

Preliminary SAT/National Merit Scholarship Qualifying Test
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2015 Practice Test #1

PSAT/NMSQT®

Preliminary SAT/National Merit Scholarship Qualifying Test

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1

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2

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Questions 20-28 are based on the following passage and supplementary material.

This passage is adapted from Tina Hesman Saey, “Lessons from the Torpid.” ©2012 by Society for Science & the Public.

Understanding how hibernators, including ground squirrels, marmots and bears, survive their long winter’s naps may one day offer solutions for problems such as heart disease, osteoporosis and muscular dystrophy.

Nearly everything about the way an animal’s body works changes when it hibernates, and preparations start weeks or months in advance. The first order of business is to fatten up.

“Fat is where it’s at for a hibernator,” says Matthew Andrews, a molecular biologist at the University of Minnesota Duluth who studies 13-lined ground squirrels. “You bring your own lunch with you.” Packing lunch is necessary because the animals go on the world’s strictest diet during the winter, surviving entirely off their white fat. “They have their last supper in October; they don’t eat again until March,” Andrews says.

Bigger fat stores mean a greater chance of surviving until spring. “If they go in really chunky, nice and roly-poly, that’s going to be a good hibernator,” he says.

Bears also watch their waistlines expand in the months before settling in for the season. The brown bears cardiologist Ole Frøbert studies pack on the pounds by chowing down on up to 40 kilograms of blueberries a day. Such gluttony among humans could have severe consequences: Obesity is associated with a greater risk of heart attack and diabetes, among other ailments.

To see how fattening up affects Scandinavian brown bears, Frøbert and his colleagues ventured into the wilds of Sweden following signals given off by radio transmitters or GPS devices on tagged bears.

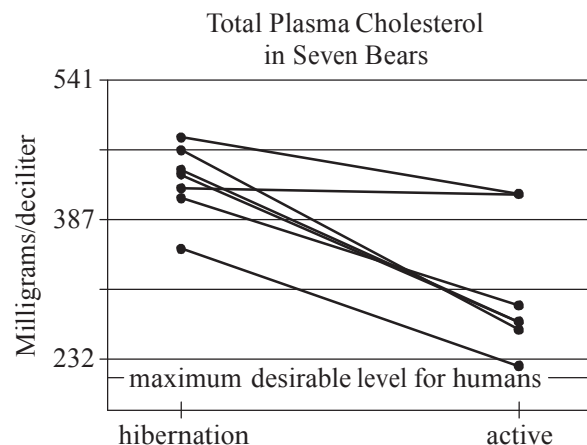
Bears can be dangerous close-up. Even hibernating bears can rouse to action quickly, so scientists tracking down bears in the winter use darts to tranquilize the animals from a distance. Scientists studying the bears in the summer tranquilize them from a helicopter.

Once a bear is under the tranquilizer’s influence (which takes about five minutes), the scientists have 60 minutes max to get the animal from its den, weigh and measure it, draw blood samples and do minor surgeries to collect fat and other tissues. The bear is returned to its den by minute 61.

Precious materials collected during this high-pressure encounter need to be analyzed within 24 hours, so the researchers often test for levels of cholesterol or certain proteins in the blood while working in the snow or at a nearby research station. A pilot sometimes flies samples from field sites to a lab in Denmark in order to meet the deadline, Frøbert says. Samples such as bones and arteries that can’t be collected from live bears come from bears killed by hunters during the legal hunting season.

Recent analyses revealed that Scandinavian brown bears spend the summer with plasma cholesterol levels considered high for humans; those values then increase substantially for hibernation, Frøbert and his colleagues reported. These “very, very fat” bears with high cholesterol also get zero exercise during hibernation. Lolling about in the den pinches off blood vessels, contributing to sluggish circulation. “That cocktail would not be advisable in humans,” Frøbert says. It’s a recipe for hardened arteries, putting people at risk for heart attacks and strokes.

Even healthy young adult humans can develop fatty streaks in their arteries that make the blood vessels less flexible, but the bears don’t build up such artery-hardening streaks. “Our bears, they had nothing,” Frøbert says. It’s not yet clear how the bears keep their arteries flexible, but Frøbert hopes to find some protective molecule that could stave off hardened arteries in humans as well.



20

The passage is written from the perspective of someone who is

- A) actively involved in conducting hibernator research.
- B) a participant in a recent debate in the field of cardiology.
- C) knowledgeable about advances in hibernator research.
- D) an advocate for wildlife preservation.

21

It is reasonable to conclude that the main goal of the scientists conducting the research described in the passage is to

- A) learn how the hibernation patterns of bears and squirrels differ.
- B) determine the role that fat plays in hibernation.
- C) illustrate the important health benefits of exercise for humans.
- D) explore possible ways to prevent human diseases.

22

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-5 (“Understanding . . . dystrophy”)
- B) Lines 10-13 (“Fat . . . squirrels”)
- C) Lines 31-35 (“To . . . bears”)
- D) Lines 42-46 (“Once . . . tissues”)

23

What main effect do the quotations by Andrews in lines 10-18 have on the tone of the passage?

- A) They create a bleak tone, focusing on the difficulties hibernators face during the winter.
- B) They create a conversational tone, relating scientific information in everyday language.
- C) They create an ominous tone, foreshadowing the dire results of Andrews’s research.
- D) They create an absurd tone, using images of animals acting as if they were human.

24

As used in line 19, “stores” most nearly means

- A) preservatives.
- B) reserves.
- C) stacks.
- D) shelters.

25

Based on the passage, what is Fröbert’s hypothesis regarding why bears’ arteries do not harden during hibernation?

- A) The bears’ increased plasma cholesterol causes the arteries to be more flexible.
- B) Sluggish circulation pinches off the blood vessels rather than hardening the arteries.
- C) Bears exercise in short, infrequent bursts during hibernation, which staves off hardened arteries.
- D) Bears possess a molecule that protects against hardened arteries.

26

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 19-20 (“Bigger . . . spring”)
- B) Lines 24-27 (“The brown . . . day”)
- C) Lines 69-72 (“Even . . . streaks”)
- D) Lines 73-76 (“It’s . . . well”)

27

What information discussed in paragraph 10 (lines 58-68) is represented by the graph?

- A) The information in lines 58-62 (“Recent . . . reported”)
- B) The information in lines 62-64 (“These . . . hibernation”)
- C) The information in lines 64-65 (“Lolling . . . circulation”)
- D) The information in lines 67-68 (“It’s . . . strokes”)

28

Which statement about the effect of hibernation on the seven bears is best supported by the graph?

- A) Only one of the bears did not experience an appreciable change in its total plasma cholesterol level.
- B) Only one of the bears experienced a significant increase in its total plasma cholesterol level.
- C) All of the bears achieved the desirable plasma cholesterol level for humans.
- D) The bear with the lowest total plasma cholesterol level in its active state had the highest total plasma cholesterol level during hibernation.

Questions 12-22 are based on the following passage and supplementary material.

Vanishing Honeybees: A Threat to Global Agriculture

Honeybees play an important role in the agriculture industry by pollinating crops. An October 2006 study found that as much as one-third of global agriculture depends on animal pollination, including honeybee **12** pollination—to increase crop output. The importance of bees **13** highlights the potentially disastrous affects of an emerging, unexplained crisis: entire colonies of honeybees are dying off without warning.

14 They know it as colony collapse disorder (CCD), this phenomenon will have a detrimental impact on global agriculture if its causes and solutions are not determined. Since the emergence of CCD around 2006, bee mortality rates have **15** exceeded 25 percent of the population each winter. There was one sign of hope: during the 2010–2012 winter seasons, bee mortality rates decreased slightly, and beekeepers speculated that the colonies would recover. Yet in the winter of 2012–2013, the **16** portion of the bee population lost fell nearly 10 percent in the United States, with a loss of 31 percent of the colonies that pollinate crops.

12

- A) NO CHANGE
- B) pollination: this is
- C) pollination,
- D) pollination;

13

- A) NO CHANGE
- B) highlights the potentially disastrous effects
- C) highlight the potentially disastrous effects
- D) highlight the potentially disastrous affects

14

- A) NO CHANGE
- B) Known as colony
- C) It is known as colony
- D) Colony

15

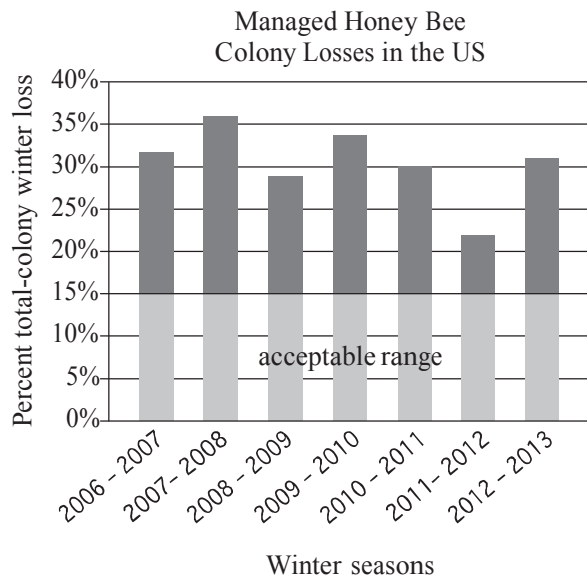
Which choice offers the most accurate interpretation of the data in the chart?

- A) NO CHANGE
- B) been above the acceptable range.
- C) not changed noticeably from year to year.
- D) greatly increased every year.

16

Which choice offers an accurate interpretation of the data in the chart?

- A) NO CHANGE
- B) portion of bees lost was double what it had been the previous year, rising to
- C) number of losses, which had fallen within the acceptable range the previous year, rose to
- D) portion of total colonies lost rose almost 10 percentage points, with a loss of



Adapted from Dennis van Engelsdorp et al., "Preliminary Results: Honey Bee Colony Losses in the United States, Winter 2012-2013." ©2013 by the Bee Informed Partnership.

17 Studies have offered several possible reasons that bees are vanishing. One reason that is often cited is the use of pesticides called neonicotinoids, which are absorbed by plants and linger much longer than do topical pesticides. **18** Chemicals such as herbicides and fungicides may also play a role, contaminating the pollen that bees typically feed on and inhibiting healthy insect maturation.

17

Which choice most smoothly and effectively introduces the writer's discussion of studies of CCD in this paragraph?

- A) NO CHANGE
- B) Bees are vanishing, and according to studies there are several possible reasons for this trend.
- C) Several possible reasons, offered by studies, may explain why bees are vanishing.
- D) DELETE the underlined sentence.

18

At this point, the writer is considering adding the following sentence.

Prolonged exposure to neonicotinoids has been shown to increase bees' vulnerability to disease and parasitic mites.

Should the writer make this addition here?

- A) Yes, because it provides support for the claim made in the previous sentence.
- B) Yes, because it introduces a new idea that will become important later in the passage.
- C) No, because it would be better placed elsewhere in the passage.
- D) No, because it contradicts the main idea of the passage.

Given the role that honeybees play in agriculture, the impact of this loss of hives on fruit, vegetable, seed, and nut crops **19** is not to be scoffed at. A reduction in bee numbers leads to less pollination, which in turn leads to smaller harvests and higher food prices. Some farmers have resorted to renting hives from beekeepers to pollinate their **20** crops; when there is a shortage of bees this being an expensive proposition. Other farmers have increased **21** they're dependence on costly hand-pollination by human workers. Furthermore, there may be sociological repercussions. Agroecologist Alexandra-Maria Klein has suggested that rising produce prices could lead to an increase in obesity as people turn to cheaper, less wholesome fare.

Though the precise causes of CCD are yet unclear, some commonsense measures may be taken. A decrease in the use of certain pesticides, herbicides, and fungicides, as well as greater attention to the nutrition, habitat, and genetic diversity of managed hives, could begin a shift in a favorable direction. **22**

19

- A) NO CHANGE
- B) is a pretty big deal.
- C) can't be put on the back burner.
- D) cannot be ignored.

20

- A) NO CHANGE
- B) crops, this is an expensive proposition when there is a shortage of bees.
- C) crops, an expensive proposition when there is a shortage of bees.
- D) crops; an expensive proposition when there is a shortage of bees.

21

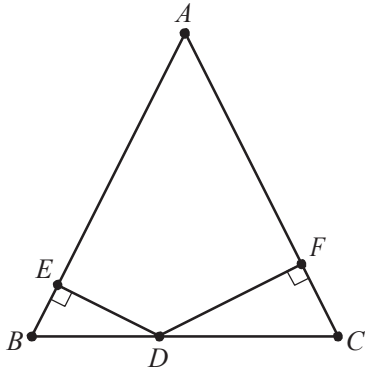
- A) NO CHANGE
- B) there
- C) their
- D) its

22

The writer wants a conclusion that addresses the future of efforts to combat CCD. Which choice results in the passage having the most appropriate concluding sentence?

- A) NO CHANGE
- B) Still, bee colonies have experienced such devastating losses that the consequences of the issue have been felt worldwide.
- C) Although CCD is a relatively new phenomenon, scientists have been studying other aspects of honeybees for over a century.
- D) Genetic variation in bee colonies generally improves bees' productivity, disease resistance, and ability to regulate body temperature.

4



Note: Figure not drawn to scale.

Triangle ABC above is isosceles with $AB = AC$ and $BC = 48$. The ratio of DE to DF is $5 : 7$. What is the length of \overline{DC} ?

- A) 12
- B) 20
- C) 24
- D) 28

5

In a certain game, a player can solve easy or hard puzzles. A player earns 30 points for solving an easy puzzle and 60 points for solving a hard puzzle. Tina solved a total of 50 puzzles playing this game, earning 1,950 points in all. How many hard puzzles did Tina solve?

- A) 10
- B) 15
- C) 25
- D) 35

6

$$2x^2 + 7x - 15 = 0$$

If r and s are two solutions of the equation above and $r > s$, which of the following is the value of $r - s$?

- A) $\frac{15}{2}$
- B) $\frac{13}{2}$
- C) $\frac{11}{2}$
- D) $\frac{3}{2}$

7

To cut a lawn, Allan charges a fee of \$15 for his equipment and \$8.50 per hour spent cutting a lawn. Taylor charges a fee of \$12 for his equipment and \$9.25 per hour spent cutting a lawn. If x represents the number of hours spent cutting a lawn, what are all the values of x for which Taylor's total charge is greater than Allan's total charge?

- A) $x > 4$
- B) $3 \leq x \leq 4$
- C) $4 \leq x \leq 5$
- D) $x < 3$

8

$$n = 456 - 3T$$

The equation above is used to model the relationship between the number of cups, n , of hot chocolate sold per day in a coffee shop and the average daily temperature, T , in degrees Fahrenheit. According to the model, what is the meaning of the 3 in the equation?

- A) For every increase of 3°F , one more cup of hot chocolate will be sold.
- B) For every decrease of 3°F , one more cup of hot chocolate will be sold.
- C) For every increase of 1°F , three more cups of hot chocolate will be sold.
- D) For every decrease of 1°F , three more cups of hot chocolate will be sold.

9

A truck enters a stretch of road that drops 4 meters in elevation for every 100 meters along the length of the road. The road is at 1,300 meters elevation where the truck entered, and the truck is traveling at 16 meters per second along the road. What is the elevation of the road, in meters, at the point where the truck passes t seconds after entering the road?

- A) $1,300 - 0.04t$
- B) $1,300 - 0.64t$
- C) $1,300 - 4t$
- D) $1,300 - 16t$

14

For what value of h is $24 = \frac{h}{10} - 6$?

15

What is the value of a if $(2a + 3) - (4a - 8) = 7$?

16

If x is not equal to zero, what is the value

of $\frac{4(3x)^2}{(2x)^2}$?

17

If $x - 2$ is a factor of $x^2 - bx + b$, where b is a constant, what is the value of b ?

STOP

**If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.**



4

A rectangle has perimeter P , length A and width w . Which of the following represents A in terms of P and w ?

A) $A = P - w$

B) $A = \frac{2P - w}{2}$

C) $A = \frac{P - 2w}{2}$

D) $A = 2P - 2w$

5

Which ordered pair (x, y) satisfies the system of equations shown below?

$$\begin{aligned} 2x - y &= 6 \\ x + 2y &= -2 \end{aligned}$$

A) $(-6, 2)$

B) $(-2, 2)$

C) $(2, -2)$

D) $(4, 2)$

6

A soda company is filling bottles of soda from a tank that contains 500 gallons of soda. At most, how many 20-ounce bottles can be filled from the tank? (1 gallon = 128 ounces)

A) 25

B) 78

C) 2,560

D) 3,200

7

A car traveled at an average speed of 80 miles per hour for 3 hours and consumed fuel at a rate of 34 miles per gallon. Approximately how many gallons of fuel did the car use for the entire 3-hour trip?

A) 2

B) 3

C) 6

D) 7



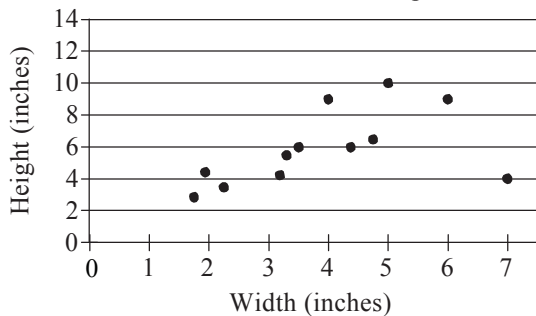
8

What is the slope of the line in the xy -plane that passes through the points $\left(-\frac{5}{2}, 1\right)$ and $\left(-\frac{1}{2}, 4\right)$?

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

9

Dimensions of Envelopes

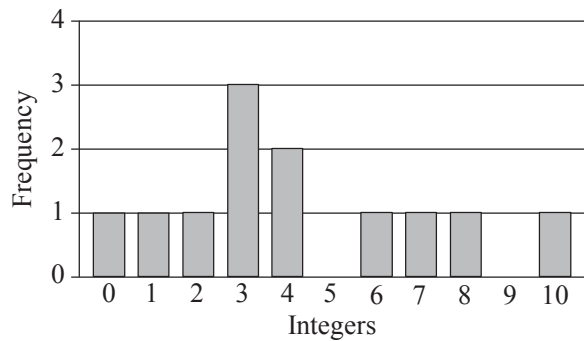


The scatterplot above shows the widths and the heights of 12 types of rectangular envelopes. What is the width, in inches, of the envelope represented by the data point that is farthest from the line of best fit (not shown)?

- A) 2
- B) 5
- C) 7
- D) 12



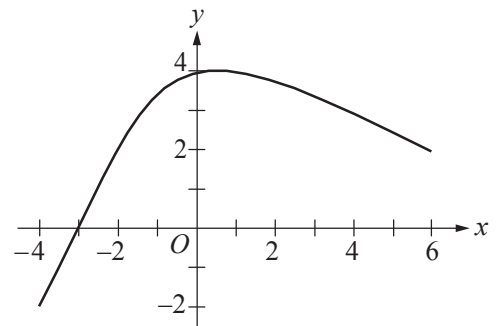
20



The graph above shows the frequency distribution of a list of randomly generated integers between 0 and 10. What is the mean of the list of numbers?

- A) 3.0
- B) 3.5
- C) 4.25
- D) 12.0

21



What is the minimum value of the function graphed on the xy -plane above, for $-4 \leq x \leq 6$?

- A) $-\infty$
- B) -4
- C) -2
- D) 1

