

Math Booster SET 7

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All important questions for your SAT test! Your ultimate pathway toward perfect score on SAT math!

Question 1.

$$2B = -5 + \frac{11 + 6G}{3Q + 7}$$

The given equation relates the positive variables B , G , and Q . Which equation correctly expresses $3Q + 7$ in terms of B and G ?

- A) $3Q + 7 = \frac{2B}{11 + 6G} - 5$
- B) $3Q + 7 = \frac{11 + 6G}{2B + 5}$
- C) $3Q + 7 = \frac{2B}{11 + 6G} + 5$
- D) $3Q + 7 = \frac{2B + 5}{11 + 6G}$

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Question 2.

For the exponential function f , the table below shows several values of x and their corresponding values of $f(x)$, where a is a constant greater than 1. If k is a constant and $f(k) = a^{29+k}$, what is the value of k ?

x	$f(x)$
1	a
2	a^5
3	a^9

Question 3.

A regular polygon has 45 sides. If the measure of one exterior angle is $(180k)$ degrees, what is the value of k ?

Question 4.

Category	Frequency
In favor	91
Against	245
Undecided	164

A survey was conducted in a certain city to determine public thought about a new offered proposal. If the population of the city was 3.2 million, based on the survey, what percent of them was not against the proposal?

- A) 36
- B) 45
- C) 51
- D) 58

Question 5.

For a certain circuit, its power P (in watts), current C (in amperes), voltage V (in volts), and resistance R (in ohms) are related by the equation:

$$\frac{CV^2}{P} = \sqrt{PR}, \quad \text{where } P, C, V, \text{ and } R \text{ are}$$

When $R = 18$, which equation correctly expresses P in terms of C and V ?

Options:

A. $P = \frac{CV^2}{\sqrt{18P}}$

B. $P = \frac{CV^2}{\sqrt{18}}$

C. $P = \sqrt[3]{\frac{C^2V^4}{18}}$

D. $P = \sqrt[3]{\frac{18}{C^2V^4}}$

Question 6.

For the positive quantities h , j , and k , 94% of h is equivalent to 47% of j , and j is equivalent to 30% of k . What percentage of k is h ?

(Disregard the % sign when entering your answer. For example, if your answer is 39%, enter 39.)

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Question 7.

39. A small business owner budgets \$3,600 to purchase timber each year. The owner must purchase a minimum of 345 slats of timber each year to maintain the discounted pricing. If the owner pays \$7.25 to purchase each slat of pine pulpwood and \$24.75 to purchase each slat of pine sawtimber, what is the maximum number of slats of pine sawtimber the owner can purchase to stay within the budget and maintain the discounted pricing?

Question 8.

	Phone	Email
Dinner dance	55%	80%
Football game	20%	10%
Picnic	20%	5%
Pool party	5%	5%
Total	100%	100%

An alumni association survey asked each high school graduate to select the one activity he or she preferred for the association's next event. Some of the people responded by phone, and the others responded by email. The table above shows the distribution of preferred activity, in percent, for each response type used. For the survey, the number of email responses was twice the number of phone responses. If a person who preferred a picnic is selected at random, what is the probability that the person responded by email?

Question 9.

Year	Subscriptions sold
2012	5,600
2013	5,880

The manager of an online news service received the report above on the number of subscriptions sold by the service. The manager estimated that the percent increase from 2012 to 2013 would be double the percent increase from 2013 to 2014. How many subscriptions did the manager expect would be sold in 2014?

(A) 6,020

(B) 6,027

(C) 6,440

(D) 6,468

Question 10.

A rectangular area consists of 1,372 equal squares where each square has an area of k . If the width of the rectangular area is 1.75 times the length and the length is equal to $x\sqrt{k}$, what is the value of x ?

Question 11.

Which of the following expressions has a factor of $x + 2b$, where b is a positive integer constant?

(A) $3x^2 + 9x + 18b$

(B) $3x^2 + 24x + 18b$

(C) $3x^2 + 30x + 18b$

(D) $3x^2 + 39x + 18b$

Question 12.

Data set A: 10, 13, 25, 30, 42

Data set B: 42, 45, 57, 62, x

The given data sets A and B consist of 5 numbers. If the standard deviation of data set A is more than the standard deviation of B, which of the following could be a value of x ?

I. 55 II. 70 III. 82

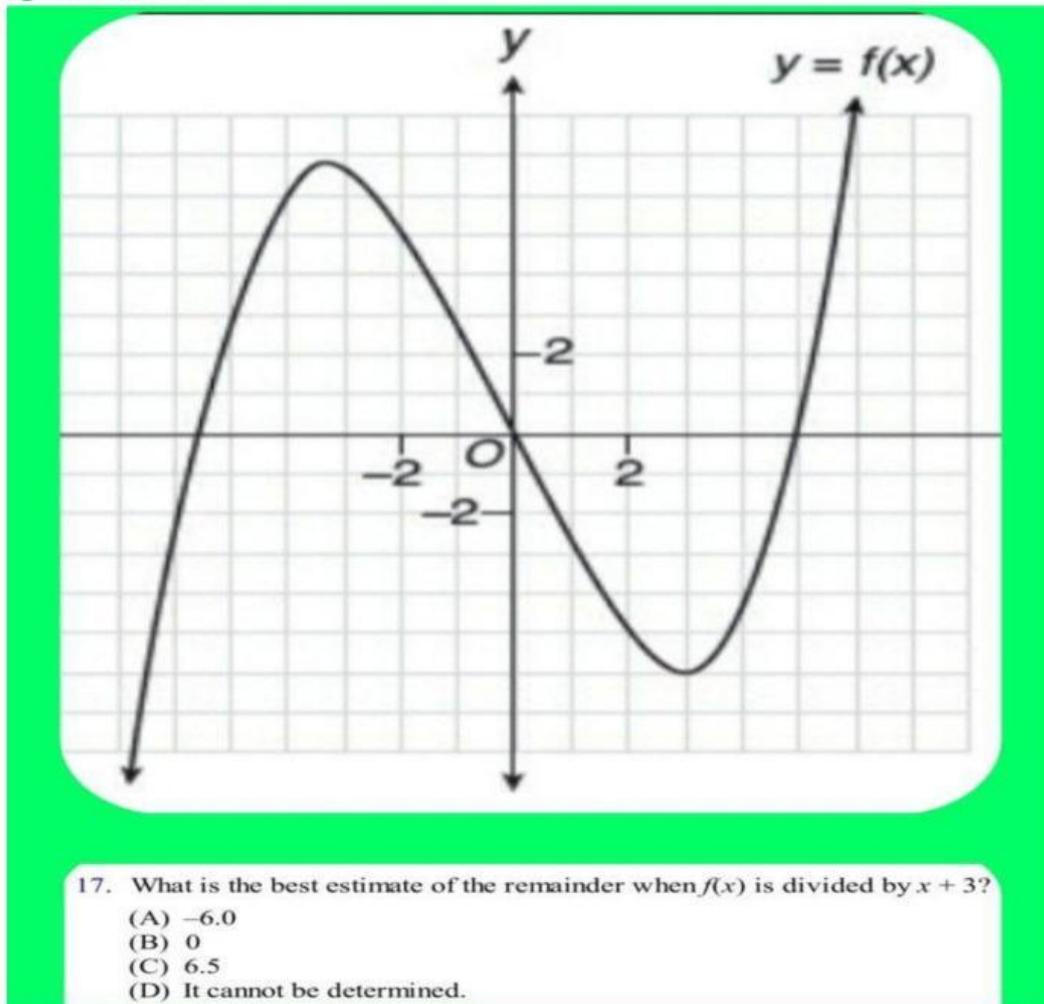
- A) Only I
 - B) I and II
 - C) I, II and III
 - D) II, III
-

Question 13.

Rhesus factor	Blood type			
	A	B	AB	O
+	33	9	3	37
-	7	2	1	x

Human blood can be classified into four common blood types—A, B, AB, and O. It is also characterized by the presence (+) or absence (-) of the rhesus factor. The table above shows the distribution of blood type and rhesus factor for a group of people. If one of these people who is rhesus negative (-) is chosen at random, the probability that the person has blood type B is $\frac{1}{9}$. What is the value of x ?

Question 14.



Question 15.

Questions 23 and 24 refer to the following information.

Oocytes are a type of cell that can be modeled as a sphere. The table shows the surface area, in square micrometers (μm^2), and volume, in cubic micrometers (μm^3), based on the average radius for oocytes at the same stage of development in four types of mammals.

(The surface area of a sphere with a radius of r is $4\pi r^2$, and the volume of a sphere with a radius of r is equal to

$$\frac{4}{3}\pi r^3.)$$

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Mammal	Surface area (μm^2)	Volume (μm^3)
Mouse	498.76	1,047.4
Hamster	1,720.2	6,708.8
Pig	2,660.3	12,903
Human	4,071.5	24,429

Based on the information in the table, what is the average radius, in micrometers, of a hamster oocyte?

- A) 68.4
- B) 20.7
- C) 14.2
- D) 11.7

Question 16.

Every athlete in a group of 60 female varsity athletes at Greenwich High School either runs track, plays soccer, or does both. If one-third of the athletes in this group who play on the soccer team also run on the track team, and one-half of the athletes in this group who run on the track team also play on the soccer team, which of the following statements must be true?

- A) This group contains 40 soccer players.
- B) This group contains 20 athletes who play soccer but do not run track.
- C) This group contains 20 athletes who play both track and soccer.
- D) The number of soccer players in this group is 15 greater than the number of track team members in this group.

Question 17.

For the exponential function f , the value of $f(3)$ is k , where k is a constant. Which of the following equivalent forms of the function f shows the value of k as the coefficient or the base?

- A) $f(x) = 3(4)(4)^{x+1}$
- B) $f(x) = 3,072(4)(4)^{x-4}$
- C) $f(x) = 12(4)(4)^x$
- D) $f(x) = 768(4)(4)^{x-3}$

Question 18.

In the expression below, a , b , and y are real numbers such that $0 < a, b < 90^\circ$:

$$3 \cos(90^\circ - a) \cdot \cos^2 b + \sin(a + y) \cdot \sin(90^\circ - b)$$

Given that $\sin a = 0.5$, $\cos b = 0.99$, and $y = 0$, find the value of the expression to **2 decimal places**.

Question 19.

A shipping service limits the size of boxes it will ship for a specific service. The rule is that for boxes shaped like rectangular prisms, the **sum of the perimeter of the base and the height** of the box must **not exceed 130 inches**.

The **perimeter of the base** is calculated using the **width** and **length** of the box.

If the **height** of the box is **60 inches** and the **length** is **2.5 times the width**, which of the following inequalities shows the possible values for the **width** x , in inches, that meet the requirement?

- A) $0 < x \leq 10$
- B) $0 < x \leq 11\frac{2}{3}$
- C) $0 < x \leq 17\frac{1}{2}$
- D) $0 < x \leq 20$

Question 20.

The expression $12x^2 + 41x + 35$ can be rewritten as $(4x + r)(3x + s)$, where r and s are integers, or as $(4x + t)(3x + v)$, where t and v are not integers. What is the value of $s + v$?

Answer Choices:

A. $\frac{41}{3}$

B. $\frac{41}{4}$

C. 12

D. 35

Question 21.

Adam's school is a 20-minute walk or a 5-minute bus ride away from his house. The bus runs once every 30 minutes, and the number of minutes, w , that Adam waits for the bus varies between 0 and 30. Which of the following inequalities gives the values of w for which it would be faster for Adam to walk to school?

Options:

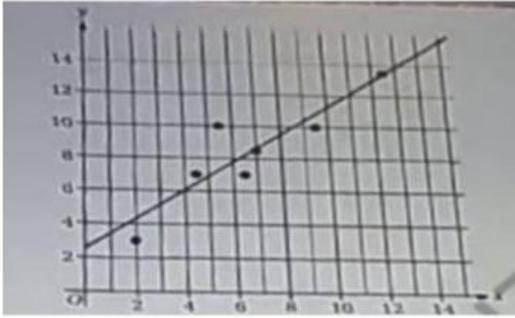
A) $w - 5 < 20$

B) $w - 5 > 20$

C) $w + 5 < 20$

D) $w + 5 > 20$

Question 22.



The scatterplot shows the relationship between two variables, x and y , for the 7 data points in data set W . A line of best fit for data set W is also shown. This line can be represented by an equation in the form $y = a + tx$, where a and t are constants. Data set V consists of all the data points in data set W as well as the point $(14, 8)$. A line of best fit for data set V can be represented by the equation $y = r + px$, where r and p are constants. Assuming the lines of best fit are calculated the same way, which of the following statements must be true?

- I. $t > p$
 - II. $a > r$
- (A) I only
 (B) II only
 (C) I and II
 (D) Neither I nor II

Question 23.

Daily low temperature (°F)	Frequency
-5 to 4	1
5 to 14	3
15 to 24	4
25 to 34	9
35 to 44	12
45 to 54	1
55 to 64	1

A researcher created a data set by recording the daily low temperature, to the nearest integer, for each of the **31 days** in December **2022** in a town in **Illinois**. The frequency table summarizes this data set.

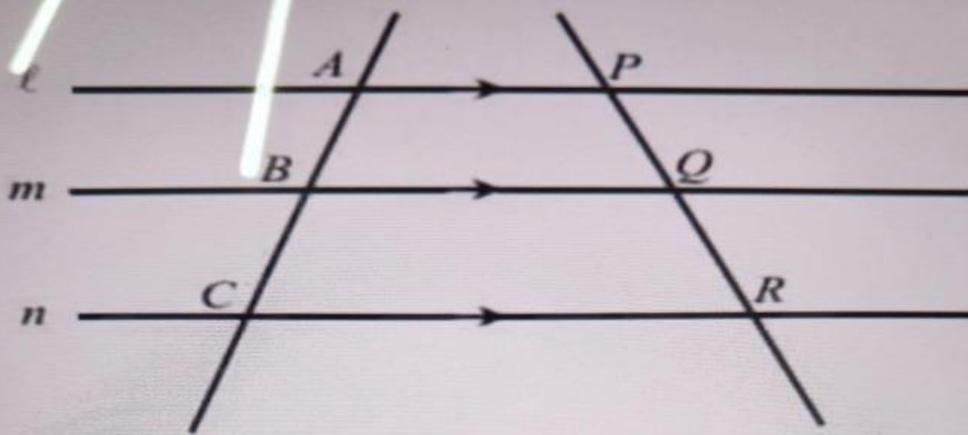
Based on the frequency table, **what is the maximum possible difference between the mean and the median** of the recorded daily low temperatures (in degrees Fahrenheit)?

Question 24.

The expression $\frac{x^{-2}y^{\frac{1}{2}}}{x^{\frac{1}{3}}y^{-1}}$, where $x > 1$ and $y > 1$, is equivalent to which of the following?

- (A) $\frac{\sqrt{y}}{\sqrt[3]{x^2}}$
- (B) $\frac{y\sqrt{y}}{\sqrt[3]{x^2}}$
- (C) $\frac{y\sqrt{y}}{x\sqrt{x}}$
- (D) $\frac{y\sqrt{y}}{x^2\sqrt[3]{x}}$

Question 25.



Note: Figure not drawn to scale.

In the figure above, line ℓ , m , and n are parallel. If $AB = 8$, $BC = 12$, and $PQ = 10$, what is the length of \overline{QR} ?

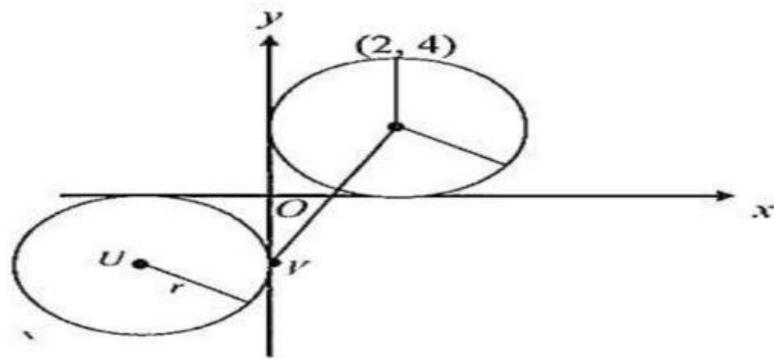
Question 26.

For a study, a group of chipmunks will be selected from a habitat consisting of 220 chipmunks, and a group of prairie dogs will be selected from a habitat consisting of 190 prairie dogs. Some of the chipmunks and prairie dogs will be in a treatment group, and some of the chipmunks and prairie dogs will be in a control group. Which of the following is necessary for this study to attempt to establish a cause-and-effect relationship between two variables?

- A) The number of chipmunks in the treatment group is equal to the number of prairie dogs in the treatment group, and the number of chipmunks in the control group is equal to the number of prairie dogs in the control group.
- B) The chipmunks and the prairie dogs are randomly assigned to the treatment and control groups.
- C) The chipmunks and the prairie dogs are randomly selected from their respective habitats.
- D) The average age of the chipmunks in the treatment group is equal to the average age of the prairie dogs in the treatment group, and the average age of the chipmunks in the control group is equal to the average age of the prairie dogs in the control group.



Question 27.



Note: Figure above not drawn to scale.

5. In the xy -plane above, points W and U are the centers of the two identical circles, which are both tangent to the x -axis and y -axis. V is the tangent point. What is the slope of \overline{WV} ?

- (A) 4
- (B) 6
- (C) 5
- (D) 2

Question 28.

10. An occupational health organization published a study showing an increase in the number of injuries that resulted from elderly people falling in the bathtub. In response to this increase, a medical supply company decided to drop its price on bathtub lifts from \$450 to \$375, hoping to still break even on the lifts. The company breaks even when its total revenue (income from selling n bathtub lifts) is equal to its total cost of producing the lifts. If the cost, C , in dollars, of producing the lifts is $C = 225n + 3,150$, how many more of the lifts does the company need to sell at the new price to break even than at the old price?

- (A) 7
- (B) 12
- (C) 14
- (D) 21



Question 29.

Disks		
Metal	Small	Large
Zinc		
Copper		
Total	100	170

A machine shop has a box of metal disks as shown in the table. There are 3 small zinc disks for every 5 large zinc disks and 4 small copper disks for every 7 large copper disks. If a small disk is chosen at random, what is the probability that it will be copper?

Question 30.

The function

$$f(x) = -0.0038400x^2 + 15.236x - 15,103$$

is a model that predicts the average Arctic sea ice area $f(x)$, in millions of square kilometers, for September of year x , where $1979 \leq x \leq 2012$.

Based on the model, what is the positive difference, in millions of square kilometers, between the predicted average Arctic sea ice area for September of the year 1991 and the predicted average Arctic sea ice area for September of the year 1992? (Round your answer to the nearest thousandth.)

Question 31.

An object's speed, in meters per hour, is increasing at a rate of 1,490 meters per hour per second. Which of the following is closest to this rate in **feet per second squared**? (Use 1 meter = 3.28 feet.)

(A) 0.126

(B) 1.36

(C) 7.57

(D) 81.5

Question 32.

The ratio of the internal angles of triangle A is 1:2:3. Triangle B is an equilateral triangle with a side of 12 cm. If the area of triangle A and B are equal and the perimeter of triangle A is $m\sqrt{2} + n\sqrt{6}$, what is the value of $m + n$?

A) 6

B) 12

C) 18

D) 24

Question 33.

The function f is defined by $f(x) = -3^{-x}$. The function g is an increasing linear function. In the xy -plane, the graphs of $y=f(x)$ and $y=g(x)$ intersect at two points, (h,j) and (k,m) , where $j > m$. When $g(x) > f(x)$, which of the following must be true?

A) $x > h$ or $x < k$

B) $k < x < h$

C) $x > k$ or $x < h$

D) $h < x < k$

Question 34.

A bakery standardizes muffins to weigh between $1\frac{3}{4}$ and $2\frac{1}{4}$ ounces. If m is the weight of a muffin from this bakery, which of the following inequalities expresses the possible values of m ?

A) $\left| m - 1\frac{3}{4} \right| < \frac{1}{4}$

B) $|m - 2| < \frac{1}{4}$

C) $|m - 2| < \frac{1}{2}$

D) $\left| m - 1\frac{3}{4} \right| < \frac{1}{2}$

Question 35.

Arturo builds and sells two types of steel tables. The revenue Arturo generates from selling each square table is 2 times his cost to build a square table, and the revenue Arturo generates from selling each hexagonal table is 2.5 times his cost to build a hexagonal table. In one year, Arturo's total cost to build tables was \$ 42,120, and he generated a total revenue of \$ 101,250 from selling all the tables he built that year. For that year, how much greater is the revenue Arturo generated from selling hexagonal tables than the revenue he generated from selling square tables?

A.

\$ 16,200

B.

\$ 25,920

C.

\$ 59,130

D.

\$ 68,850