5

Mark for Review

From the given graph below, find the y -intercept.



(A) 12

(A)

(B) 10

(B)

(C) 9

(C)

(D) 6

(D)

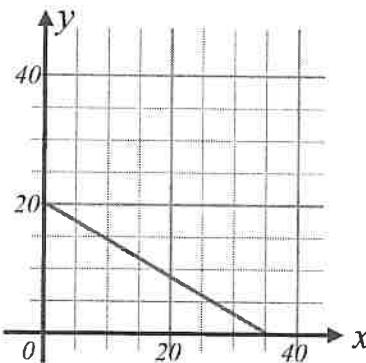
Section 2, Module 2: Math



6

Mark for Review

The graph below shows the relationship between the time a candle burns, x (in hours), and the height of a candle, y (in centimeters). Which equation represents this relationship?

(A) $y = -4/7x + 20$

(A)

(B) $y = -7/4x + 20$

(B)

(C) $y = 4/7x + 20$

(C)

(D) $y = 7/4x + 20$

(D)

II

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Module
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Section 2, Module 2: Math

Annotate

7

Mark for Review

Which of the following equations is perpendicular to $2x - y = 4$?

(A) $2x - y = 4$

(A)

(B) $-2x - y = 4$

(B)

(C) $\frac{1}{2}x - y = 4$

(C)

(D) $-\frac{1}{2}x - y = 4$

(D)

Section 2, Module 2: Math

Annotate

9

Mark for Review

If the expression below is rewritten in the form $ax^3 + bx^2 + cx + d$, where a , b , c , and d are constants, what is the value of c ?

$3x(2x^2 - x + 5) - x(6x - 2) + 3$

IV

TEST QUBE

Question 7 of 22 >

Section 2, Module 2: Math

Annotate

8

Mark for Review

What is the maximum number of boxes that Sarah can bring with her in an elevator with a maximum load capacity of 210 pounds, if she weighs 110 pounds and each box weighs 15 pounds?

(A) 4

(A)

(B) 5

(B)

(C) 6

(C)

(D) 7

(D)

Section 2, Module 2: Math

Annotate

10

Mark for Review

Find the sum of two solutions for the given equation below.

$2x^2 + 9x - 5 = 0$

(A) $9/2$

(A)

(B) $-9/2$

(B)

(C) $2/9$

(C)

(D) $-2/9$

(D)

V

TEST QUBE

Question 8 of 22 >

VI

TEST QUBE

Question 10 of 22 >

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Module
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Section 2, Module 2: Math



11

Mark for Review

Simplify the expression below where $x \neq 2$.

$$\frac{2x^2 - 2x - 4}{x - 2}$$

(A) $2x + 2$

(A)

(B) $2x - 2$

(B)

(C) $2x - 3$

(C)

(D) $x - 2$

(D)

TESTQUBE

Question 11 of 22 >

Section 2, Module 2: Math



12

Mark for Review

The model estimates that the number of corals in area A will decrease by 15% annually due to rising temperatures, and at the end of 2023, there are 300 corals in the area. Which of the following equations accurately represents the expected number of corals living in area A at the end of 2028, according to the model's estimates?

(A) $300(0.15)^5$

(A)

(B) $300(0.85)^5$

(B)

(C) $0.15(300)^5$

(C)

(D) $0.85(300)^5$

(D)

TESTQUBE

Question 12 of 22 >

Section 2, Module 2: Math



13

Mark for Review

The equation $f(x) = 7.1 + 48t$ gives the estimated height of Justin (in centimeters) t years after he was born. Which of the following answer choices is the best interpretation of the number 7.1 for this equation? ($0 \leq t \leq 5$)

(A) The number of years since Justin was born

(A)

(B) The height of Justin when he was born

(B)

(C) The increase in the height of Justin each year

(C)

(D) The weight of Justin t years after he was born

(D)

TESTQUBE

Question 13 of 22 >

IV

Section 2, Module 2: Math



14

Mark for Review

Village A has a population of 3,500 in 2023. However, due to gentrification, the village is experiencing an outflow of 10% of its population from the previous year. How many people will there be in village A in 2025?

(A) 3,035

(A)

(B) 2,935

(B)

(C) 2,835

(C)

(D) 2,735

(D)

VI

VII

TESTQUBE

Question 14 of 22 >

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Module
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Section 2, Module 2: Math



15

Mark for Review

The table below summarizes the 30 data values in a set of data. Which of the following sentences are true?

Value	Frequency
0	1
1	3
2	2
3	5
4	4
5	7
6	4
7	1
8	3

- i.) The mean is larger than the mode of this data set.
 ii.) The mode of this data set is 8.
 iii.) The range of this data set is 8.

(A) *i* only

(A)

(B) *iii* only

(B)

(C) *i* and *iii*

(C)

(D) *ii* and *iii*

(D)

VII

Module
2

Section 2, Module 2: Math



16

Mark for Review

The table below summarizes the number of students who took different college entrance exams in class *A* and *B*. There are 29 students who took SAT in class *A* and there are 58 students who took SAT in class *B*. The ratio of the number of students who took IB in class *A* to *B* is 3 to 2, and the total number of students taking CSAT is half of the total number of students who took IB. There are a total of 40 students who took IB. If one student is chosen at random from a total pool of students, what is the probability that he or she took IB at class *B*? (Round to the nearest hundredth)

Class	Test		
	SAT	IB	CSAT
<i>A</i>	29	?	?
<i>B</i>	58	?	?
Total	87	40	?

IV

V

VI

2

Module
2

2

Section 2, Module 2: Math



17

Mark for Review

In triangle ABC , the following information is given:
 Angle B measures 90 degrees, and Angle C
 measures 45 degrees. If the length of side BC is 10,
 find the length of the hypotenuse for triangle ABC .

- (A) $10\sqrt{3}$
- (B) $10\sqrt{2}$
- (C) 20
- (D) 40

 A
 B
 C
 D

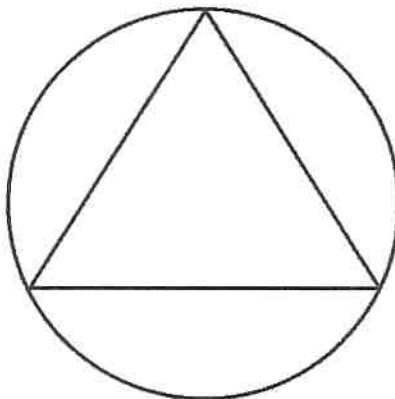
Section 2, Module 2: Math



18

Mark for Review

There is an equilateral triangle inscribed in a circle
 as shown below. If the radius of this circle is 4, what
 is the area of this equilateral triangle?



II

III

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VII

- (A) $4\sqrt{3}$
- (B) $8\sqrt{3}$
- (C) $12\sqrt{3}$
- (D) $16\sqrt{3}$

 A
 B
 C
 D

2

Module
2

2

Section 2, Module 2: Math

Annotate

19

Mark for Review

Tim is driving a car between his home and work. The distance between the two places is d and it takes h hours to travel from home to work. Which expression represents the average speed of this trip?

(A) $d + h$ (B) $d - h$ (C) $d \times h$ (D) d/h

II

III

IV

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VI

VII

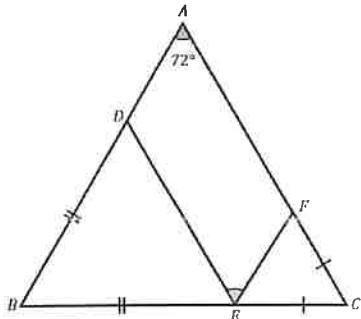
Section 2, Module 2: Math

Annotate

20

Mark for Review

In the triangle below, triangle ABC is an isosceles triangle in which $AB = AC$. If $BD = BE$, $CE = CF$, and angle $\angle A = 72^\circ$, what is the measure of angle $\angle DEF$?



Note: Figure Not Drawn to Scale

(A) 36° (B) 54° (C) 63° (D) 72°

2

Module
2

2

Section 2, Module 2: Math



⋮

21

Mark for Review

The function f is defined by $f(x) = -2x^2 + 9x - 4$ and function g is defined by $g(x) = -f(x)$. Find one x -intercept of the function $g(x)$.

Section 2, Module 2: Math

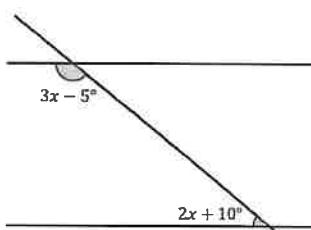


⋮

22

Mark for Review

In the figure below, the two horizontal lines run parallel to each other. What is the value of x ?



II

III

Note: Figure Not Drawn to Scale

(A) 35

(A)

(B) 45

(B)

(C) 55

(C)

(D) 65

(D)

IV

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Math

22 QUESTIONS

(TIME: 35 MIN)

DIRECTIONS

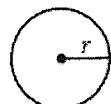
The questions in this section address a number of important math skills.

Use of a calculator is permitted for all questions.

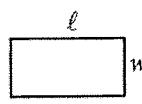
NOTES

Unless otherwise indicated:

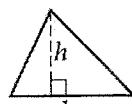
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

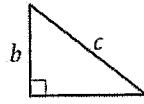
$$\begin{aligned} A &= \pi r^2 \\ C &= 2\pi r \end{aligned}$$



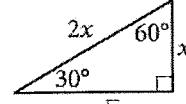
$$A = \ell w$$



$$A = \frac{1}{2}bh$$

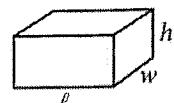
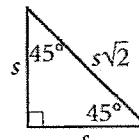


$$c^2 = a^2 + b^2$$

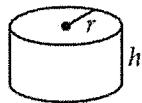


$\sqrt{3}$

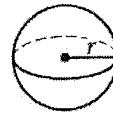
Special Right Triangles



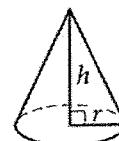
$$V = \ell wh$$



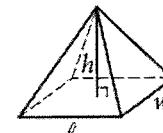
$$V = \pi r^2 h$$



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



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

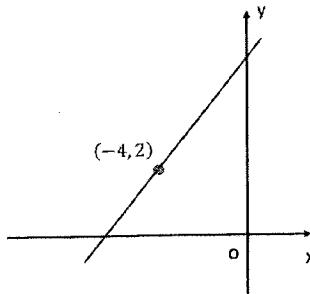
The sum of the measures in degrees of the angles of a triangle is 180.

For multiple-choice questions, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

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- If your answer is a **mixed number** (such as $3\frac{1}{2}$), write it as an improper fraction ($7/2$) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

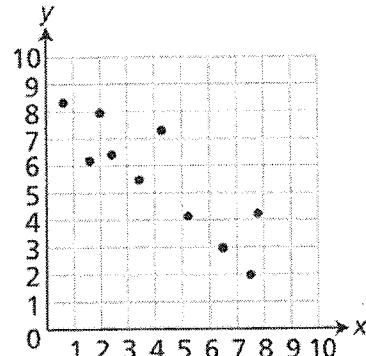
1



The line as shown in the figure goes through the point $(-4, 2)$ in the XY-plane. What is the area of triangle formed by the line in the XY-plane if the line has a slope of 2?

- A) 25
- B) 50
- C) 56
- D) 60

3



Which of the following best represents the relationship between x and y variables in the scatterplot above?

- A) Speed of a car (x) vs. distance traveled (y).
- B) Distance traveled (x) vs. gas remaining in the tank (y).
- C) Temperature outside (x) vs. Cost for air conditioning (y) in a hot weather.
- D) Number of days to attend gym (x) vs. Number of total hours of exercising (y).

2

In the shipment department of a computer manufacturing company, the quality control staffs found that there were four defective units out of 200 machines. If two computers are selected at random and tested for being defective, what is the probability that at least one is defective?

- A) $\frac{3}{9950}$
- B) $\frac{98}{4975}$
- C) $\frac{79}{1990}$
- D) $\frac{1}{50}$

4

In the XY-plane, what is the equation of the circle if two points, $A(-1, 3)$ and $B(1, -3)$, are the end points of a diameter of the circle?

- A) $(x - 1)^2 + (y - 3)^2 = 10$
- B) $(x + 1)^2 + (y - 3)^2 = 10$
- C) $x^2 + y^2 = 10$
- D) $x^2 + y^2 = 40$

5

$$f(x) = 1.34(1.01)^x$$

The function above represent to estimate the number of Electric Vehicles in a certain state, in millions, for $x \geq 0$, where x is the number of years after 2020. Which of the following best interpret the number 1.34 in this context?

- A) The estimated number of EV, in millions, in 2020.
- B) The estimated percent increase each year from 2020.
- C) The estimated number of EV, in millions, x years after 2020.
- D) The estimated number of EV, in millions, per year after 2020.

6

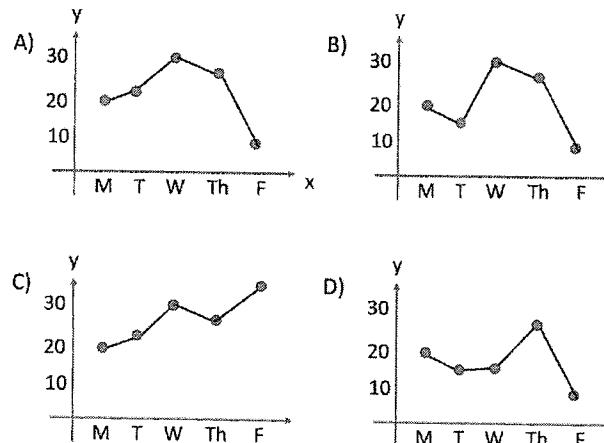
$$\begin{aligned}y &= -2x^2 \\y &= x - 3\end{aligned}$$

In the system of equations above, if the graphs intersect at a point (x, y) in the fourth quadrant, What is the y-coordinate of the point of intersection?

- A) -4.5
- B) -1.5
- C) -2
- D) -3

7

A car manufacturing factory in a certain company had 20,000 vehicles in stock at the end of Monday. The company delivered 8,000 vehicles to the customers and manufactured 12,000 vehicles on Tuesday. There were no deliveries on Wednesday but manufactured 6,000 vehicles. On Thursday, the company delivered 15,000 vehicles and manufactured 13,000 vehicles. On Friday, the company delivered 20,000 vehicles and no vehicles are manufactured. Which of the following best represents the number of vehicles the company had in stock on each day?



8

The sum of three numbers is 720. The sum of two numbers is 50% more than the third number, z. what is the value of z?

9

A study of a random sample of 2,000 of a certain brand phone battery estimated that the mean working time was 5.6 hours with all default functions on. The study also found out that there was a margin of error 0.2 hours. Which of the following best concludes based on the study?

- A) This brand phone battery has a mean working time of between 5.4 and 5.8 hours.
- B) This brand phone battery has a mean working time at least 5.4 hours.
- C) This brand phone battery has a mean working time at most 5.8 hours.
- D) Any battery in this brand has a mean working time of between 5.4 and 5.8 hours.

10

x	$f(x)$
-8	-11
-4	-5
0	1
2	4

The table above shows some values of x and their corresponding values of $f(x)$. What is the x -intercept of the graph of $y = f(x)$?

- E) $\left(-\frac{3}{2}, 0\right)$
- F) $\left(-\frac{2}{3}, 0\right)$
- G) $\left(\frac{3}{2}, 0\right)$
- H) $\left(\frac{2}{3}, 0\right)$

11

Peter jogs on a trail in the neighborhood every morning. One morning, He found out that he still needed to jog 2 miles to complete after he jogged P percent of the entire tail. What is the correct expression of the length of the entire trail in terms of P ?

- A) $\frac{100}{200-P}$
- B) $\frac{200}{100-P}$
- C) $\frac{200}{P-100}$
- D) $\frac{200}{P-100}$

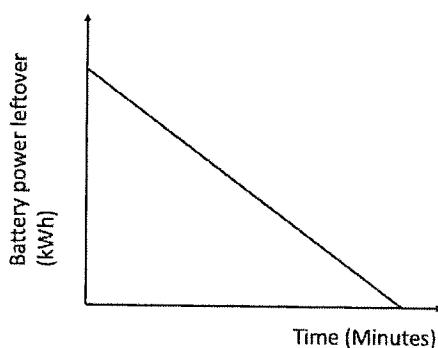
12

$$\begin{aligned}x - y &< 3 \\-2x + y &< 0\end{aligned}$$

In the system of inequalities above, which of the following ordered pairs (x, y) satisfies the system?

- E) $(-3, 3)$
- F) $(-2, 0)$
- G) $(1, 3)$
- H) $(1, 0)$

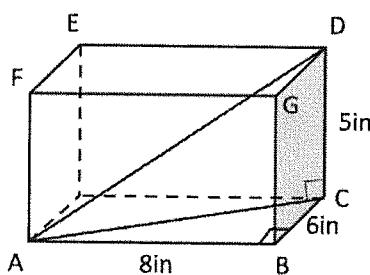
13



The graph represents the battery power leftover (kWh) for a certain brand after using t minutes. The tester charged a battery fully in the beginning and started to use it to the testing motor. Which of the following best interpret the x -intercept of the graph above?

- E) The capacity of battery power when its fully charged.
- F) The hourly rate of battery usage.
- G) The time in minutes when the battery used completely.
- H) The time in minutes when the battery fully charged.

14



In the rectangular solid above, what is the length of the diagonal \overline{AD} , in inches, to the nearest tenth?

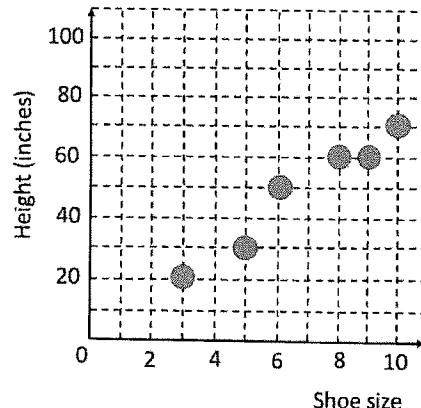
15

$$f(x) = 150 \cdot \left(1 + \frac{b}{100}\right)^x$$

The function shown above is used to compute the total balance of CD account, where x is the number of years after the initial deposit. which of the following describes the function f , correctly if b is the interest rate in percent?

- A) The function increases linearly.
- B) The function increases exponentially.
- C) The function decreases linearly.
- D) The function decreases exponentially.

16



The scatter plot shows the relationship between shoe sizes (x) and height (y). Which of the following statements best describes the scatter plot above?

- A) The scatter plot shows a negative correlation between x , y variables.
- B) The scatter plot shows a positive correlation between x , y variables.
- C) The scatter plot shows no correlation between x , y variables.
- D) The scatter plot shows very weak relationship between x , y variables.

17

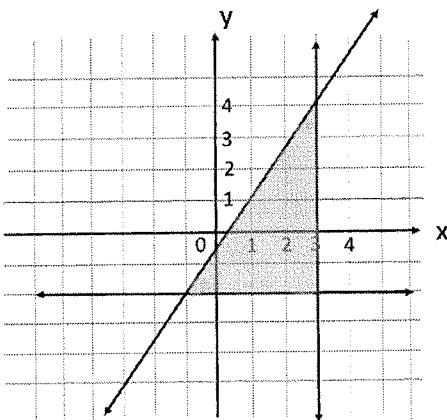
Jeremiah deposited \$2,000 to his savings account at 20% annual interest rate, which increases 20% of its value the previous year. The balance in the savings account, in dollars, 3 years after he deposited can be represented by the expression $2,000b$, where b is a constant. What is the value of b in the nearest hundredth?

19

$$N(x) = -2x^2 + 120x - 275$$

The function above is formulated based on the study of tools market. If the number of tools, N , a manufacturer can sell is based on the unit price, x , What is the price of the tool in order to sell the maximum number of tools?

18



The solution to which system of inequalities is represented by the shaded region in the graphs above?

A) $\begin{cases} x \leq 3 \\ y \geq -2 \\ y \leq -\frac{3}{2}x - \frac{1}{2} \end{cases}$

B) $\begin{cases} x \geq 3 \\ y \geq -2 \\ y \leq \frac{3}{2}x - \frac{1}{2} \end{cases}$

C) $\begin{cases} x \leq 3 \\ y \geq -2 \\ y \leq \frac{3}{2}x - \frac{1}{2} \end{cases}$

D) $\begin{cases} x \leq -3 \\ y \geq 2 \\ y \leq \frac{3}{2}x - \frac{1}{2} \end{cases}$

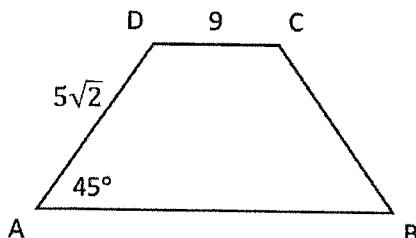
20

$$g(x) = \sqrt{\frac{2x}{3}} + k$$

$$h(x) = \frac{3g(x)}{2}$$

In the system of equations above, where k is a constant, if $h(6) = 6$, then what is the value of k ?

21



In the figure shown above, Isosceles trapezoid ABCD has base angle A has 45° and the length of side AD equals to $5\sqrt{2}$ and the length of top CD equals to 9. What is the area of trapezoid?

- E) 60
- F) 70
- G) $50\sqrt{2}$
- H) $70\sqrt{2}$

22

There are 20 students in a class and students can take either Biology or History or both or none. If 12 students take Biology, 15 students take History, and 2 students take neither Biology nor History, what is the probability that a randomly selected student takes both subjects?

- A) $\frac{9}{20}$
- B) $\frac{1}{2}$
- C) $\frac{11}{20}$
- D) $\frac{3}{5}$

STOP

If you finish before time is called, you may check your work on this module only. Do not turn to any other module in the test.

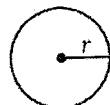
Math**22 QUESTIONS****(TIME: 35 MIN)****DIRECTIONS**

The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

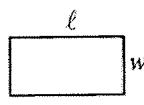
NOTES

Unless otherwise indicated:

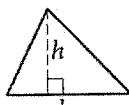
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

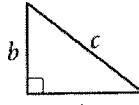
$$\begin{aligned} A &= \pi r^2 \\ C &= 2\pi r \end{aligned}$$



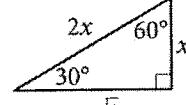
$$A = \ell w$$



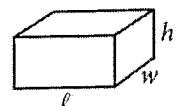
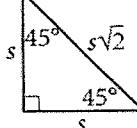
$$A = \frac{1}{2} bh$$



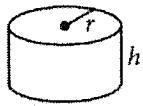
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



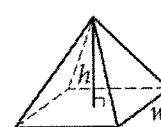
$$V = \pi r^2 h$$



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



$$V = \frac{1}{3} \pi r^2 h$$



$$V = \frac{1}{3} \ell wh$$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

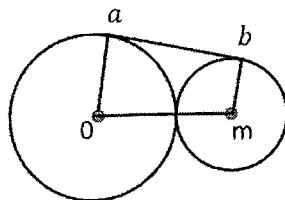
The sum of the measures in degrees of the angles of a triangle is 180.

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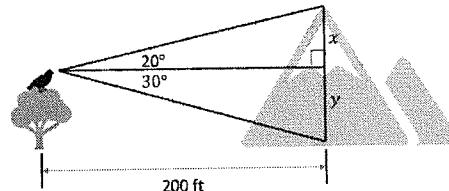
1



Note: Not drawn to scale.

In the circles o and m , the length of \overline{oa} is 7 and the length of \overline{mb} is 1. If two circles are externally tangent and segment \overline{ab} is common external tangent to both circles as shown above, what is the length of \overline{ab} , to the nearest tenth?

3



A bird looks up to the top of a mountain from the top of a tree at an angle of elevation 20° and also looks down to the bottom of the same mountain at an angle of depression 30° . If the tree is 200 ft away from the bottom of the mountain as shown above, which of the following expression is the height of the mountain?

- A) $\frac{200}{\tan(20^\circ)} + \frac{200}{\tan(30^\circ)}$
- B) $200\tan(20^\circ) + 200\tan(30^\circ)$
- C) $\frac{\tan(20^\circ)}{200} + \frac{\tan(30^\circ)}{200}$
- D) $\frac{200}{\sin(20^\circ)} + \frac{200}{\sin(30^\circ)}$

2

The Number of Lakes classified by Alkalinity and Depth

Depth in lake	Alkalinity Level			Total
	Low	Medium	High	
Low	25	55	152	232
Medium	45	74	98	217
High	52	35	24	111
Total	122	164	274	560

The table shows the number of lakes in a certain country classified by alkalinity and depth. If a lake has medium depth, what is the probability that it has high alkalinity level?

- A) $\frac{98}{217}$
- B) $\frac{98}{560}$
- C) $\frac{24}{111}$
- D) $\frac{24}{560}$

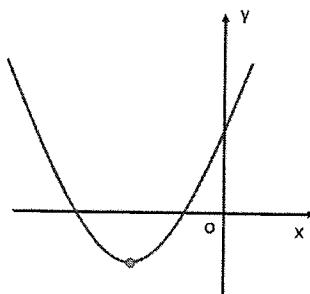
4

$$y = 2x + k^2$$

$$x^2 - 2kx + y = 0$$

In the system of equations above, k is a constant. When the equations are graphed in the XY-plane, they will intersect only at one point. What is the value of k ?

5



In the quadratic function in the XY-plane above, if the equation of the function is $y = ax^2 + bx + c$, which of the following must be true?

- I. $a > 0$
- II. $b < 0$
- III. $c > 0$

- A) I only
- B) I and II only
- C) I and III only
- D) I, II, and III

6

$$x^{\frac{2}{7}} \left(x^{\frac{1}{2}} \cdot x^{\frac{1}{3}} \right)^{\frac{6}{7}} = x^m$$

In the equation above, what is the value of m , where $m > 0$?

- A) 1
- B) 2
- C) $\frac{3}{7}$
- D) $\frac{83}{42}$

7

Which of the following examples best represent a linear pattern?

- A) The balance after t years in a savings account which gains interest at 3% annually.
- B) The population of ants after D days in a certain colony that the population will be doubled every day.
- C) The salary in t years if it will increase 20% every year.
- D) A worker gets paid at \$40 hourly rate.

8

Which of the following samples will most likely show a negative correlation when graphed on a scatter plot?

- A) The number of visitors at a museum and the length of the line for the admission tickets.
- B) A person's height and shoe size.
- C) Temperature outside and the cost of cooling down inside the house during the hot summer time.
- D) The number of orders for a certain item and the number of items left in stock at the store.

9

In a survey of 500 people, $\frac{3}{5}$ indicated that they are for affirmative action. There were some people who didn't respond for the question and the rest of people were against affirmative action. If $\frac{4}{25}$ indicated that they are against it, how many people didn't respond the question?

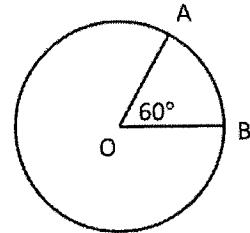
- A) 300
- B) 200
- C) 120
- D) 80

10

The average price per pound of grapes started at \$2.50 at ABC market. But the store increased the price at a constant rate each week for several weeks until it reached \$5.10 because of market inflation. The equation $2.50 + 0.20x = 5.10$ represent this situation, where x is the number of weeks after the average price per pound is \$2.50. which of the following best interpret 0.20 in this context?

- A) The rate of change, in dollars per week, in the average price per pound of grapes.
- B) The average price of grapes per pound x weeks after the average price per pound is \$2.50.
- C) The percent increase in the average price of grapes in pounds.
- D) Total price increase, in dollars, x weeks after the average price per pound is \$2.50.

11



In the figure above, the measure of central angle $\angle AOB$ is 60° . If the area of sector \overarc{AOB} is 20π , what is the length of radius of the circle O?

- A) $\sqrt{30}$
- B) $2\sqrt{30}$
- C) $\sqrt{\frac{10}{3}}$
- D) $2\sqrt{\frac{10}{3}}$

12

An insect scientist researched to predict the number of ants (y) that will be come out in a certain ant hole during 2 hours period in the morning. x represents the number of days after the date a scientist started to monitor ($0 \leq x \leq 30$) and he determined the equation of a line of best fit using data collected as below.

$$y = 125 + 25x$$

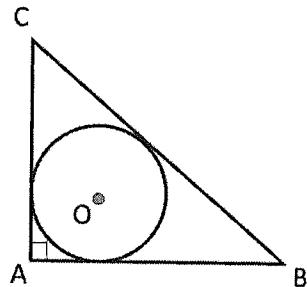
Based on the equation above, what is the positive difference between the number of ants came out when the scientist first time recorded and the number of ants came out in the same hole 10 days after the date the scientist started to monitor?

13

If $ax - 1$ is a factor of $-8x^3 + 28x^2 - 12x$, where a is a positive constant, what could be the value of a ?

- A) 2
- B) 4
- C) 6
- D) 8

15



In the figure above, the circle O is tangent to three sides of triangle ABC as shown. If $AB = 9$ and $AC = 12$, what is the area of the circle O ?

- A) 15π
- B) 12π
- C) 9π
- D) 6π

14

A quadratic function can model the height of a cannon ball above the ground in terms of time, in seconds, after shooting in the air. According to the model, a cannon ball was launched from the ground and reached the maximum height of 180 ft 3 seconds after it was launched. Based on the model, what is the height, in feet, of the cannon ball 2 seconds after it was launched?

- A) 100 ft
- B) 120 ft
- C) 140 ft
- D) 160 ft

16

$$f(x) = a(x + 2)(x - 6)$$

The graph of the function f is parabola in the xy -plane, where a is a constant. What is the x coordinate of the vertex?

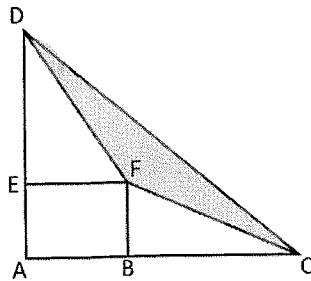
- E) 1
- F) 2
- G) -2
- H) 4

17

A delivery service company is contracted to deliver 100 chairs for \$50 each. The company agrees to compensate \$250 for each chair that is broken during transport. If the delivery company wants to earn at least \$4,000, what is the maximum number of chairs that can be broken during transport?

- A) 3
- B) 4
- C) 5
- D) 6

18



Note: Not drawn to scale.

In the figure above, $\overline{AB} = 5$, $\overline{BC} = 8$, $\overline{AE} = 6$, and $\overline{ED} = 12$. Find the area of the shaded triangle CDF.

19

Armaan visited a local fishing farm to play a game. The fishing farm has two kinds of fish, catfish and trout. Gaming laws allow him to catch no more than 10 catfish, no more than 5 trout per day, and less than 11 fish per day. Which of the following systems of inequalities can represent these constraints?

- A) $\begin{cases} x \leq 10 \\ y \leq 5 \\ x + y \geq 11 \end{cases}$
- B) $\begin{cases} x \leq 10 \\ y \leq 5 \\ x + y < 11 \end{cases}$
- C) $\begin{cases} x < 10 \\ y < 5 \\ x + y > 11 \end{cases}$
- D) $\begin{cases} x \leq 10 \\ y \leq 5 \\ x + y > 11 \end{cases}$

20

$$\begin{aligned}f(x) &= 2x^2 + 4x - 8 \\h(x) &= a\end{aligned}$$

In the system of equations above, a is a constant. If $h(x) \leq f(x) + 12$ for all values of x , what is the maximum value of a ?

- A) 2
- B) 4
- C) -10
- D) 10

21

The measure of an angle is 135° can be written as $\frac{k}{4}\pi$ in radians. What is the value of k ?

22

Noah orders floor tables for his company. The floor table cost \$ 450 each and sales tax is 10% of the total cost of the purchase. If he can spend no more than \$30,000 on the floor tables, including tax, what is the maximum number of floor tables Noah can order?

- A) 60
- B) 61
- C) 62
- D) 63

STOP

If you finish before time is called, you may check your work on this module only. Do not turn to any other module in the test.

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2

Module
1

35:00

Section 2, Module 1: Math



⋮

1

Mark for Review

 $\frac{36}{x} = 4$. What is the value of x ?

- (A) 4
(B) 6
(C) 8
(D) 9



3

Mark for Review

The function f is defined by $f(x) = 4x^2 + 2$. What is the value when $f(\frac{1}{2})$?

- (A) 1
(B) 3
(C) 5
(D) 6



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IV

Section 2, Module 1: Math



⋮

2

Mark for Review

What is 120% of 80?

- (A) 64
(B) 72
(C) 96
(D) 176



Section 2, Module 1: Math



⋮

4

Mark for Review

$y > 3x + 5$

If the value of x is -2 , which value of y satisfies the inequality above?

- (A) -5
(B) -3
(C) -1
(D) 2



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5

Mark for Review

Jason works at a car dealership where his monthly wage fluctuates depending on the number of cars he sells each month. His wage is calculated using the formula $y = 30x + 110$, where 30 represents the commission he receives for selling one car. What does the value 110 represent in this formula?

(A) The number of times he sold a car to his customers



(B) The minimum wage he receives every month



(C) The hours he spends per month working at the dealership



(D) The amount of money it takes to sell one car



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Section 2, Module 1: Math



6

Mark for Review

If a car travels 60 miles in 1 hour, what is its average speed in feet per second? (1 mile = 5280 feet)

(A) 12



(B) 44



(C) 88



(D) 5280



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Section 2, Module 1: Math



7

Mark for Review

$x^2 + 4xy + 4y^2 = 16$. What is one possible value for $x + 2y$?

(A) 4



(B) 8



(C) 64



(D) 256



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Section 2, Module 1: Math



8

Mark for Review

If the first integer is 3 more than twice the second integer, and the sum of the two integers is 24, what is the value of the second integer?

(A) 3



(B) 5



(C) 7



(D) 11



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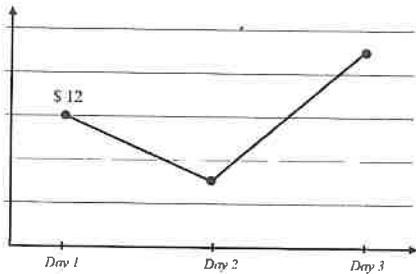
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9

Mark for Review

Astra, a company renowned for specializing in space travel technology, experienced a tumultuous week with various news events impacting its stock price. The stock began the week at \$12. However, on the second day, the price dipped by 7 percent due to negative news. Fortunately, on the third day, positive forecasts led to a 12 percent increase in the stock price. Which answer is closest to the stock's final price at the end of the third day?

Stock Price: ASTRA



(A) \$11.50

Ⓐ

(B) \$12.50

Ⓑ

(C) \$14.50

Ⓒ

(D) \$17.00

Ⓓ

Section 2, Module 1: Math



⋮

10

Mark for Review

$$\frac{1 - \frac{3}{x}}{x - \frac{9}{x}}$$

Which of the following equation is equivalent to the expression shown above?

(A) $\frac{1}{x-3}$

Ⓐ

(B) $\frac{x-3}{x+3}$

Ⓑ

(C) $\frac{1}{x+3}$

Ⓒ

(D) $\frac{x+3}{x^2-9}$

Ⓓ

TESTQUBE

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Section 2, Module 1: Math



⋮

11

Mark for Review

V

What is the equation of a circle with center $(2, 3)$ and radius of 5 ?

(A) $(x + 2)^2 + (y + 3)^2 = 5$

Ⓐ

(B) $(x + 2)^2 + (y + 3)^2 = 25$

Ⓑ

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

Ⓒ

(D) $(x - 2)^2 + (y - 3)^2 = 25$

Ⓓ

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Section 2, Module 1: Math



12

Mark for Review

There are 6 different types of marbles inside a bag. Dylan chooses one marble at random from the bag. What is the probability that Dylan grabs either a rough green marble or a blue marble?

	Red	Blue	Green
Smooth	4	2	3
Rough	2	7	6
Total	6	9	9

(A) 15/18

Ⓐ

(B) 5/24

Ⓑ

(C) 1/2

Ⓒ

(D) 5/8

Ⓓ

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Section 2, Module 1: Math



13

Mark for Review

The expression $\sqrt[3]{\frac{a^{37}b^{40}c^{25}}{(abc)^{10}}}$ is equivalent to $a^x b^y c^z$, where x, y, z are positive constants. What is the value of $x + y + z$?

TEST QUBE

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Section 2, Module 1: Math



14

Mark for Review

$$\begin{cases} y = 2x + 8 \\ y = 3px + 4 \end{cases}$$

The set of equations is given above. Find the value of p so that there are no solutions to the given system of equations.

(A) 1/2

Ⓐ

(B) 4/5

Ⓑ

(C) 2/3

Ⓒ

(D) 1

Ⓓ

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Section 2, Module 1: Math



15

Mark for Review

A study is being conducted to assess the physical fitness of 100 high school seniors. One of the categories being quantitatively measured is the number of consecutive push-ups students can perform within a 2-minute time frame. The data is organized in a table with increments of 10. What is the median number of push-ups performed by the group, according to the table?

Number of Push-ups	10	20	30	40	50
Number of People	27	32	22	15	4

(A) 10

 A

(B) 20

 B

(C) 22

 C

(D) 32

 D

Section 2, Module 1: Math



16

Mark for Review

What value satisfies the inequality below?
 $|x + 1| < 3$

(A) -4

 A

(B) 0

 B

(C) 2

 C

(D) 3

 D

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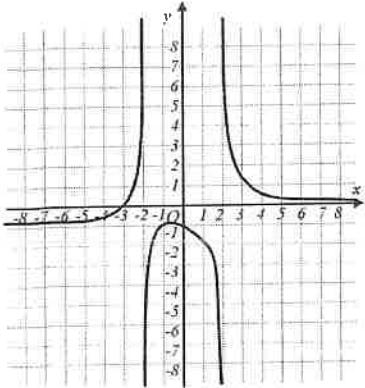
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17

Mark for Review

The rational function f is defined by an equation in the form of $f(x) = \frac{x+3}{x^2-4}$. How many values of x is not defined for $f(x)$?



IV

(A) 0

(A)

(B) 1

(B)

(C) 2

(C)

(D) 3

(D)

V

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Section 2, Module 1: Math



18

Mark for Review

For a right triangle with side lengths 6 and 8, what is a possible side length of the third side?

(A) 3

(A)

(B) $3\sqrt{5}$

(B)

(C) $2\sqrt{7}$

(C)

(D) 12

(D)

Section 2, Module 1: Math



19

Mark for Review

$$y = 3x^2 - 5x - 12$$

The given equations above is a polynomial function with two roots. If the values of the two roots are denoted as a and b , what is the value of ab ?

(A) -4

(A)

(B) -3

(B)

(C) 3

(C)

(D) 4

(D)

Section 2, Module 1: Math



20

Mark for Review

In Physics, there is a widely used formula in understanding the movement of a fluid. The equation, adapted from the founder himself, is called the Bernoulli's Equation. This equation is used to gain insight in the motion of a fluid, specifically related to the pressure, speed and height. Assuming that there is no static pressure, the formula can be expressed as follows. Which equation correctly expresses p in terms of h , v , c , and g ?

$$\frac{p}{2}v^2 + pgh = c$$

(A) $p = \frac{2c}{v^2+2gh}$

A

(B) $p = \frac{c}{gvh}$

B

(C) $p = \frac{2c}{vgh+2}$

C

(D) $p = \frac{gc}{v^2+2vh}$

D

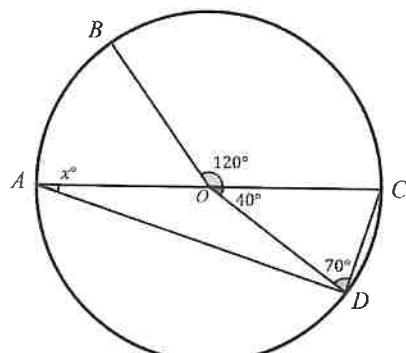
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Mark for Review



Note: Figure Not Drawn to Scale

In the shown figure, the segment AC is the diameter of the circle with the center O . Also, $\angle BOC = 120^\circ$, $\angle COD = 40^\circ$, and $\angle CDO = 70^\circ$. Find the angle of x° .

(A) 70°

A

(B) 45°

B

(C) 30°

C

(D) 20°

D

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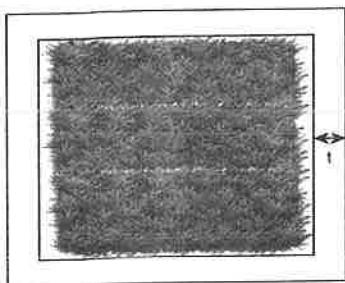
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Mark for Review

John is trying to decide what kind of fence he should use for his garden. The dimension of the garden is $10m \times 20m$ and John decides $10m^2$ to be the overall area of the fence. If the fence goes around the garden and is uniform in thickness, and the thickness is denoted as t in meters, what is the closest value of t ?



IV

(A) $1.54m$ A(B) $0.85m$ B(C) $0.53m$ C(D) $0.17m$ D

V

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Annotate

1

Mark for Review

If a rectangle has a length of 8 units and a width of 5 units, what is its area?

- (A) 13 square units
- (B) 25 square units
- (C) 30 square units
- (D) 40 square units

 A
 B
 C
 D

Section 2, Module 2: Math

Annotate

3

Mark for Review

A car is traveling at a constant speed, and after 2 hours it has covered a distance of 350 km. What is the car's speed in km/hour?

- (A) 100 km/hour
- (B) 120 km/hour
- (C) 150 km/hour
- (D) 175 km/hour

 A
 B
 C
 D

TEST QUBE

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TEST QUBE

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Section 2, Module 2: Math

Annotate

2

Mark for Review

Jenna owns a thrift store that sells second-hand goods at a fixed price of \$20 each. During a clearance sale, the store reduces the price of these items by 30%. What is the final price of the goods during the clearance sale?

- (A) \$6
- (B) \$14
- (C) \$18
- (D) \$30

 A
 B
 C
 D

Section 2, Module 2: Math

Annotate

4

Mark for Review

A factory is responsible for producing shoes for its district. For every 200 shoes that the factory produces, 8 of them have a defect. If a shoe is randomly selected from the factory's production, what is the probability of selecting a shoe that has a defect?

- (A) $\frac{8}{100}$
- (B) $\frac{8}{1000}$
- (C) $\frac{4}{100}$
- (D) $\frac{4}{10}$

 A
 B
 C
 D

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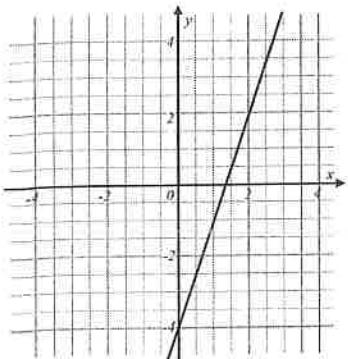
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5

Mark for Review

- The graph of $f(x) = 3x - 4$ is shown. What would be the y -intercept of the line for the function $f(x + 3)$?



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Section 2, Module 2: Math



6

Mark for Review

- In a right triangle, if the measure of one acute angle is 45° and the length of the side opposite to it is 8 units, what is the length of the hypotenuse?

(A) $6\sqrt{2}$ units A

(B) 8 units

 B(C) $8\sqrt{2}$ units C

(D) 12 units

 D

TESTQUBE

Question 6 of 22 >

Section 2, Module 2: Math



7

Mark for Review

Consider the system of equations:

$$\begin{aligned}2x - y &= 5 \\(3x + y)^2 &= 25\end{aligned}$$

Which ordered pair (x, y) is a possible solution to the given system of equations?

(A) $(2, -1)$ A(B) $(2, -5)$ B(C) $(0, -1)$ C(D) $(0, 2)$ D

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Section 2, Module 2: Math



8

Mark for Review

What value of x is the solution to the given equation?

$$3x + 7 = 28$$

(A) 15

(A)

(B) 12

(B)

(C) 9

(C)

(D) 7

(D)

TESTQUBE

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Section 2, Module 2: Math



9

Mark for Review

$$f(x) = x^2 + 4x + 3.$$

The given equation defines the function f . For the ordered pair of (x, y) where $f(x)$ is at its minimum, what is the sum of $x + y$?

(A) -4

(A)

(B) -3

(B)

(C) 1

(C)

(D) 3

(D)

TESTQUBE

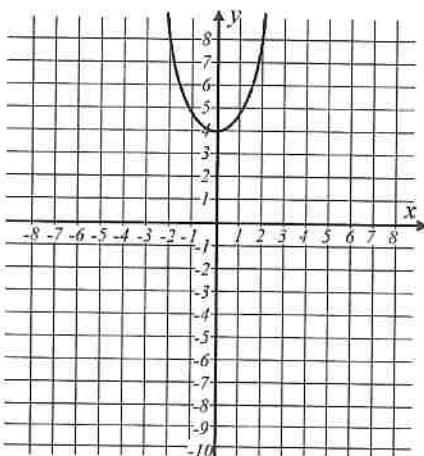
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Section 2, Module 2: Math



10

Mark for Review



The graph of $y = x^2 + 4$ is shown. What is the value of x at $(x, 4)$?

(A) -2

(A)

(B) 0

(B)

(C) 2

(C)

(D) 4

(D)

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Section 2, Module 2: Math

Annotate

11

Mark for Review

Which expression is equivalent to $(x^3 + y^2) - (3y^2 - x^3)$?

(A) $2y^2$

(A)

(B) $-2y^2$

(B)

(C) $2y^2 + 2x^3$

(C)

(D) $-2y^2 + 2x^3$

(D)

IV

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Section 2, Module 2: Math

Annotate

13

Mark for Review

A company produces and sells widgets at a rate of \$10 per widget. However, the company needs to rent out a warehouse to make the product which has a fixed cost of \$200. Let P represent the profit in dollars and w represent the number of widgets sold. Which equation correctly models the relationship between P and w ?

(A) $P = 10w - 200$

(A)

(B) $P = 10w + 200$

(B)

(C) $P = 200w - 10$

(C)

(D) $P = 200w + 10$

(D)

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Section 2, Module 2: Math

Annotate

12

Mark for Review

Jonathan keeps track of his record for how many times he scores during each football practice. The record for the latest 10 games are,

7, 2, 0, 3, 2, 1, 0, 2, 3, 2

By analyzing the mean, mode, and median, which of the value is the highest?

(A) Mean

(A)

(B) Mode

(B)

(C) Median

(C)

(D) All values are the same

(D)

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TEST QUBE

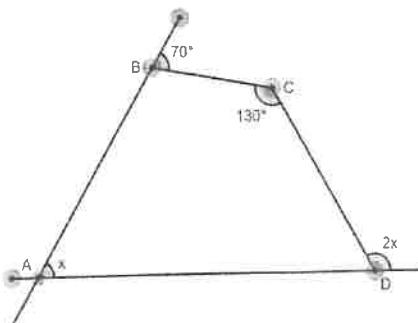
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14

Mark for Review

In the figure $ABCD$, find the value of x . (Ignore the degree sign)



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Section 2, Module 2: Math



15

Mark for Review

John is a plumber who is in charge of maintaining a water tank that supplies water to multiple villas. There is an annual checkup of the tank during which John drains all the water and then refills it. However, due to the high demand for water, the drainage pipe is left open while the tank is being filled. The pipe used for filling the tank can fill it in 4 hours, while the drainage pipe would take 6 hours to drain it completely. Assuming the tank starts off empty and both pipes are opened at the same time, how long, rounded to the nearest hour, will it take to fill the tank to its full capacity?

(A) 8 hours

(A)

(B) 10 hours

(B)

(C) 12 hours

(C)

(D) 24 hours

(D)

Section 2, Module 2: Math



16

Mark for Review

The formula to calculate the compound interest on an investment is given by $A = P(1 + r/n)^{nt}$ where A represents the final amount, P is the principal amount, r is the annual interest rate, n is the number of times interest is compounded per year, and t is the number of years. Rearrange the formula to express the annual interest rate, r , in terms of A , P , n , t .

(A) $r = n[(A/P)^{1/nt} - 1]$

(A)

(B) $r = n[(P/A)^{nt} - 1]$

(B)

(C) $r = n[(P/A)^{1/nt} - 1]$

(C)

(D) $r = n[(A/P)^{nt} + 1]$

(D)

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Section 2, Module 2: Math



17

Mark for Review

A circle with center $(3, -2)$ and radius of 5 is represented by the equation

$(x - 3)^2 + (y + 2)^2 = 25$. Which point lies on the circle?

(A) $(7, -2)$

(A)

(B) $(3, -8)$

(B)

(C) $(-2, 3)$

(C)

(D) $(8, -2)$

(D)

TESTQUBE

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Section 2, Module 2: Math



18

Mark for Review

A company conducted a survey to collect data on customer preferences regarding various products. The results are displayed in the table below. If a male customer is selected at random, what is the probability that his preferred product category is "Electronics"? Round your answer to the nearest hundredth.

Preferred Category	Male	Female	Total
Electronics	150	80	230
Clothing	120	90	210
Home Goods	70	60	130
Sports & Outdoor	50	70	120
Total	390	300	690

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Section 2, Module 2: Math



19

Mark for Review

The population of a town is modeled by the function $P(t) = 5000(1.03)^t$, where P represents the population and t represents the number of years since the start of the model. If the population is expected to reach 10,000, which of the following answer choice is the closest to the year this occurs?

(A) 15 years

(A)

(B) 20 years

(B)

(C) 25 years

(C)

(D) 30 years

(D)

TESTSQUARE

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Section 2, Module 2: Math



20

Mark for Review

A bookstore sells books at a 20% discount from the original price. During Thanksgiving, there is another 25% discount applied to the already discounted price. If a book's original price is \$100, what is the difference in price between buying the book during the regular discount and after the Thanksgiving sale?

(A) \$10

(A)

(B) \$15

(B)

(C) \$20

(C)

(D) \$60

(D)

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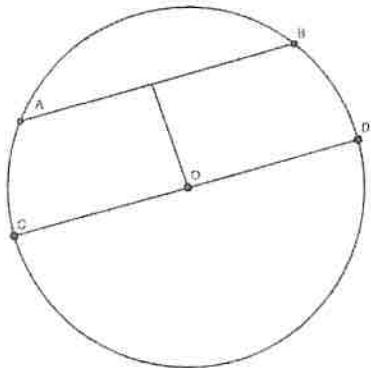


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Mark for Review

The figure below depicts a circle with center O . If chord AB is parallel to diameter CD , where AB measures 6 cm and CD measures 10 cm, what is the shortest distance between point O and chord AB ?



(A) 3cm

Ⓐ

(B) 4cm

Ⓑ

(C) 5cm

Ⓒ

(D) 6cm

Ⓓ

Section 2, Module 2: Math



⋮

22

Mark for Review

A rectangular prism has a volume of 990 cubic units. If the length, width, and height of the prism are consecutive positive integers, what is the sum of the length, width, and height?

(A) 29 units

Ⓐ

(B) 30 units

Ⓑ

(C) 31 units

Ⓒ

(D) 32 units

Ⓓ

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