



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

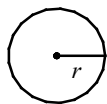
DIRECTIONS

For questions **1-15**, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16-20**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

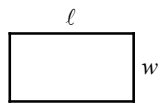
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- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

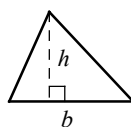


$$A = \pi r^2$$

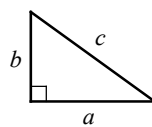
$$C = 2\pi r$$



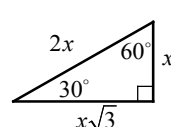
$$A = \ell w$$



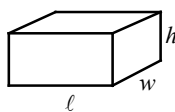
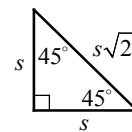
$$A = \frac{1}{2}bh$$



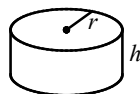
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



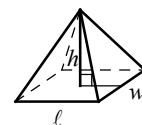
$$V = \pi r^2 h$$



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



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



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

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.

CONTINUE

1

x	-1	1	3	5
$f(x)$	9	3	-3	-9

The table above shows some values of the linear function f . Which of the following defines f ?

- A) $f(x) = 2x - 7$
- B) $f(x) = 3x + 6$
- C) $f(x) = -3x + 6$
- D) $f(x) = -2x + 7$

2

For which of the following ordered pairs (x, y) is $y > x - 4$ and $x + y < 5$?

- A) $(0, -5)$
- B) $(0, 2)$
- C) $(5, 3)$
- D) $(4, -2)$

3

Which of the following equations represents a line that is parallel to the line with the equation

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

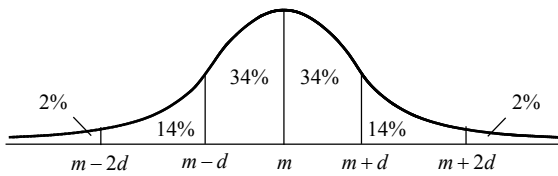
- A) $2x + 3y = 5$
- B) $3x + 2y = 9$
- C) $4x - 6y = 3$
- D) $4x + 6y = -8$

4

If $\frac{3^{(a+b)^2}}{3^{(a-b)^2}} = 343$, what is the value of ab ?

- A) $\frac{5}{4}$
- B) $\frac{3}{2}$
- C) $\frac{7}{4}$
- D) 2

5



The figure above shows a normal distribution with mean m and standard deviation d , including approximate percents of the distribution corresponding to the six regions shown.

The mean value of 500 homes in a county is \$225,000 and the standard deviation is \$25,000.

Approximately how many of the homes in the county are between \$175,000 and \$225,000?

- A) 310
- B) 340
- C) 380
- D) 410

6

If a number p increased by 120 percent equals a number q decreased by 20 percent, which of the following is true?

- A) $q = \frac{5}{2}p$
- B) $q = \frac{11}{4}p$
- C) $q = \frac{7}{2}p$
- D) $q = \frac{15}{4}p$

7

Kay purchased a total of 8 bags of Colombia Coffee and Roast Espresso. Each bag of Colombia Coffee costs \$25 and each bag of Roast Espresso costs \$35. If Kay paid \$230 for the coffee and espresso, solving which of the following systems of equations yields the number of bags of Colombia Coffee, c , and the number of bags of Roast Espresso, r ?

- A) $\begin{cases} c + r = 8 \\ 35c + 25r = 230 \end{cases}$
- B) $\begin{cases} c = r + 8 \\ 25c + 35r = 230 \end{cases}$
- C) $\begin{cases} c + r = \frac{230}{8} \\ 25c + 35r = 230 \end{cases}$
- D) $\begin{cases} c + r = 8 \\ 25c + 35r = 230 \end{cases}$

8

$$h(x) = -px^2 + 1$$

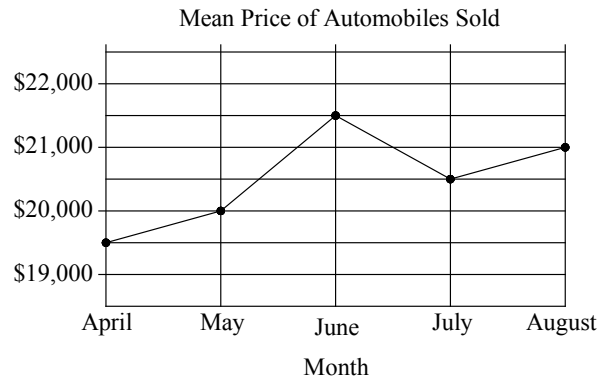
For the function h defined above, p is a constant and $h(2) = -1$. What is the value of $h(p)$?

- A) $\frac{7}{8}$
- B) $-\frac{5}{4}$
- C) $\frac{5}{4}$
- D) $-\frac{7}{8}$

Questions 9-11 refer to the following information.

AUTOMOBILES SOLD AT MAX CAR DEALER, APRIL-AUGUST

Number of Automobiles Sold	
Month	Number
April	275
May	395
June	405
July	338
August	262



9

Which of the following is closest to the mean of the prices of the 670 automobiles sold in April and May?

- A) \$19,600
- B) \$19,700
- C) \$19,800
- D) \$19,900

10

What is the percent increase of the mean price of automobiles sold from May to June?

- A) 7%
- B) 7.5%
- C) 8%
- D) 8.5%

11

Max Car Dealer collected a tax equal to 8 percent of the price of each automobile sold in August. Approximately how much did Max Car Dealer collect in taxes from all automobiles sold in August?

- A) \$42,000
- B) \$44,000
- C) \$420,000
- D) \$440,000

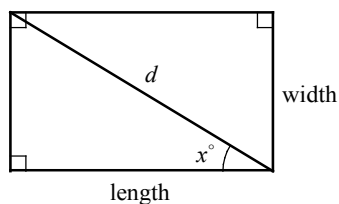
12

$$\frac{3 - i\sqrt{3}}{1 - i\sqrt{3}}$$

If the expression above is rewritten in the form $a + bi$, in which a and b are real numbers, what is the value of b ?

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

13



The figure above shows a rectangle with a diagonal of length d . Which of the following equations represents the area of the rectangle?

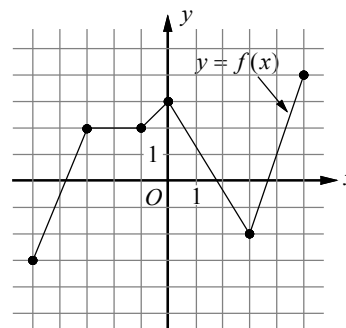
- A) $d^2 \cos^2 x^\circ$
 B) $d \sin^2 x^\circ$
 C) $d^2 \cos x^\circ \cdot \sin x^\circ$
 D) $d \cos x^\circ \cdot \sin x^\circ$

14

Which of the following is equivalent to $\frac{7^x \cdot x^7}{7^7 \cdot x^x}$?

- A) 1
 B) $(x-7)^x$
 C) $\left(\frac{x}{7}\right)^{x-7}$
 D) $\left(\frac{7}{x}\right)^{x-7}$

15



The complete graph of function f is shown in the xy -plane above, for $-5 \leq x \leq 5$. Which of the following are true?

- I. f is strictly increasing then strictly decreasing for $-1 < x < 3$.
 II. $f\left(-\frac{3}{2}\right) = 2$
 III. f is maximum at $x = 0$.
- A) I only
 B) I and II only
 C) II and III only
 D) I, II, and III



DIRECTIONS

For questions 16-20, solve the problem and enter your answer in the grid as described below, on the answer sheet.

1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.

5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or $7/2$. (If $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \circ & \circ & \bullet & \circ \\ \hline \end{array}$ is entered into the grid, it will be interpreted as $\frac{31}{2}$ not $3\frac{1}{2}$.)

6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write answer → in boxes.

Grid in result.

Answer: $\frac{5}{12}$

5	/	1	2
○	○	○	○
○	○	○	○
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Answer: 3.25

3	.	2	5
○	○	○	○
○	○	○	○
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Decimal point

Acceptable ways to grid $\frac{2}{3}$ are:

	2	/	3
○	○	○	○
○	○	○	○
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

.	6	6	6
○	○	○	○
○	○	○	○
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

.	6	6	7
○	○	○	○
○	○	○	○
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7

Answer: 212 - either position is correct.

	2	1	2
○	○	○	○
○	○	○	○
0	0	0	0
1	1	1	1
2	2	2	2

2	1	2	
○	○	○	○
○	○	○	○
0	0	0	0
1	1	1	1
2	2	2	2

NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

16

What is the value of $9 - n$
if $n - 9 = -n + 16 - 3n$?

17

If $\frac{(3ab^2)(2a^2b)^3}{8a^2b^2} = 3a^m b^n$, what is the value of $m + n$?

18

$$\begin{aligned} 3x + 2y &= 24 \\ -2x + 3y &= 10 \end{aligned}$$

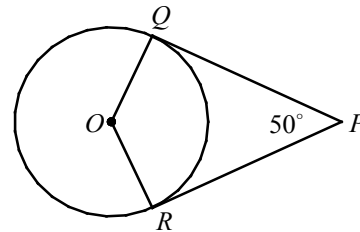
If (x, y) is solution to the system of equations above, what is the value of $x + y$?

19

x	$f(x)$	$g(x)$
-1	-3	-2
2	3	1
3	5	6

The table above gives values of f and g at selected values of x . What is the value of $g(f(2))$?

20



In the figure above, point O is the center of the circle, and line segments PQ and PR are tangent to the circle at points Q and R , respectively. If the radius of the circle is $\frac{9}{\pi}$, what is the length of the minor arc \widehat{QR} ?

No Test Material On This Page



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

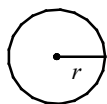
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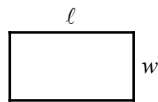
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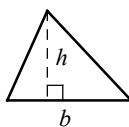


$$A = \pi r^2$$

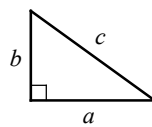
$$C = 2\pi r$$



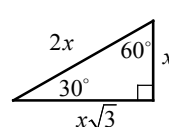
$$A = \ell w$$



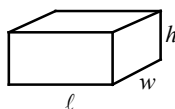
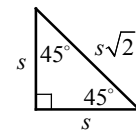
$$A = \frac{1}{2}bh$$



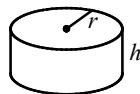
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



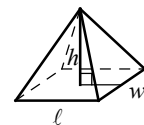
$$V = \pi r^2 h$$



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



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



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

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.

CONTINUE

1

Half the difference of 18 and a number n is equal to the sum of n and three. What is the value of n ?

- A) $\frac{5}{2}$
- B) 4
- C) $\frac{11}{2}$
- D) 6

2

If $0.14x = 2.8$, what is the value of $\frac{1}{x}$?

- A) 0.2
- B) 0.5
- C) 0.02
- D) 0.05

3

$$11 + 5x = kx - 3(x - 4)$$

If the linear equation above has no solution, which of the following could be the value of k ?

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

4

If $f(2 - x) = 3x - 5$ for all values of x , what is the value of $f(-3)$?

- A) -14
- B) -2
- C) 10
- D) 14

5

The line of a graph in the xy -plane has slope $\frac{1}{3}$ and contains the point $(6, -1)$. The graph of a second line passes through the points $(0, 1)$ and $(1, 0)$. If the two lines intersect at the point (p, q) , what is the value of $p \cdot q$?

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

6

Which of the following numbers is NOT a solution to the inequality $2 - \frac{1}{2}x \leq 2x + 7$?

- A) -2.5
- B) -0.5
- C) 0.5
- D) 2.5

7

During a basketball game, the Lancers scored 15 points in the first quarter, $\frac{2}{7}$ of their total score in the second quarter, $\frac{1}{4}$ of their total score in the third quarter, and the remaining 11 points in the fourth quarter. What is the total number of points the Lancers scored in the game?

- A) 48
- B) 53
- C) 56
- D) 60

8

	Distance from Burbank (miles)
Helicopter	$-150t + 260$
Plane	$-270t + 440$

The expressions in the table above show the distance from Burbank to a helicopter and a plane t hours after 10:00 AM. At what time will the helicopter and the plane be equidistant from Burbank?

- A) 11:00 AM
- B) 11:15 AM
- C) 11:30 AM
- D) 11:45 AM

Questions 9 and 10 refer to the following information.

A skier starts a downhill race course that is 1,800 meters long, and the finish line is 360 meters below the start line. During the race, the skier averaged a speed of 9 meters per second.

9

Which of the following expressions gives the skier's elevation above the finish line t seconds after she started the race?

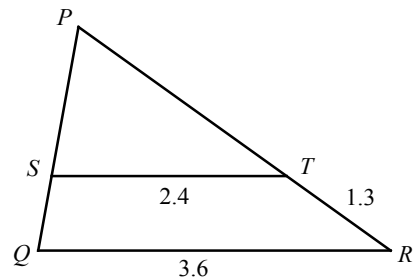
- A) $360 - 0.2t$
- B) $360 - 1.8t$
- C) $360 - 4.5t$
- D) $360 - 9t$

10

How far is the skier from the finish line one minute after she started the race?

- A) 540 meters
- B) 780 meters
- C) 1,020 meters
- D) 1,260 meters

11



In the figure above, segments ST and QR are parallel. What is the length of \overline{PT} ?

- A) 2.6
- B) 3.0
- C) 3.4
- D) 3.8

12

At a certain concert, all tickets are equally priced. A survey showed that decreasing the price of these tickets by 10 percent would increase the number of tickets sold by 20 percent. If each concert ticket is discounted by 10 percent, what is the percent increase in the amount of money received from the sale of tickets?

- A) 8%
- B) 10%
- C) 12%
- D) 15%

13

$$\begin{aligned}x - y &= 5 \\ y &= (3x + 1)(x - 2)\end{aligned}$$

How many ordered pairs (x, y) satisfy the system of equations shown above?

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

14

In the xy -plane, the graph of function f has x -intercepts at -3 , 0 , and 6 . Which of the following could define f ?

- A) $f(x) = 2x^3 + 8x^2 - 24x$
- B) $f(x) = 2x^3 - 8x^2 - 24x$
- C) $f(x) = 2x^3 + 6x^2 - 36x$
- D) $f(x) = 2x^3 - 6x^2 - 36x$

15

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

If (x, y) is a solution to the equation above and $y \neq 0$, what is the ratio $\frac{x}{y}$?

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

16

Grape juice makes up 12% of brand A fruit punch and 20% of brand B fruit punch. If 10 ounces of brand A fruit punch are mixed with 15 ounces of brand B fruit punch, what percent of the mixed punch is the grape juice?

- A) 14.2%
- B) 15.4%
- C) 16.8%
- D) 20.6%

Questions 17 and 18 refer to the following information.

Metal	Density of materials ($\frac{\text{g}}{\text{cm}^3}$)
aluminum	2.7
copper	9.0
gold	19.3
iron	7.9
mercury	13.6
silver	10.5

The chart above shows approximations of the density of metals, d , in grams per cubic centimeters ($\frac{\text{g}}{\text{cm}^3}$) for six metals. The mass of an object can be found by using the formula $m = d \cdot V$, in which m is the mass of a metal measured in grams and V is the volume of a metal measured in cm^3 .

17

What is the volume, in cubic centimeters, of an aluminum with a mass of 5.4 kilograms?
(1 kilogram=1,000 grams)

- A) 1,450
- B) 2,000
- C) 14,500
- D) 20,000

18

Which of the following metals with 630 grams of mass has approximately the same volume as gold with a mass of 1350 grams?

- A) 630 grams of mercury
- B) 630 grams of silver
- C) 630 grams of copper
- D) 630 grams of iron

19

A weather balloon was launched for weather forecast. At an elevation of 1,000 meters above the sea level, the outside temperature recorded 12°C . As the balloon went up, the outside temperature decreased linearly. At an elevation of 1,500 meters above the sea level, outside temperature recorded 8.6°C . If the temperature decreased at a constant rate as the balloon went up, which of the following models best describes temperature C at an elevation h meters above the sea level?

- A) $C = -0.0136h + 25.6$
- B) $C = -0.0272h + 15.2$
- C) $C = -0.0068h + 18.8$
- D) $C = -0.0034h + 15.4$

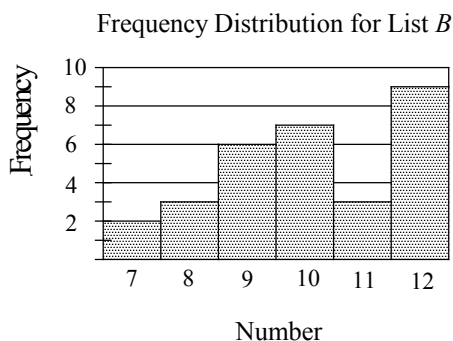
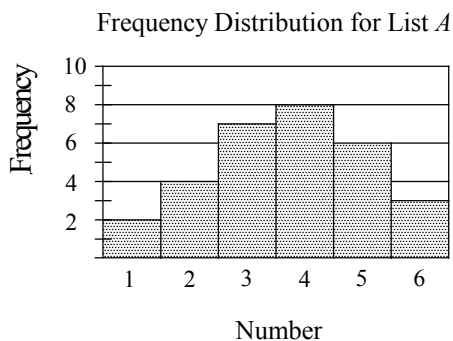
20

In a right triangle, one angle measures x° , for which $\cos x^\circ = \frac{\sqrt{7}}{4}$. What is $\cos(90^\circ - x^\circ)$?

- A) $\frac{\sqrt{3}}{4}$
- B) $\frac{1}{2}$
- C) $\frac{\sqrt{7}}{4}$
- D) $\frac{3}{4}$

Questions 21 and 22 refer to the following information.

List A and List B each contains 30 numbers. Frequency distributions for each list are recorded in the histograms below.



The average (arithmetic mean) of the numbers in list A is 3.7, and the average of the numbers in list B is 10.1. List C contains 60 numbers: the 30 numbers of list A and the 30 numbers of list B .

21

Let M be the average and m be the median of the 60 numbers in list C . Which of the following relationships between M and m must be true?

- A) $M > m$
- B) $M < m$
- C) $M = m$
- D) The relationships between M and m cannot be determined.

22

Which of the following is true about the two lists shown for the 30 numbers?

- A) The standard deviation of the numbers in list A is larger.
- B) The standard deviation of the numbers in list B is larger.
- C) The standard deviation of the numbers in list A is the same as that of list B .
- D) The standard deviation of the numbers in the two lists cannot be determined.

23

$$y = 2(x - a)(x - b)$$

In the quadratic equation above, a and b are positive constants, with $a > b$. If the graph of the equation in the xy -plane is a parabola with vertex $(6, -18)$, what is the value of a ?

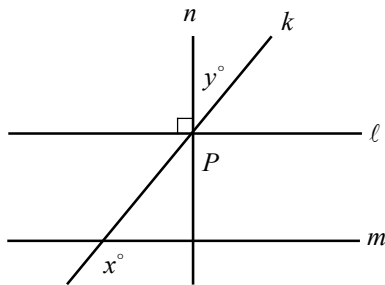
- A) 3
- B) 6
- C) 9
- D) 12

24

If an event can succeed in S ways and fail in F ways, the probability of success P is given as $P = \frac{S}{S+F}$. Which of the following expresses S in terms of the other variables?

- A) $S = \frac{F}{P-1}$
- B) $S = \frac{F}{1-P}$
- C) $S = \frac{PF}{P-1}$
- D) $S = \frac{PF}{1-P}$

25

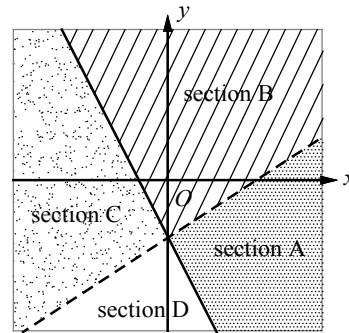


In the figure above, lines k , ℓ , and n intersect at point P . If $\ell \parallel m$ and $\ell \perp n$, which of the following is true?

- A) $x = 2y$
- B) $x - y = 90$
- C) $x + y = 90$
- D) $180 - x = y$

26

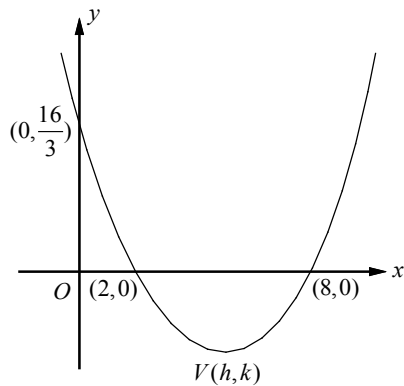
$$\begin{cases} 2x + y \geq -1 \\ 2x - 3y < 3 \end{cases}$$



A system of inequalities and a graph are shown above. Which section or sections of the graph could represent all of the solutions to the system?

- A) Section A
- B) Section B
- C) Section C
- D) Section D

27



The xy -plane above shows two x -intercepts, a y -intercept, and vertex V of a parabola. Which of the following must be the coordinates of the vertex of the parabola?

- A) $V(5, -3)$
- B) $V(5, -\frac{10}{3})$
- C) $V(5, -\frac{8}{3})$
- D) $V(5, -2)$

28

	Ratings			Total
	1	2	3	
Group A	10	21	29	60
Group B	5	28	27	60
Total	15	49	56	120

The table above shows the number of people in two groups who rated a bestseller on a scale of 1 to 3.

If a person is chosen at random from those who gave a rating of at least 2, what is the probability that the person belongs to Group B?

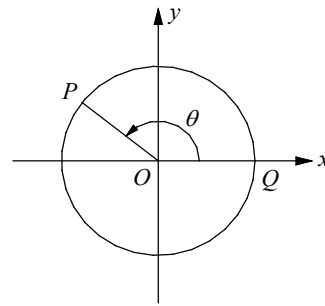
- A) $\frac{49}{105}$
- B) $\frac{50}{105}$
- C) $\frac{55}{105}$
- D) $\frac{56}{105}$

29

Printer A , working alone at a constant rate, prints 100 pages of documents in m minutes. Printer B , working alone at a constant rate, prints 100 pages of documents in n minutes. If printers A and B , working together at their respective constant rates, printed p pages of documents in 1 hour, which of the following equations describes p in terms of m and n ?

- A) $\left(\frac{m}{100} + \frac{n}{100}\right)\frac{1}{60} = p$
- B) $(100m + 100n)\frac{1}{60} = p$
- C) $(100m + 100n)60 = p$
- D) $\left(\frac{100}{m} + \frac{100}{n}\right)60 = p$

30



In the xy -plane above, O is the center of the circle, and the measure of $\angle POQ$ is θ . If

$\sin \theta = \frac{a}{r}$, what is $\sin(2\pi - \theta)$?

- A) $\frac{\sqrt{r^2 - a^2}}{r}$
- B) $-\frac{\sqrt{r^2 - a^2}}{r}$
- C) $-\frac{a}{r}$
- D) $\frac{a}{r}$

31

What is the value of r if the line that passes through $(-5, 4)$ and $(3, r)$ has a slope of $-\frac{1}{5}$?

32

At a farmers market, n pounds of avocados cost \$4.50. If Gloria paid $4n$ dollars for 8 pounds of avocados, what is the value of n ?

33

$$ax - 9y = 7$$

$$bx - 4y = 5$$

In the system of equations above, a and b are constants and x and y are variables. If the system of equations above has no solution, what is the value of $\frac{a}{b}$?

34

In a book store, hardcover copies of a certain book are priced at \$24 each and paperback copies of the same book are priced at \$13.50 each. Last week, the total amount collected in the sales of the hardcover and paperback copies was the same as if every book sold had cost \$15.60 each. If 300 hard cover copies were sold, what was the total number of the books sold last week?

35

If $(ax-1)(bx+2) = cx^2 - x - 2$ for all values of x , and $a+b=10$, what is the value of c ?

36

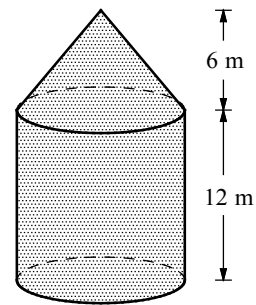
The purchase price of a car is \$24,000, and the value of the car decreases by 15 percent per year. The value V , in dollars, t years after the car is purchased is given by the function $V = 24,000(x)^t$. What is the value, in dollars, of the car 10 years after it is purchased? (Round your answer to the nearest dollar and ignore the dollar sign when gridding your answer.)

37

$$x^2(x+2) = x^2 + 8x + 12$$

If $x > 0$, what is the solution to the equation above?

38



A grain silo of a barn consists of a right circular cylinder capped by a right circular cone. The heights of the cylinder and cone are represented by the figure above. If the volume of the grain silo is 224π cubic meters, what is the diameter of the silo, in meters?

Answer Key

SAT Practice Test 2 – No Calculator

- | | | | | |
|-------|-------|--------|-------|---------|
| 1. C | 2. B | 3. C | 4. A | 5. D |
| 6. B | 7. D | 8. A | 9. C | 10. B |
| 11. D | 12. B | 13. C | 14. D | 15. B |
| 16. 4 | 17. 8 | 18. 10 | 19. 6 | 20. 6.5 |

SAT Practice Test 2 – Calculator

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. B | 2. D | 3. D | 4. C | 5. A |
| 6. A | 7. C | 8. C | 9. B | 10. D |
| 11. A | 12. A | 13. B | 14. D | 15. D |
| 16. C | 17. B | 18. C | 19. C | 20. D |
| 21. A | 22. B | 23. C | 24. D | 25. B |
| 26. B | 27. A | 28. C | 29. D | 30. C |
31. $\frac{12}{5}$ or 2.4 32. 3 33. $\frac{9}{4}$ or 2.25 34. 1500
35. 21 36. 4725 37. 3 38. 8

Answers and Explanations

SAT Practice Test 2 – No Calculator

1. C

Pick two points from the table to find the slope of f . Let's use $(-1, 9)$ and $(1, 3)$.

$$\text{Slope} = \frac{3-9}{1-(-1)} = -3$$

Only choice C has a line with slope -3 .

2. B

Check each answer choice to find if the ordered pairs satisfy the given inequalities, $y > x - 4$ and $x + y < 5$.

A) $(0, -5)$ If $x = 0$ and $y = -5$,
 $-5 > 0 - 4$ is not true
 Discard choice A.

B) $(0, 2)$ If $x = 0$ and $y = 2$,
 $2 > 0 - 4$ is true
 $0 + 2 < 5$ is also true.

Since $(0, 2)$ satisfy both inequalities, choice B is correct.

3. C

The slope of the line $y = \frac{2}{3}x + 2$ is $\frac{2}{3}$.

The equation in each answer choice is written in standard form. Change the equations in each answer choice to slope-intercept form.

A) $2x + 3y = 5 \Rightarrow y = -\frac{2}{3}x + \frac{5}{3}$

B) $3x + 2y = 9 \Rightarrow y = -\frac{3}{2}x + \frac{9}{2}$

C) $4x - 6y = 3 \Rightarrow y = \frac{2}{3}x - \frac{1}{2}$

The equation in choice C has slope $\frac{2}{3}$.

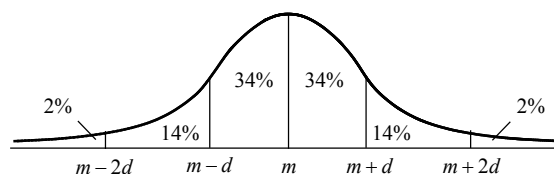
4. A

$$\begin{aligned} & \frac{3^{(a+b)^2}}{3^{(a-b)^2}} \\ &= 3^{(a+b)^2 - (a-b)^2} && \frac{a^m}{a^n} = a^{m-n} \\ &= 3^{(a^2+2ab+b^2) - (a^2-2ab+b^2)} && \text{FOIL} \\ &= 3^{4ab} && \text{Simplify.} \end{aligned}$$

Therefore, $\frac{3^{(a+b)^2}}{3^{(a-b)^2}} = 3^{4ab} = 243$. Since $243 = 3^5$,

we can conclude $4ab = 5$, so $ab = \frac{5}{4}$.

5. D



The mean value of 500 homes in a county is \$225,000 and the standard deviation is \$25,000.

Since $m = \$225,000$ and $d = 25,000$,
 $m - d = \$225,000 - \$25,000 = \$200,000$,
 $m - 2d = \$225,000 - 2 \times \$25,000 = \$175,000$,
 and $m + d = \$225,000 + \$25,000 = \$250,000$.

Reading the graph, $14\% + 34\% + 34\%$, or 82% , of the 500 homes are priced between \$175,000 ($= m - 2d$) and \$225,000 ($= m + d$). Therefore, there are 0.82×500 , or 410 homes.

6. B

A number p increased by 120 percent is
 $p + 1.2p = 2.2p$.

A number q decreased by 20 percent is
 $q - 0.2q = 0.8q$.

Therefore, $2.2p = 0.8q$. Solving the equation

$$\text{for } q \text{ yields, } q = \frac{2.2}{0.8}p = \frac{22}{8}p = \frac{11}{4}p.$$

7. D

Since the total number of bags is 8, $c + r = 8$.
 Each bag of Columbia Coffee costs \$25. So
 $25 \times c$ is the total cost for Columbia Coffee.
 Each bag of Roast Espresso costs \$35. So $35 \times r$
 is the total cost for Roast Espresso. If Kay paid
 \$230 for the coffee and espresso, the equation
 $25 \times c + 35 \times r = 230$ is true.

Choice D is correct.

8. A

$$h(x) = -px^2 + 1$$

$$h(2) = -p(2)^2 + 1 = -1 \quad h(2) = -1$$

$$-4p + 1 = -1 \quad \text{Simplify.}$$

$$-4p = -2 \Rightarrow p = \frac{1}{2}$$

$$\text{Therefore, } h(x) = -\frac{1}{2}x^2 + 1.$$

$$\text{Since } p = \frac{1}{2}, h(p) = h\left(\frac{1}{2}\right) = -\frac{1}{2}\left(\frac{1}{2}\right)^2 + 1 = \frac{7}{8}.$$

9. C

The mean of the prices of the 670 automobiles
 sold in April and May is

$$\frac{275 \times \$19,500 + 395 \times \$20,000}{275 + 395}$$

$$= \frac{\$13,262,500}{670} \approx \$19,794.78.$$

The average is closest to \$19,800.

Choice C is correct.

10. B

Percent increase of the mean price of automobiles
 sold from May to June is

$$\frac{\text{amount of increase}}{\text{price in May}} = \frac{21,500 - 20,000}{20,000}$$

$$= \frac{1500}{20,000} = 0.075 = 7.5\%$$

11. D

Total amount collected from the automobile sales
 in August is $262 \times \$21,000 = \$5,502,000$.

The tax is 8 percent of \$5,502,000, which is
 $0.08 \times \$5,502,000$, or \$440,160.

Choice D is correct.

12. B

$$\frac{3 - i\sqrt{3}}{1 - i\sqrt{3}}$$

$$= \frac{(3 - i\sqrt{3})(1 + i\sqrt{3})}{(1 - i\sqrt{3})(1 + i\sqrt{3})} \quad \text{Rationalize the denominator.}$$

$$= \frac{3 + 3\sqrt{3}i - \sqrt{3}i - 3i^2}{1 - 3i^2} \quad \text{FOIL}$$

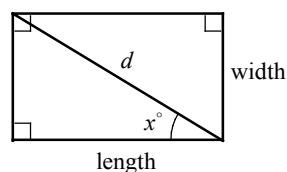
$$= \frac{3 + 2\sqrt{3}i + 3}{1 + 3} \quad \text{Simplify. } i^2 = -1$$

$$= \frac{6 + 2\sqrt{3}i}{4} \quad \text{Simplify.}$$

$$= \frac{3}{2} + \frac{\sqrt{3}}{2}i$$

$$\text{Therefore, } b = \frac{\sqrt{3}}{2}.$$

13. C



$$\cos x^\circ = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{\text{length}}{d}$$

$$\Rightarrow \text{length} = d \cos x^\circ$$

$$\sin x^\circ = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{\text{width}}{d}$$

$$\Rightarrow \text{width} = d \sin x^\circ$$

Area of rectangle

$$= \text{length} \times \text{width}$$

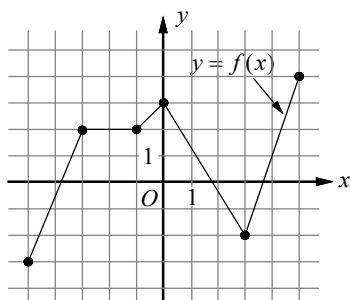
$$= d \cos x^\circ \times d \sin x^\circ = d^2 \cos x^\circ \sin x^\circ$$

14. D

$$\frac{7^x \cdot x^7}{7^7 \cdot x^x} = \frac{7^x}{7^7} \cdot \frac{x^7}{x^x} \quad \text{Rearrange.}$$

$$\begin{aligned}
 &= 7^{(x-7)} \cdot x^{(7-x)} & \frac{a^m}{a^n} &= a^{m-n} \\
 &= 7^{(x-7)} \cdot x^{-(x-7)} & 7-x &= -(x-7) \\
 &= 7^{(x-7)} \cdot \frac{1}{x^{(x-7)}} & a^{-m} &= \frac{1}{a^m} \\
 &= \frac{7^{(x-7)}}{x^{(x-7)}} & & \text{Simplify.} \\
 &= \left(\frac{7}{x}\right)^{(x-7)}
 \end{aligned}$$

15. B



I. A function f is increasing on an interval if the value of f increases as x increases on the interval. A function f is decreasing on an interval if the value of f decreases as x increases on the interval. A function f is not increasing or decreasing on an interval if the graph of f is a horizontal line. For $-1 < x < 0$, f is strictly increasing and for $0 < x < 3$, f is strictly decreasing. Therefore, f is strictly increasing then strictly decreasing for $-1 < x < 3$.

Statement I is true.

II. The value of f is 2 when the x -coordinate on the graph is $-\frac{3}{2}$. Therefore, $f(-\frac{3}{2}) = 2$.

Statement II is true.

III. The value of f at $x = 0$ is 3. The value of f at $x = 5$ is 5. Therefore, f is maximum at $x = 5$.

Statement III is not true.

16. 4

$$n - 9 = -n + 16 - 3n$$

$$\begin{aligned}
 n - 9 &= -4n + 16 && \text{Simplify.} \\
 5n - 9 &= 16 && \text{Add } 4n \text{ to each side.} \\
 5n &= 25 && \text{Add } 9 \text{ to each side.} \\
 n &= 5 && \text{Divide each side by } 5.
 \end{aligned}$$

Therefore, $9 - n = 9 - 5 = 4$.

17. 8

$$\begin{aligned}
 &\frac{(3ab^2)(2a^2b)^3}{8a^2b^2} \\
 &= \frac{(3ab^2)(8a^6b^3)}{8a^2b^2} && (a^m)^n = a^{m \cdot n} \\
 &= \frac{24a^7b^5}{8a^2b^2} && a^m \cdot a^n = a^{m+n} \\
 &= 3a^5b^3 && \frac{a^m}{a^n} = a^{m-n}
 \end{aligned}$$

If $3a^5b^3 = 3a^m b^n$, the $m = 5$ and $n = 3$. Therefore, $m + n = 5 + 3 = 8$.

18. 10

$$\begin{aligned}
 3x + 2y &= 24 && \text{1st equation} \\
 -2x + 3y &= 10 && \text{2nd equation}
 \end{aligned}$$

Multiply each side of the first equation by 2 and multiply each side of the second equation by 3. Then add the two equations.

$$\begin{aligned}
 2(3x + 2y = 24) &\Rightarrow 6x + 4y = 48 \\
 3(-2x + 3y = 10) &\Rightarrow + \underline{-6x + 9y = 30} \\
 &13y = 78
 \end{aligned}$$

Solving $13y = 78$ yields $y = 6$.

Substituting 6 for y in the equation

$$3x + 2y = 24 \text{ yields } 3x + 2(6) = 24.$$

Solving the equation for x gives $x = 4$.

So, $x + y = 4 + 6 = 10$.

19. 6

x	$f(x)$	$g(x)$
-1	-3	-2
2	3	1
3	5	6

Reading the table, when $x = 2$, $f(x) = 3$.

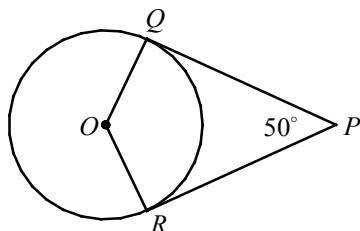
So, $f(2) = 3$.

$$g(f(2)) = g(3)$$

When $x = 3$, $g(x) = 6$

Therefore, $g(f(2)) = g(3) = 6$.

20.6.5



If a line is tangent to a circle, then the line is perpendicular to the radius at the point of tangency.

Thus, $\overline{PQ} \perp \overline{OQ}$ and $\overline{PR} \perp \overline{OR}$, or $m\angle PQO = 90$ and $m\angle PRO = 90$.

Since the sum of the measures of the interior angles of quadrilateral is 360,
 $m\angle P + m\angle PQO + m\angle QOR + m\angle PRO = 360$.

$$50 + 90 + m\angle QOR + 90 = 360 \quad \text{Substitution}$$

$$230 + m\angle QOR = 360 \quad \text{Simplify.}$$

$$m\angle QOR = 130$$

Length of the minor arc \widehat{QR}

$$= 2\pi r \times \frac{m\angle QOR}{360}$$

$$= 2\pi \left(\frac{9}{\pi}\right) \times \frac{130}{360} \quad r = \frac{9}{\pi}, m\angle QOR = 130$$

$$= 6.5$$

SAT Practice Test 2 – Calculator

1. B

$$\frac{1}{2} \underbrace{(18-n)}_{\substack{\text{the difference of} \\ 18 \text{ and a number}}} = \underbrace{n+3}_{\substack{\text{sum of the} \\ \text{number and 3}}}$$

$$2 \cdot \frac{1}{2}(18-n) = 2 \cdot (n+3) \quad \text{Multiply each side by 2.}$$

$$18-n = 2n+6 \quad \text{Distributive Property}$$

$$18-3n = 6 \quad \text{Subtract } 2n.$$

$$-3n = -12 \quad \text{Subtract 18.}$$

$$n = 4 \quad \text{Divide each side by } -3.$$

2. D

$$0.14x = 2.8$$

$$\frac{0.14x}{0.14} = \frac{2.8}{0.14} \quad \text{Divide each side by 0.14.}$$

$$x = 20 \quad \text{Simplify.}$$

$$\frac{1}{x} = \frac{1}{20} = 0.05$$

3. D

$$11 + 5x = kx - 3(x-4)$$

$$11 + 5x = kx - 3x + 12$$

$$11 + 5x - 11 = kx - 3x + 12 - 11$$

$$5x = kx - 3x + 1$$

$$5x - kx + 3x = kx - 3x + 1 - kx + 3x$$

$$8x - kx = 1$$

$$(8-k)x = 1$$

$$x = \frac{1}{8-k}$$

The equation is undefined if the denominator

of $x = \frac{1}{8-k}$ is equal to zero. Therefore, the

value of k for which the linear equation has no solution is 8.

4. C

First, solve the equation $2 - x = -3$.

Solving the equation gives $x = 5$.

So, $f(-3) = f(2-5) = 3(5) - 5 = 10$.

5. A

$$y = mx + b \quad \text{Slope-Intercept Form}$$

$$y = \frac{1}{3}x + b \quad m = \frac{1}{3}$$

$$-1 = \frac{1}{3}(6) + b \quad (6, -1) \text{ is on the graph.}$$

$$-3 = b$$

Thus equation of the line that has slope $\frac{1}{3}$ and

contains the point $(6, -1)$ is $y = \frac{1}{3}x - 3$.

The slope of the second line is $\frac{0-1}{1-0}$, or -1 .

The equation of the second line is

$$y - 1 = -1(x - 0), \text{ or } y = -x + 1.$$

Substitute $-x + 1$ for y in the equation

$$y = \frac{1}{3}x - 3.$$

$$-x + 1 = \frac{1}{3}x - 3 \Rightarrow 1 = \frac{4}{3}x - 3 \Rightarrow 4 = \frac{4}{3}x$$

$$\Rightarrow 3 = x$$

Substitute 3 for x in the equation $y = -x + 1$,

to solve for y . So, $y = -(3) + 1 = -2$.

The point of intersection is $(3, -2)$.

Therefore, $p = 3$ and $q = -2$, so

$$p \cdot q = 3 \times -2 = -6.$$

6. A

$$2 - \frac{1}{2}x \leq 2x + 7$$

$$2 - \frac{1}{2}x - 2x \leq 2x + 7 - 2x \quad \text{Subtract } 2x.$$

$$2 - \frac{5}{2}x \leq 7 \quad \text{Simplify.}$$

$$2 - \frac{5}{2}x - 2 \leq 7 - 2 \quad \text{Subtract } 2.$$

$$-\frac{5}{2}x \leq 5 \quad \text{Simplify.}$$

$$-\frac{2}{5}(-\frac{5}{2}x) \geq -\frac{2}{5}(5) \quad \begin{array}{l} \text{Multiply each side by} \\ -\frac{2}{5} \text{ and change } \leq \text{ to } \geq. \end{array}$$

$$x \geq -2$$

Therefore, -2.5 is the only number in the answer choices which is not the solution to the inequality.

7. C

Let n = the total number of points the Lancers scored.

Adding all the points scored in the first quarter, second quarter, third quarter, and the fourth quarter, the total score must equal n .

$$n = 15 + \frac{2}{7}n + \frac{1}{4}n + 11$$

$$n = 26 + \frac{15}{28}n \quad \text{Simplify.}$$

$$n - \frac{15}{28}n = 26 + \frac{15}{28}n - \frac{15}{28}n \quad \text{Subtract } \frac{15}{28}n.$$

$$\frac{13}{28}n = 26 \quad \text{Simplify.}$$

$$n = 26 \cdot \frac{28}{13} \quad \text{Multiply each side by } \frac{28}{13}.$$

$$n = 56$$

8. C

If the helicopter and the plane is equidistant from Burbank, then $-150t + 260 = -270t + 440$.

$$\Rightarrow -150t + 260 + 270t = -270t + 440 + 270t$$

$$\Rightarrow 120t + 260 = 440$$

$$\Rightarrow 120t + 260 - 260 = 440 - 260$$

$$\Rightarrow 120t = 180$$

$$\Rightarrow t = 1.5$$

The helicopter and the plane will be equidistant from Burbank 1.5 hours after 10:00 AM, or at 11:30AM.

9. B

Since the skier's average speed is 9 meters per second, her distance from the start line will be $9t$ meters, t seconds after she started the race. Since the elevation drops 360 meters for 1800 meters along the slope, it follows that for $9t$ meters along the slope, the elevation drops

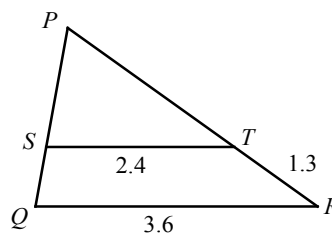
$$9t \times \frac{360}{1800}, \text{ or } 1.8t \text{ meters. Therefore, the skier's}$$

elevation above the finish line t seconds after she started the race is $360 - 1.8t$ meters.

10. D

Her speed is 9 meters per second. One minute, or 60 seconds after she started the race, her distance from the start line will be 9×60 , or 540 meters. Therefore, she is $1,800 - 540$, or 1,260 meters, from the finish line.

11. A



Since segments ST and QR are parallel, the following proportion is true.

$$\frac{PT}{ST} = \frac{PR}{QR}$$

Let $PT = x$, then $PR = PT + TR = x + 1.3$.

Substitute x for PT and $x + 1.3$ for PR , in the proportion.

$$\frac{x}{2.4} = \frac{x + 1.3}{3.6} \quad ST = 2.4 \text{ and } QR = 3.6$$

$$3.6x = 2.4(x + 1.3) \quad \text{Cross Products}$$

$$3.6x = 2.4x + 3.12 \quad \text{Distributive Property}$$

$$1.2x = 3.12 \quad \text{Subtract } 2.4x \text{ from each side.}$$

$$x = \frac{3.12}{1.2} = 2.6$$

Therefore, the length of \overline{PT} is 2.6.

12. A

Let n = the number of tickets sold at regular price. Let p = the regular price of the tickets. Then let np = the total amount received from the sale of tickets at regular price.

If the price of tickets decreases by 10%, the new price of the tickets will be $p - 0.1p$, or $0.9p$.

If the number of tickets sold increases by 20%, the new number sold will be $n + 0.2n$, or $1.2n$.

The amount of money received from the sale of tickets at the discounted price is

$$0.9p \times 1.2n = 1.08np.$$

The total amount is increased by 8 percent.

13. B

$$x - y = 5 \Rightarrow y = x - 5$$

Substitute $x - 5$ for y in the equation

$$y = (3x + 1)(x - 2).$$

$$x - 5 = (3x + 1)(x - 2) \quad \text{Substitution}$$

$$x - 5 = 3x^2 - 5x - 2 \quad \text{FOIL}$$

$$3x^2 - 6x + 3 = 0 \quad \text{Make one side 0.}$$

$$3(x^2 - 2x + 1) = 0 \quad \text{Factor.}$$

$$3(x - 1)^2 = 0 \quad \text{Factor.}$$

$$x - 1 = 0$$

$$x = 1$$

$$y = x - 5 = 1 - 5 = -4 \quad \text{Substitution}$$

The ordered pair $(1, -4)$ satisfies the system of equations. There is only one ordered pair that satisfies the given system of equations.

14. D

If a function f has x -intercepts at -3 , 0 , and 6 , then $(x + 3)$, x , and $(x - 6)$ must each be a factor of f . Therefore, $f(x)$ can be written as $f(x) = ax(x + 3)(x - 6)$, in which a is a constant.

$$f(x) = ax(x^2 - 3x - 18) \quad \text{FOIL}$$

$$f(x) = a(x^3 - 3x^2 - 18x) \quad \text{Distributive Property}$$

Since the leading coefficient is 2 in each answer choice, substitute 2 for a in the above polynomial equation.

$$f(x) = 2(x^3 - 3x^2 - 18x) \quad a = 2$$

$$f(x) = 2x^3 - 6x^2 - 36x \quad \text{Distributive Property}$$

Choice D is correct.

15. D

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

$$x - y + y = \frac{1}{2}y + y \quad \text{Add } y \text{ to each side.}$$

$$x = \frac{3}{2}y \quad \text{Simplify.}$$

$$\frac{x}{y} = \frac{\frac{3}{2}y}{y} \quad \text{Divide each side by } y.$$

$$\frac{x}{y} = \frac{3}{2} \quad \text{Simplify.}$$

16. C

Grape juice makes up 12% of brand A fruit punch and 20% of brand B fruit punch. Thus, 10 ounces of brand A fruit punch contain 0.12×10 , or 1.2 ounces of grape juice, and 15 ounces of brand B fruit punch contain 0.2×15 , or 3 ounces of grape juice. The percent of grape juice in the mixed punch is

$$\frac{\text{amount of grape juice}}{\text{total amount}} = \frac{1.2 + 3}{10 + 15} = 0.168.$$

There is 16.8% of grape juice in the mixed punch.

17. B

Metal	Density of materials ($\frac{\text{g}}{\text{cm}^3}$)
aluminum	2.7
copper	9.0
gold	19.3
iron	7.9
mercury	13.6
silver	10.5

The density of aluminum is 2.7 g/cm^3 .

$$m = d \cdot V$$

$$5400 = 2.7 \times V \quad m = 5.4 \text{ kg} = 5400 \text{ g}$$

$$\frac{5400}{2.7} = V$$

$$2,000 = V$$

18. C

$$m = d \cdot V \Rightarrow V = \frac{m}{d}$$

The density of gold is 19.3 g/cm^3 , so the volume of gold with a mass of 1350 grams is

$$V = \frac{m}{d} = \frac{1350}{19.3} \approx 69.9 \text{ cm}^3.$$

Check each answer choice to find which metal with 630 grams of mass has approximately the same volume as gold with a mass of 1350 grams.

A) 630 grams of mercury

$$V = \frac{m}{d} = \frac{630}{13.6} \approx 46.3 \text{ cm}^3$$

B) 630 grams of silver

$$V = \frac{m}{d} = \frac{630}{10.5} \approx 60 \text{ cm}^3$$

C) 630 grams of copper

$$V = \frac{m}{d} = \frac{630}{9.0} \approx 70 \text{ cm}^3$$

So, 630 grams of copper has approximately the same volume as gold with a mass of 1350 grams.

19. C

The slope of a line is the ratio of the change in one quantity to the change in another quantity. In this question, elevation is the independent variable and the temperature is the dependent variable. Thus the rate of change in temperature is

$$\begin{aligned} \text{is } \frac{\text{change in temperature}}{\text{change in elevation}} &= \frac{\text{change in } C}{\text{change in } h} \\ &= \frac{8.6 - 12}{1500 - 1000} = -0.0068 \text{ C/meters.} \end{aligned}$$

The point-slope form of the equation of the line that contains (1000,12) with slope -0.0068 is

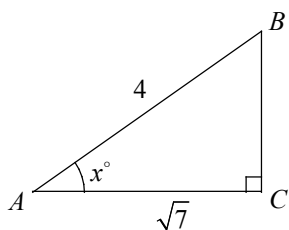
$$C - 12 = -0.0068(h - 1000).$$

$$C - 12 = -0.0068h + 6.8 \quad \text{Distributive Property}$$

$$C = -0.0068h + 18.8$$

20. D

In a right triangle, if $\cos x^\circ = \frac{\sqrt{7}}{4}$, the length of the hypotenuse is 4 and the side adjacent to the angle x° is $\sqrt{7}$. Sketch a right triangle with hypotenuse 4 and a side adjacent to the angle x° with length $\sqrt{7}$. Let A , B , and C be the three vertices of the triangle as shown in the figure below.



Pythagorean Theorem can be used to find the length of BC .

$$BC^2 + AC^2 = AB^2 \quad \text{Pythagorean Theorem}$$

$$BC^2 + (\sqrt{7})^2 = 4^2 \quad \text{Substitution}$$

$$BC^2 + 7 = 16$$

$$BC^2 = 9$$

$$BC = 3$$

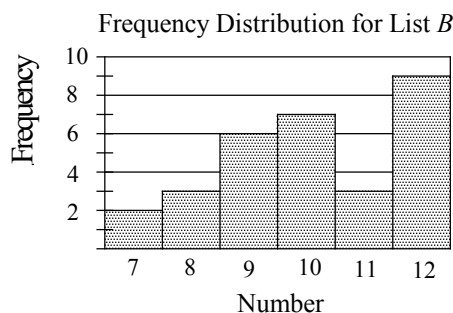
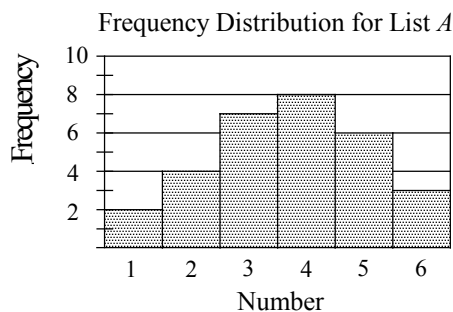
In a right triangle, the acute angles are complementary. Therefore, $m\angle A + m\angle B = 90$.

$$x + m\angle B = 90 \quad \text{Substitution}$$

$$m\angle B = 90 - x$$

$$\cos \angle B = \cos(90 - x)^\circ = \frac{BC}{AB} = \frac{3}{4}$$

21. A



Because list A and list B each contain the same number of values, 30 numbers each, the average of the numbers in list C is the average of the individual averages of the numbers in list A and list B . Thus, the average of the numbers in list C is

$$M = \frac{3.7 + 10.1}{2}, \text{ or } M = 6.9.$$

The median of 60 numbers in list C is the average of two middle numbers because there are even number of value in list C . The two middle numbers in list C are 6 and 7. The median is

$$m = \frac{6 + 7}{2}, \text{ or } m = 6.5. \text{ Thus, the average is greater than the median of the numbers.}$$

22. B

The standard deviation is a measure of how far the data set values are from the mean. In general, when the measures are clustered close to the mean the standard deviation is small, and when the measures are widely spread apart the standard deviation is relatively large. In list A , the data are closest to the mean. In list B , the data are more spread out, thus by observation, the standard deviation of the numbers in list B is larger.

23. C

$$y = 2(x - a)(x - b)$$

In the quadratic equation, the x -coordinate of the vertex is the average of two x -intercepts. The two x -intercepts of the given quadratic

equation are a and b . Thus, $6 = \frac{a + b}{2}$.

$$2(6) = 2\left(\frac{a + b}{2}\right) \quad \text{Multiply each side by 2.}$$

$$12 = a + b \quad \text{Simplify.}$$

$$12 - a = b \quad \text{Solve for } b.$$

Since the coordinate of the vertex is $(6, -18)$, you can substitute $x = 6$ and $y = -18$ in the given equation to find the value of a and b .

$$-18 = 2(6 - a)(6 - b) \quad x = 6 \text{ and } y = -18$$

$$-9 = (6 - a)(6 - b) \quad \text{Divide each side by 2.}$$

Substitute $12 - a$ for b in the equation above.

$$-9 = (6 - a)(6 - (12 - a)) \quad \text{Substitution}$$

$$-9 = (6 - a)(-6 + a) \quad \text{Simplify.}$$

$$-9 = -(6 - a)(6 - a) \quad -6 + a = -(6 - a)$$

$$9 = (6 - a)(6 - a) \quad \text{Divide each side by } -1.$$

$$9 = (6 - a)^2$$

$$\pm 3 = (6 - a) \quad \text{Square root each side.}$$

$$3 = 6 - a \text{ or } -3 = 6 - a$$

$$a = 3 \text{ or } a = 9$$

$$\text{If } a = 3, b = 12 - a = 12 - 3 = 9.$$

$$\text{If } a = 9, b = 12 - a = 12 - 9 = 3.$$

Since $a > b$, $a = 9$ and $b = 3$.

24. D

$$P = \frac{S}{S + F}$$

Multiply each side by $S + F$.

$$(S + F)P = (S + F)\frac{S}{S + F}$$

$$PS + PF = S \quad \text{Simplify.}$$

$$PS + PF - PS = S - PS \quad \text{Subtract } PS.$$

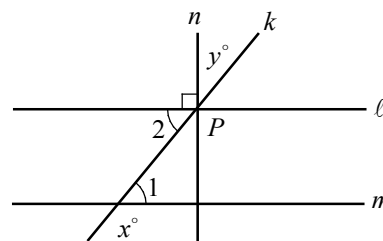
$$PF = S - PS \quad \text{Simplify.}$$

$$PF = S(1 - P) \quad \text{Factor.}$$

$$\frac{PF}{1 - P} = \frac{S(1 - P)}{1 - P} \quad \text{Divide each side by } 1 - P.$$

$$\frac{PF}{1 - P} = S \quad \text{Simplify.}$$

25. B



$$x + m\angle 1 = 180 \quad \text{Straight angle measures 180.}$$

$$m\angle 1 = 180 - x \quad \text{Subtract } x \text{ from each side.}$$

$$m\angle 1 = m\angle 2 \quad \text{If } \ell \parallel m, \text{ Alternate Interior Angles are equal in measure.}$$

$$m\angle 2 = 180 - x \quad \text{Substitution: } m\angle 1 = m\angle 2.$$

$$m\angle 2 + 90 + y = 180 \quad \text{Straight angle measures 180.}$$

$$180 - x + 90 + y = 180 \quad \text{Substitution: } m\angle 2 = 180 - x.$$

$$270 - x + y = 180 \quad \text{Simplify.}$$

$$-x + y = -90 \quad \text{Subtract 270 from each side.}$$

$$(-1)(-x + y) = (-1)(-90) \quad \text{Multiply each side by } -1.$$

$$x - y = 90 \quad \text{Simplify.}$$

26. B

$$2x + y \geq -1$$

$$2x - 3y < 3$$

Select a point from each section, then test them on the inequalities. Let's use $(3, 0)$, $(0, 3)$, $(-3, 0)$, and $(0, -3)$ from each section as test points.

$$2(3) + 0 \geq -1 \quad x = 3, y = 0 \text{ is true.}$$

$$2(3) - 3(0) < 3 \quad x = 3, y = 0 \text{ is false.}$$

$$2(0) + 3 \geq -1 \quad x = 0, y = 3 \text{ is true.}$$

$$2(0) - 3(3) < 3 \quad x = 0, y = 3 \text{ is true.}$$

Since $x = 0$ and $y = 3$ are true for both inequalities, section B represents all of the solutions to the system.

27. A

In the quadratic equation, the x -coordinate of the vertex is the average of two x -intercepts. The two x -intercepts of the given quadratic equation are 2 and 8. Thus, $h = \frac{2+8}{2} = 5$.

Since you know the x -coordinate of the vertex, write the equation of the parabola in vertex form, $y = a(x-h)^2 + k$.

$$y = a(x-5)^2 + k \quad h = 5$$

$$0 = a(2-5)^2 + k \quad (2,0) \text{ is on the graph.}$$

$$0 = 9a + k \quad \text{Simplify.}$$

$$\frac{16}{3} = a(0-5)^2 + k \quad (0, \frac{16}{3}) \text{ is on the graph.}$$

$$\frac{16}{3} = 25a + k \quad \text{Simplify.}$$

$$\frac{16}{3} = 25a + k$$

$$- \underline{0 = 9a + k} \quad \text{Subtract.}$$

$$\frac{16}{3} = 16a$$

$$\frac{1}{3} = a$$

Substitute $\frac{1}{3} = a$ in the equation $0 = 9a + k$.

$$0 = 9(\frac{1}{3}) + k \quad \frac{1}{3} = a$$

$$0 = 3 + k \quad \text{Simplify.}$$

$$-3 = k$$

Therefore, the coordinates of the vertex is $(5, -3)$.

28. C

There are $49 + 56$, or 105 people who gave at least 2 for the rating. Out of these $28 + 27$, or 55, people belonged to Group B .

Therefore, if a person is chosen at random from those who have given at least 2 for the rating, the probability that the person belongs to Group B

is $\frac{55}{105}$.

29. D

If printer A , working alone at a constant rate, prints 100 pages of documents in m minutes,

printer A prints $\frac{100}{m}$ pages in 1 minute.

If printer B , working alone at a constant rate, prints 100 pages of documents in n minutes

printer B prints $\frac{100}{n}$ pages in 1 minute.

In 1 hour, printers A and B working together will print $(\frac{100}{m} \cdot 60 + \frac{100}{n} \cdot 60)$ pages of document.

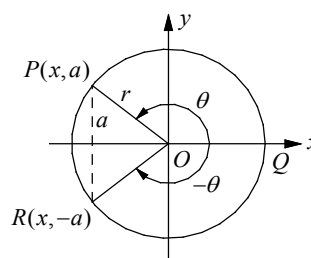
If printers A and B working together printed p pages of documents in 1 hour, then you can

set up the equation $(\frac{100}{m} \cdot 60 + \frac{100}{n} \cdot 60) = p$

$$\text{or } (\frac{100}{m} + \frac{100}{n})60 = p.$$

Choice D is correct.

30. C



Draw \overline{OR} so that $m\angle QOR = m\angle QOP = \theta$.

Since the measure of major arc QPR is $2\pi - \theta$, the measure of angle $\angle QOR$ in a circle can be expressed as $-\theta$ or $2\pi - \theta$. The sine of

angle θ in a circle, by definition, is $\sin \theta = \frac{y}{r}$.

Therefore, if $\sin \theta = \frac{a}{r}$, the y -coordinate of point

P must be a . If the y -coordinate of point P is a , then the y -coordinate of point R must be $-a$.

Thus, $\sin \angle QOR = \sin(2\pi - \theta) = \frac{-a}{r}$.

31. $\frac{12}{5}$ or 2.4

Use the slope formula.

$$\frac{1}{5} = \frac{r-4}{3-(-5)} \quad m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{1}{5} = \frac{r-4}{8} \quad \text{Simplify.}$$

$$5(r-4) = -8 \quad \text{Cross Products}$$

$$5r - 20 = -8 \quad \text{Distributive Property}$$

$$5r = 12 \quad \text{Add 20 to each side.}$$

$$r = \frac{12}{5}$$

32. 3

If n pounds of avocados cost \$4.50 and 8 pounds of avocados cost $4n$ dollars, you can set up the following proportion.

$$\frac{n \text{ pounds}}{4.5 \text{ dollars}} = \frac{8 \text{ pounds}}{4n \text{ dollars}}$$

$$n \times 4n = 4.5 \times 8 \quad \text{Cross Products}$$

$$4n^2 = 36 \quad \text{Simplify.}$$

$$n^2 = 9 \quad \text{Divide each side by 9.}$$

$$n = \pm\sqrt{9} = \pm 3 \quad \text{Square root each side.}$$

Since the number of pounds is positive, $n = 3$.

33. $\frac{9}{4}$ or 2.25

$$ax - 9y = 7 \quad \text{First equation}$$

$$bx - 4y = 5 \quad \text{Second equation}$$

$$y = \frac{a}{9}x - \frac{7}{9} \quad \text{1st equation in slope-intercept form}$$

$$y = \frac{b}{4}x - \frac{5}{4} \quad \text{2nd equation in slope-intercept form}$$

If two linear equations have the same slope and have different y -intercepts, then the system of equations have no solution.

Therefore, if $\frac{a}{9} = \frac{b}{4}$, the system of equations will have no solution.

$$4a = 9b \quad \text{Cross Products}$$

$$\frac{4a}{b} = \frac{9b}{b} \quad \text{Divide each side by } b.$$

$$4\frac{a}{b} = 9 \quad \text{Simplify.}$$

$$\frac{1}{4} \cdot 4\frac{a}{b} = \frac{1}{4} \cdot 9 \quad \text{Multiply each side by } \frac{1}{4}.$$

$$\frac{a}{b} = \frac{9}{4} \quad \text{Simplify.}$$

The value of $\frac{a}{b}$ is $\frac{9}{4}$.

34. 1500

Let x = the total number of books sold, then let $x - 300$ = the number of paperback copies sold. If every book sold had cost \$15.60 each, the dollar amount collected will be $15.6x$. The amount of dollars collected from the sale of 300 hardcover copies is 300×24 and the amount of dollars

collected from the sale of $x - 300$ paperback copies is $(x - 300) \times 13.5$ dollars.

If the total amount collected in the sales of the hardcover and paperback copies was the same as if every book sold had cost \$15.60 each, then you can set up the following equation.

$$300 \times 24 + (x - 300) \times 13.5 = 15.6x$$

$$7200 + 13.5x - 4050 = 15.6x \quad \text{Distributive Property}$$

$$3150 + 13.5x = 15.6x \quad \text{Simplify.}$$

$$3150 = 2.1x \quad \text{Subtract } 13.5x.$$

$$\frac{3150}{2.1} = \frac{2.1x}{2.1} \quad \text{Divide by } 2.1.$$

$$1500 = x$$

The total number of the books sold last week is 1,500.

35. 21

$$(ax - 1)(bx + 2) = cx^2 - x - 2$$

$$\Rightarrow abx^2 + (2a - b)x - 2 = cx^2 - x - 2$$

The coefficient of x^2 and the coefficient of x have to be equal on both sides of the equation to make the polynomial true.

Thus, $ab = c$ and $2a - b = -1$.

Add the given equations $a + b = 10$ and $2a - b = -1$.

$$\begin{array}{r} a + b = 10 \\ + \underline{2a - b = -1} \\ 3a = 9 \end{array}$$

Solving for a yields $a = 3$.

Substituting $a = 3$ in $a + b = 10$ gives $b = 7$.

Therefore, $c = ab = 3 \cdot 7 = 21$.

36. 4725

Since the value of the car decreases by 15% per year, the initial value of the car must be multiplied by a factor of $(1 - 0.15)$, or 0.85. If the value of the car is \$24,000 this year, it will be $\$24,000(0.85)$ one year later, $\$24,000(0.85)(0.85)$ two years later, $\$24,000(0.85)(0.85)(0.85)$ three years later, and so on. After ten years, the value of the car will be $V = 24,000(0.85)^{10} \approx 4724.98$.

To the nearest dollar, the value of the car will be 4725 dollars.

37.3

$$x^2(x+2) = x^2 + 8x + 12$$

$$x^2(x+2) = (x+2)(x+6) \quad \text{Factor.}$$

$$x^2(x+2) - (x+2)(x+6) = 0 \quad \text{Make one side 0.}$$

$$(x+2)(x^2 - (x+6)) = 0 \quad \text{Distributive Property}$$

$$(x+2)(x^2 - x - 6) = 0 \quad \text{Simplify.}$$

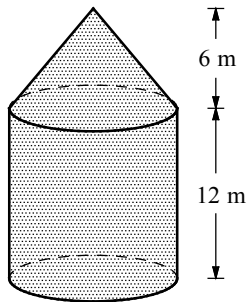
$$(x+2)(x+2)(x-3) = 0 \quad \text{Factor.}$$

$$(x+2)^2(x-3) = 0 \quad \text{Simplify.}$$

$$x = -2 \text{ or } x = 3 \quad \text{Zero Product Property}$$

Since $x > 0$, the solution to the equation is 3.

38.8



Let r be the radius of the circular cylinder and circular cone.

The volume of the grain silo is the sum of the volume of the cylinder and the volume of the cone. Since the volume of the grain silo is given as 224π

cubic meters, $V = \pi r^2(12) + \frac{1}{3}\pi r^2(6) = 224\pi$.

$$\pi(12r^2 + 2r^2) = 224\pi$$

$$12r^2 + 2r^2 = 224$$

$$14r^2 = 224$$

$$r^2 = \frac{224}{14} = 16$$

$$r = \pm\sqrt{16} = \pm 4$$

The radius of the silo is 4 meters, thus the diameter of the silo is 2×4 , or 8 meters.