### Math 27 QUESTIONS

#### DIRECTIONS

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

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#### REFERENCE



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

How many <u>teaspoons</u> are equivalent to 44 tablespoons? (3 teaspoons = 1 tablespoon)

- A) 47
- B) 88
- C) 132
- D) 176

#### 4

What is 23% of 100?

- A) 23
- B) 46
- C) 77
- D) 123

2

The function *f* is defined by  $f(x) = \frac{1}{6x}$ . What is the value of f(x) when x = 3 ?

A)  $\frac{1}{3}$ B)  $\frac{1}{6}$ C)  $\frac{1}{9}$ D)  $\frac{1}{18}$ 

#### 3

If x = 40, what is the value of x + 6?

A) 34

- B) 40
- C) 46
- D) 64

Which expression is equivalent to  $50x^2 + 5x^2$  ?

A)  $250x^2$ 

5

- B) 10x<sup>2</sup>
- C) 45*x*<sup>2</sup>
- D) 55*x*<sup>2</sup>

6

The population density of Cedar County is 230 people per square mile. The county has a population of 85,100 people. What is the area, in square miles, of Cedar County?

$$\frac{-54}{w} =$$

6

What is the solution to the given equation?

#### 8

For the function *f*, the graph of y = f(x) in the *xy*-plane has a slope of 3 and passes through the point (0, -8). Which equation defines *f* ?

- A) f(x) = 3x
- B) f(x) = 3x 8
- C) f(x) = 3x + 5
- D) f(x) = 3x + 11





Note: Figure not drawn to scale.

The triangle shown has a perimeter of 22 units. If x = 9 units and y = 7 units, what is the value of *z*, in units?

- A) 6
- B) 7
- C) 9
- D) 16

### 10

The function *h* is defined by h(x) = 3x - 7. What is the value of h(-2) ?

- A) –13
- B) -10
- C) 10
- D) 13



In the triangle shown, what is the value of  $\tan x^{\circ}$ ?

A) 
$$\frac{1}{26}$$
  
B)  $\frac{19}{26}$ 

C) 
$$\frac{26}{7}$$

D) 
$$\frac{33}{5}$$

#### 12

The scatterplot shows the relationship between x and y. A line of best fit is also shown.



Which of the following is closest to the slope of the line of best fit shown?

- A) –2.27
- B) -0.44
- C) 0.44
- D) 2.27

The *y*-intercept of the graph of 12x + 2y = 18 in the *xy*-plane is (0, *y*). What is the value of *y* ?

#### 14

A model predicts that a certain animal weighed 241 pounds when it was born and that the animal gained 3 pounds per day in its first year of life. This model is defined by an equation in the form f(x) = a + bx, where f(x) is the predicted weight, in pounds, of the animal *x* days after it was born, and *a* and *b* are constants. What is the value of *a* ?



The graph shows the height above ground, in meters, of a ball x seconds after the ball was launched upward from a platform. Which statement is the best interpretation of the marked point (1.0, 4.8) in this context?

- A) 1.0 second after being launched, the ball's height above ground is 4.8 meters.
- B) 4.8 seconds after being launched, the ball's height above ground is 1.0 meter.
- C) The ball was launched from an initial height of 1.0 meter with an initial velocity of 4.8 meters per second.
- D) The ball was launched from an initial height of 4.8 meters with an initial velocity of 1.0 meter per second.

Based on a random sample from a population, a researcher estimated that the mean value of a certain variable for the population is 20.5, with an associated margin of error of 1. Which of the following is the most appropriate conclusion?

- A) It is plausible that the actual mean value of the variable for the population is between 19.5 and 21.5.
- B) It is not possible that the mean value of the variable for the population is less than 19.5 or greater than 21.5.
- C) Every value of the variable in the population is between 19.5 and 21.5.
- D) The mean value of the variable for the population is 20.5.

#### 18

A rectangle has a length that is 15 times its width. The function y = (15w)(w) represents this situation, where y is the area, in square feet, of the rectangle and y > 0. Which of the following is the best interpretation of 15w in this context?

- A) The length of the rectangle, in feet
- B) The area of the rectangle, in square feet
- C) The difference between the length and the width of the rectangle, in feet
- D) The width of the rectangle, in feet

19

$$x + 2y = 6$$
$$x - 2y = 4$$

The solution to the given system of equations is (x, y). What is the value of x ?

- A) 2.5
- B) 5
- C) 6
- D) 10

#### 17

#### 7m = 5(n+p)

The given equation relates the positive numbers m, n, and p. Which equation correctly gives n in terms of m and p?

- A)  $n = \frac{5p}{7m}$
- B)  $n = \frac{7m}{5} p$
- C) n = 5(7m) + p
- D) n = 7m 5 p

The table shows the frequency of values in a data set.

Value	Frequency
19	7
21	1
23	7
25	4

What is the minimum value of the data set?

#### 21

A number x is at most 17 less than 5 times the value of y. If the value of y is 3, what is the greatest possible value of x ?

#### 22

$$5x^2 - 37x - 24 = 0$$

What is the positive solution to the given equation?



D) 37

Note: Figure not drawn to scale.

In the figure shown, lines r and s are parallel, and line m intersects both lines. If y < 65, which of the following must be true?

- A) x < 115
- B) *x* > 115
- C) x + y < 180
- D) x + y > 180

#### 24

$$f(x) = \frac{a-19}{x} + 5$$

In the given function *f*, *a* is a constant. The graph of function *f* in the *xy*-plane, where y = f(x), is translated 3 units down and 4 units to the right to produce the graph of y = g(x). Which equation defines function *g* ?

A)  $g(x) = \frac{a-19}{x+4} + 2$ 

B) 
$$g(x) = \frac{a-19}{x-4} + 2$$

C) 
$$g(x) = \frac{a-22}{x+4} + 5$$

D) 
$$g(x) = \frac{a-22}{x-4} + 5$$

25

A machine launches a softball from ground level. The softball reaches a maximum height of 51.84 meters above the ground at 1.8 seconds and hits the ground at 3.6 seconds. Which equation represents the height above ground *h*, in meters, of the softball *t* seconds after it is launched?

- A)  $h = -t^2 + 3.6$
- B)  $h = -t^2 + 51.84$
- C)  $h = -16(t 1.8)^2 3.6$
- D)  $h = -16(t 1.8)^2 + 51.84$

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#### 26

In triangle *ABC*, the measure of angle *B* is 90° and  $\overline{BD}$  is an altitude of the triangle. The length of  $\overline{AB}$  is 15 and the length of  $\overline{AC}$  is 23 greater than the length of  $\overline{AB}$ . What is the value of  $\frac{BC}{BD}$  ?

- A)  $\frac{15}{38}$
- B)  $\frac{15}{23}$
- C)  $\frac{23}{15}$
- D)  $\frac{38}{15}$

### 27

$$f(x) = (x+7)^2 + 4$$

The function f is defined by the given equation. For what value of x does f(x) reach its minimum?

# **STOP**

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# The box plot summarizes 15 data values. What is the median of this data set?

- A) 2
- B) 3
- C) 5
- D) 8



What is the *x*-intercept of the graph shown?

- A) (-5,0)
- B) (5,0)
- C) (-4,0)
- D) (4,0)

#### 3

Henry receives a \$60.00 gift card to pay for movies online. He uses his gift card to buy 3 movies for \$7.50 each. If he spends the rest of his gift card balance on renting movies for \$1.50 each, how many movies can Henry rent?

- A) 10
- B) 25C) 35
- D) 40

4

$$x = 49$$
$$y = \sqrt{x} + 9$$

The graphs of the given equations intersect at the point (x, y) in the *xy*-plane. What is the value of *y* ?

- A) 16
- B) 40
- C) 81
- D) 130

5

A cherry pitting machine pits 12 pounds of cherries in 3 minutes. At this rate, how many minutes does it take the machine to pit 96 pounds of cherries?

- A) 8
- B) 15
- C) 24
- D) 36



If 2x = 12, what is the value of 9x?

#### 7

Line *k* is defined by  $y = \frac{1}{4}x + 1$ . Line *j* is parallel to line *k* in the *xy*-plane. What is the slope of *j* ?

### 8

#### 6, 6, 8, 8, 8, 10, 21

Which of the following lists represents a data set that has the same median as the data set shown?

- A) 4, 6, 6, 6, 8, 8
- B) 6, 6, 8, 8, 10, 10
- C) 6, 8, 10, 10, 10, 12
- D) 8, 8, 10, 10, 21, 21

#### 9

The length of the base of a certain parallelogram is 89% of the height of the parallelogram. Which expression represents the length of the base of the parallelogram, where h is the height of the parallelogram?

- A) 89h
- B) 0.089h
- C) 8.9*h*
- D) 0.89h

#### 10

For a camping trip a group bought *x* one-liter bottles of water and *y* three-liter bottles of water, for a total of 240 liters of water. Which equation represents this situation?

- A) x + 3y = 240
- B) x + y = 240
- C) 3x + 3y = 240
- D) 3x + y = 240

#### y = -4x + 40

Which table gives three values of *x* and their corresponding values of *y* for the given equation?

A)	x	y
	0	0
	1	-4
	2	-8



$\sim$		
C)	x	у
	0	40
	1	36
	2	32

D)	x	у
	0	0
	1	4
	2	8

#### 12



The shaded region shown represents solutions to an inequality. Which ordered pair (x, y) is a solution to this inequality?

- A) (0, -4)
- B) (0,4)
- C) (-4,0)
- D) (4,0)

#### 13

In triangle *JKL*, the measures of  $\angle K$  and  $\angle L$  are each 48°. What is the measure of  $\angle J$ , in degrees? (Disregard the degree symbol when entering your answer.)

$$y = x^2 + 14x + 48$$
  
 $x + 8 = 11$ 

The solution to the given system of equations is (x, y). What is the value of y ?

#### 15

A cleaning service that cleans both offices and homes can clean at most 14 places per day. Which inequality represents this situation, where f is the number of offices and h is the number of homes?

- A)  $f+h \leq 14$
- B)  $f+h \ge 14$
- C)  $f-h \leq 14$
- D)  $f-h \ge 14$

#### 16

Which expression is a factor of  $2x^2 + 38x + 10$ ?

- A) 2
- B) 5*x*
- C) 38*x*
- D) 2*x*<sup>2</sup>

#### 17

The equation 40x + 20y = 160 represents the number of sweaters, *x*, and number of shirts, *y*, that Yesenia purchased for \$160. If Yesenia purchased 2 sweaters, how many shirts did she purchase?

A) 3

B) 4

- C) 8
- D) 40

18

$$y = 0.25x^2 - 7.5x + 90.25$$

The equation gives the estimated stock price *y*, in dollars, for a certain company *x* days after a new product launched, where  $0 \le x \le 20$ . Which statement is the best interpretation of (x, y) = (1, 83) in this context?

- A) The company's estimated stock price increased\$83 every day after the new product launched.
- B) The company's estimated stock price increased\$1 every 83 days after the new product launched.
- C) 1 day after the new product launched, the company's estimated stock price is \$83.
- D) 83 days after the new product launched, the company's estimated stock price is \$1.

f(x) = 39

For the given linear function *f*, which table gives three values of *x* and their corresponding values of f(x)?

A)	x	f(x)
	0	0
	1	0
	2	0
- `		
B)	x	f(x)
	0	39
	1	39
	2	39
-		
C)	x	f(x)
	0	0
	1	39
	2	78
D)	x	f(x)
	0	39

1

2

0 -39

#### 20

A triangular prism has a height of 8 centimeters (cm) and a volume of 216 cm<sup>3</sup>. What is the area, in cm<sup>2</sup>, of the base of the prism? (The volume of a triangular prism is equal to *Bh*, where *B* is the area of the base and *h* is the height of the prism.)



The graph shows the momentum *y*, in newton-seconds, of an object *x* seconds after the object started moving, for  $0 \le x \le 8$ . What is the average rate of change, in newton-seconds per second, in the momentum of the object from x = 2 to x = 6?

22

$$-15x + 25y = 65$$

One of the two equations in a system of linear equations is given. The system has infinitely many solutions. Which of the following could be the second equation in the system?

- A) 12x + 20y = 52
- B) 12x + 20y = -52
- C) -12x + 20y = 52
- D) -12x + 20y = -52

#### 23

A bus traveled on the highway and on local roads to complete a trip of 160 miles. The trip took 4 hours. The bus traveled at an average speed of 55 miles per hour (mph) on the highway and an average speed of 25 mph on local roads. If x is the time, in hours, the bus traveled on the highway and y is the time, in hours, it traveled on local roads, which system of equations represents this situation?

- A) 55x + 25y = 4x + y = 160
- B) 55x + 25y = 160x + y = 4
- C) 25x + 55y = 4x + y = 160
- D) 25x + 55y = 160x + y = 4

#### 24

Quadrilateral P'Q'R'S' is similar to quadrilateral *PQRS*, where *P*, *Q*, *R*, and *S* correspond to *P'*, *Q'*, *R'*, and *S'*, respectively. The measure of angle *P* is 30°, the measure of angle *Q* is 50°, and the measure of angle *R* is 70°. The length of each side of P'Q'R'S' is 3 times the length of each corresponding side of *PQRS*. What is the measure of angle *P'*?

- A) 10°
- B) 30°
- C) 40°
- D) 90°

#### 25

#### f(x) = 2x + 244

The given function f represents the perimeter, in centimeters (cm), of a rectangle with a length of x cm and a fixed width. What is the width, in cm, of the rectangle?

A) 2

B) 122

- C) 244
- D) 488

The functions *f* and *g* are defined by the given equations, where  $x \ge 0$ . Which of the following equations displays, as a constant or coefficient, the maximum value of the function it defines, where  $x \ge 0$  ?

I. 
$$f(x) = 33(0.4)^{x+3}$$

II. 
$$g(x) = 33(0.16)(0.4)^{x-2}$$

- A) I only
- B) II only
- C) I and II
- D) Neither I nor II

#### 27

### $64x^2 - (16a + 4b)x + ab = 0$

In the given equation, *a* and *b* are positive constants. The sum of the solutions to the given equation is k(4a + b), where *k* is a constant. What is the value of *k* ?

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# **PSAT/NMSQT** Practice Test Worksheet: Answer Key

Mark each of your correct answers below, then add them up to get your raw score on each module.

Reading and Writing					Math								
Module 1 Module 2			Module 1					Module 2					
QUESTION #	CORRECT	MARK YOUR CORRECT ANSWERS		QUESTION #	CORRECT	MARK YOUR CORRECT ANSWERS	QUESTION #	CORRECT	MARK YOUR CORRECT ANSWERS		QUESTION #	CORRECT	MARK YOUR Correct ANSWERS
1	В			1	В		1	С			1	С	
2	D			2	С		2	D			2	D	
3	В			3	D		3	С			3	В	
4	В			4	С		4	A			4	А	
5	А			5	С		5	D			5	С	
6	D			6	А		6	370			6	54	
7	А			7	С		7	-9			7	.25; 1/4	
8	А			8	С		8	В			8	В	
9	С			9	С		9	A			9	D	
10	D			10	С		10	A			10	А	
11	D			11	В		11	С			11	С	
12	А			12	D		12	С			12	D	
13	D			13	А		13	9			13	84	
14	D			14	С		14	241			14	99	
15	В			15	С		15	A			15	А	
16	D			16	А		16	A			16	А	
17	В			17	D		17	В			17	В	
18	С			18	А		18	A			18	С	
19	С			19	С		19	В			19	В	
20	С			20	С		20	19			20	27	
21	А			21	D		21	-2			21	.5; 1/2	
22	В			22	С		22	С			22	С	
23	С			23	А		23	В			23	В	
24	Α			24	D		24	В			24	В	
25	В			25	А		25	D			25	В	
26	D			26	С		26	D			26	В	
27	С			27	D		27	-7			27	.0625; 1/16	
28	А			28	В								
29	D			29	С								
30	С			30	В								
31	А			31	D								

#### READING AND WRITING SECTION RAW SCORE

(Total # of Correct Answers)

32

33

D

С

\_\_\_\_\_

Module 1

32

33

С

D



MATH SECTION RAW SCORE (Total # of Correct Answers)

Module 1

Module 2

# **PSAT/NMSQT** Practice Test Worksheet: Section and Total Scores

### **Conversion: Calculate Your Section and Total Scores**

Enter the number of correct answers (raw scores from the previous page) for each of the modules in the boxes below and add them together to get your section raw score. Find that section raw score in the first column of the table below and then enter the corresponding lower and upper values in the two-column boxes. Add each of your lower and upper values for the test sections separately to calculate your total PSAT/NMSQT score range.



### **Raw Score Conversion Table: Section Scores**

RAW SCORE	Reading a Section So	nd Writing ore Range	Ma Section So	ath core Range	RAW SCORE	Reading a Section Sc	nd Writing core Range	Math Section Score Range		
(# OF CORRECT ANSWERS)	LOWER	UPPER	LOWER	UPPER	(# OF CORRECT ANSWERS)	LOWER	UPPER	LOWER	UPPER	
0	160	160	160	160	34	410	450	430	470	
1	160	180	160	170	35	420	460	450	490	
2	160	190	160	180	36	430	470	450	510	
3	160	200	160	200	37	440	480	460	520	
4	160	210	160	220	38	450	490	470	530	
5	160	220	160	230	39	450	490	480	540	
6	160	230	160	240	40	460	500	490	550	
7	160	240	160	260	41	470	510	500	560	
8	160	250	170	270	42	480	520	520	580	
9	160	260	180	280	43	480	540	530	590	
10	170	270	200	290	44	490	550	540	600	
11	180	280	250	300	45	500	560	540	620	
12	190	290	270	310	46	500	560	560	640	
13	200	300	280	320	47	510	570	580	660	
14	210	310	290	330	48	520	580	600	680	
15	220	320	300	340	49	530	590	620	720	
16	250	350	310	350	50	540	600	650	750	
17	290	350	310	350	51	560	620	680	760	
18	300	360	320	360	52	570	630	720	760	
19	320	360	330	370	53	580	640	740	760	
20	320	360	340	380	54	590	650	760	760	
21	330	370	340	380	55	600	660			
22	340	380	340	380	56	610	660			
23	340	380	350	390	57	620	680			
24	350	390	350	390	58	630	690			
25	360	400	360	400	59	640	700			
26	360	400	370	410	60	660	720			
27	370	410	380	420	61	670	730			
28	370	410	380	420	62	680	740			
29	380	420	390	430	63	700	760			
30	380	420	390	430	64	720	760			
31	390	430	400	440	65	740	760			
32	400	440	410	450	66	760	760			
33	400	440	420	460						