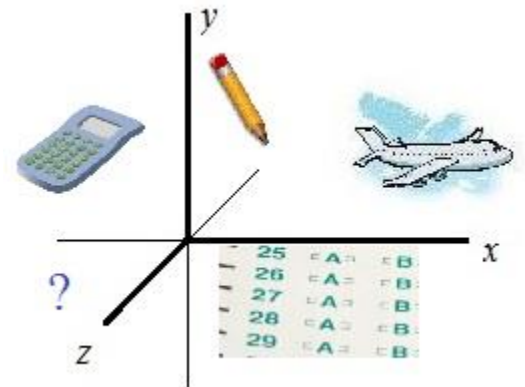


SAT Math Level 2

Practice Test A

25 multiple choice math questions (and solutions)

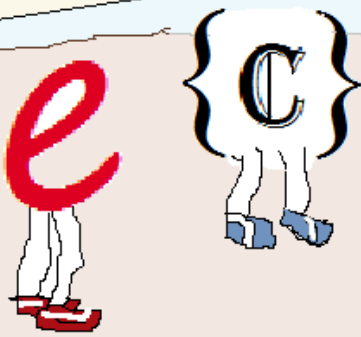


Mathplane.com

Topics include arc length, distance, probability, circles, functions, summation, sequences, trigonometry, domain, range, and more.

Ultra-Marathon

100K Challenge



"Red e..
Set..
GO!"



Testing the limits of endurance,
these math figures will run on and on...

LanceAF #87 5-24-13
www.mathplane.com

Practice test ->

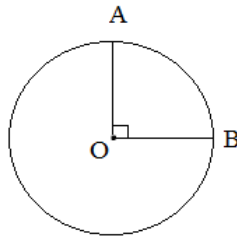
SAT Subject Test - Math Level 2 Practice

1) If $f(x) = \frac{3x + 7}{6x + 4}$ what value does $f(x)$ approach as x gets infinitely larger?

- a) 0
- b) $1/2$
- c) $3/4$
- d) $7/4$
- e) infinity

2) O is the center of the circle, and the diameter is 12. What is the arc length \widehat{AB} ?

- a) 3π
- b) 6π
- c) 9π
- d) 18π
- e) 36π



3) What is the distance in space between $(1, 0, 5)$ and $(-3, 6, 3)$?

- a) 4
- b) 6
- c) $2\sqrt{11}$
- d) $2\sqrt{14}$
- e) 12

4) $|5 - 7| - |7 - 5| =$

- a) -4
- b) 0
- c) 2
- d) 4
- e) 12

5) A line has the parametric equation $x = t + 5$ and $y = t + 10$. What is the slope of the line?

- a) 1
- b) 2
- c) 5
- d) 10
- e) 50

SAT Subject Test - Math Level 2 Practice

- 6) Two dice are tossed. What is the probability that neither die is a 4?
- a) $1/6$
 - b) $1/3$
 - c) $2/3$
 - d) $25/36$
 - e) $5/6$
- 7) $(1, 6)$, $(3, -2)$, and $(-2, K)$ are collinear points. What is K ?
- a) -6
 - b) 2
 - c) 8
 - d) 10
 - e) 18
- 8) Vectors u and v are given by $u = (3, 0)$ and $v = (1, -4)$. What is the length of vector w , given by $w = 2u - v$?
- a) $2\sqrt{10}$
 - b) $\sqrt{41}$
 - c) $6 - \sqrt{17}$
 - d) 3
 - e) $\sqrt{23}$
- 9) The domain of $g(x) = \frac{3}{\sqrt{4-x^2}}$ is:
- a) $[-2, 2]$
 - b) $(-2, 2)$
 - c) $(0, 2)$
 - d) $(-\infty, -2)$
 - e) $(-\infty, 2)$
- 10) The radius of circle $x^2 - 4x + y^2 + 6y = 3$
- a) 3
 - b) $\sqrt{3}$
 - c) 4
 - d) 8
 - e) 16

SAT Subject Test - Math Level 2 Practice

- 11) $f(x) = 2x + 1$ $g(x) = x^2 - 1$ $(f \circ g)(x) =$
- a) $x^2 + 2x$
 - b) $2x^3 + x^2 - 2x - 1$
 - c) $2x^2 - 1$
 - d) $4x^2 + 4x$
 - e) $2(x^2 + x + 1)$
- 12) The intersection of line $x + y = 2$ and circle $x^2 + y^2 = 4$ occurs when $x =$
- a) $-2, 2$
 - b) $-2, 0, 2$
 - c) $-2, 4$
 - d) $0, 2$
 - e) $0, 4$
- 13) Which is a zero of the function $f(x) = \sin 2(x) - 1/2$?
- a) $\frac{-\pi}{12}$
 - b) $\frac{-\pi}{3}$
 - c) $\frac{-\pi}{2}$
 - d) 0
 - e) $-\pi$
- 14) A circle is inscribed in a square. If the area of the square is 36 sq. units, what is the area of the circle?
- a) 6π
 - b) 9π
 - c) 12π
 - d) 18π
 - e) 36π
- 15) Find the sum
- a) -100
 - b) 2250
 - c) 4500
 - d) 4550
 - e) 4850
- $$\sum_{n=1}^{100} (n - 2)$$

SAT Subject Test - Math Level 2 Practice

- 16) In the xy -plane, the vertices of a triangle are $(-1, 3)$, $(6, 3)$ and $(-1, -4)$.
The area of the triangle is:

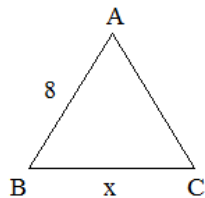
- a) 10
- b) 17.5
- c) 24.5
- d) 35
- e) 42

- 17) A right cylinder has radius 5 and height 5. If A and B are points on the surface, what is the maximum possible (line) distance between them?

- a) 5
- b) $5\sqrt{2}$
- c) 10
- d) 12.5
- e) $5\sqrt{5}$

- 18) In the figure, $AB = AC$ and $\angle A = 80$. What is x ?

- a) 8
- b) 10.3
- c) 11.4
- d) 12
- e) 12.7



- 19) $f(x) = 2x^2$ is translated 2 units to the right and 1 unit up.

If the resulting graph is $g(x)$, then what is $g(3)$?

- a) 3
- b) 11
- c) 15
- d) 26
- e) 31

- 20) A sequence is (recursively) defined as $a_1 = 0$, $a_2 = 1$ and, for $n > 2$, $a_n = a_{n-1} - 3a_{n-2}$.

- a) -8
- b) 1
- c) 18
- d) 72
- e) 109

What is a_6 ?

SAT Subject Test - Math Level 2 Practice

21) If $\sin \Theta = .47$, then $\sin(\pi - \Theta) =$

- a) $-.47$
- b) $-.43$
- c) 0
- d) $.43$
- e) $.47$

22) What is the range of the function defined as $g(x) = \frac{1}{x} + 3$

- a) all real numbers
- b) all real numbers except 0
- c) all real numbers > 3
- d) all real numbers except 3
- e) all real numbers > 1

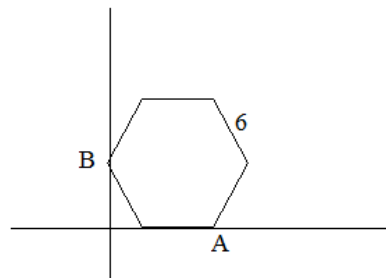
23)

For the matrices $A = \begin{bmatrix} 1 & 3 \\ 0 & -1 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 2 \\ -1 & 4 \end{bmatrix}$ What is BA ?

- a) $\begin{bmatrix} 3 & 5 \\ -1 & 3 \end{bmatrix}$
- b) $\begin{bmatrix} 1 & -1 \\ -1 & 5 \end{bmatrix}$
- c) $\begin{bmatrix} -1 & 14 \\ 1 & -4 \end{bmatrix}$
- d) $\begin{bmatrix} 2 & 4 \\ -1 & -7 \end{bmatrix}$
- e) none of the above

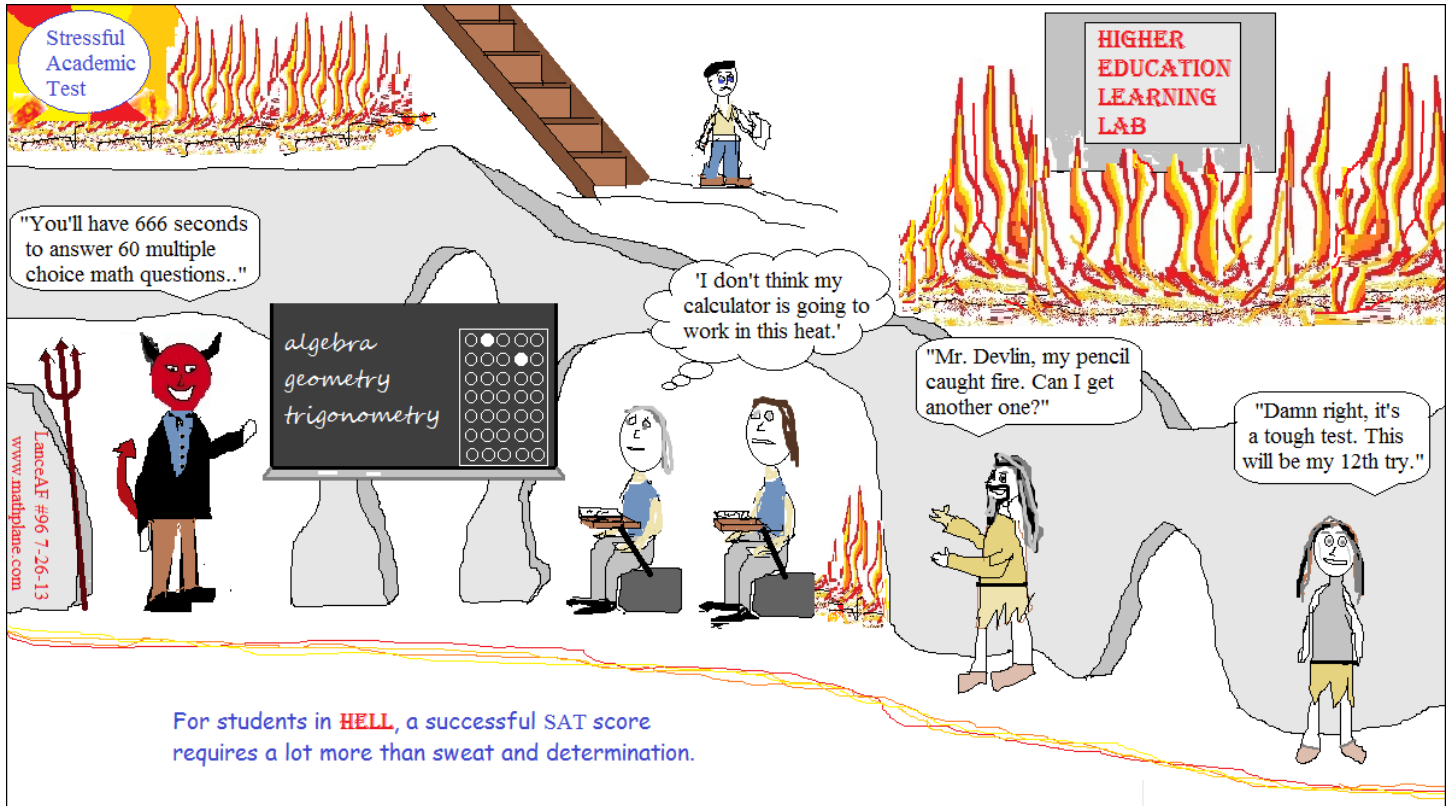
24) In the figure, there is a regular hexagon with sides of length 6. If the coordinate of A is (9, 0), what is the y-coordinate of B?

- a) 0
- b) 3
- c) $3\sqrt{2}$
- d) $3\sqrt{3}$
- e) $4\frac{1}{2}$



25) A sample of 25 scores has a mean 75, median 79, and standard deviation of 8. If you increase every score by 10, which of the following is true?

- a) I only
 - b) II only
 - c) I and II only
 - d) none
 - e) I, II, and III
- I. The new mean is 85
 - II. The new median is 89
 - III. The new standard deviation is 18



Solutions ->

1) If $f(x) = \frac{3x + 7}{6x + 4}$ what value does $f(x)$ approach as x gets infinitely larger?

- a) 0
- b) 1/2
- c) 3/4
- d) 7/4
- e) infinity

Since the rational expression is neither "top heavy" nor "bottom heavy", look at the lead coefficients....

$$\frac{3}{6} = 1/2$$

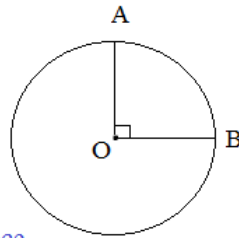
2) O is the center of the circle, and the diameter is 12. What is the arc length \widehat{AB} ?

- a) 3π
- b) 6π
- c) 9π
- d) 18π
- e) 36π

Circumference = π (diameter)
or 2π (radius)

So, circumference of circle O is 12π

Since $\angle AOB$ is 90 degrees, the arc length of AB is 1/4 of the circumference



$$\frac{90^\circ}{360^\circ} \cdot \pi(12) = 3\pi$$

3) What is the distance in space between (1, 0, 5) and (-3, 6, 3)?

- a) 4
- b) 6
- c) $2\sqrt{11}$
- d) $2\sqrt{14}$
- e) 12

$$\begin{aligned} \text{distance} &= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2} \\ &= \sqrt{(1 - (-3))^2 + (0 - 6)^2 + (5 - 3)^2} = \sqrt{16 + 36 + 4} = \sqrt{56} \\ &= 2\sqrt{14} \end{aligned}$$

4) $|5 - 7| - |7 - 5| =$

- a) -4
- b) 0
- c) 2
- d) 4
- e) 12

$$|-2| - |2| = 2 - 2 = 0$$

5) A line has the parametric equation $x = t + 5$ and $y = t + 10$. What is the slope of the line?

- a) 1
- b) 2
- c) 5
- d) 10
- e) 50

$$x = t + 5$$

so,

$$t = x - 5$$

then, using substitution,

$$y = (x - 5) + 10 \longrightarrow y = x + 5 \text{ (slope is 1)}$$

6) Two dice are tossed. What is the probability that neither die is a 4?

- a) $1/6$
 b) $1/3$
 c) $2/3$
 d) $25/36$
 e) $5/6$
- $p(\text{1st is NOT } 4) = 5/6$
 $p(\text{2nd is NOT } 4) = 5/6$
 since each die is independent,
 $p(\text{neither is } 4) = (5/6)(5/6) = 25/36$

7) $(1, 6)$, $(3, -2)$, and $(-2, K)$ are collinear points. What is K ?

- a) -6
 b) 2
 c) 8
 d) 10
 e) 18
- If 3 points are collinear, they are on the same line ---- i.e. each pair with have the same slope!
 slope of $(1, 6)$ and $(3, -2)$ is $\frac{-2 - 6}{3 - 1} = -4$
 slope of $(1, 6)$ and $(-2, K)$ must be -4 $\frac{K - 6}{-2 - 1} = -4$ $K = 18$

8) Vectors u and v are given by $u = (3, 0)$ and $v = (1, -4)$. What is the length of vector w , given by $w = 2u - v$?

- a) $2\sqrt{10}$
 b) $\sqrt{41}$
 c) $6 - \sqrt{17}$
 d) 3
 e) $\sqrt{23}$
- $w = 2(3, 0) - (1, -4)$
 $w = (5, 4)$
 $\|w\| = \sqrt{(5)^2 + (4)^2} = \sqrt{41}$

9) The domain of $g(x) = \frac{3}{\sqrt{4 - x^2}}$ is:

- a) $[-2, 2]$
 b) $(-2, 2)$
 c) $(0, 2)$
 d) $(-\infty, -2)$
 e) $(-\infty, 2)$
- cannot have negative under a radical
 and cannot have zero in the denominator...
 so, must be between -2 and 2

10) The radius of circle $x^2 - 4x + y^2 + 6y = 3$

- a) 3
 b) $\sqrt{3}$
 c) 4
 d) 8
 e) 16
- complete the square to change into standard form...
 $x^2 - 4x + 4 + y^2 + 6y + 9 = 3 + 4 + 9$
 $(x - 2)^2 + (y + 3)^2 = 16$ radius = 4
 $(x - h)^2 + (y - k)^2 = r^2$

SAT Subject Test - Math Level 2 Practice

SOLUTIONS

11) $f(x) = 2x + 1$ $g(x) = x^2 - 1$

$(f \circ g)(x) =$

a) $x^2 + 2x$

b) $2x^3 + x^2 - 2x - 1$

c) $2x^2 - 1$

d) $4x^2 + 4x$

e) $2(x^2 + x + 1)$

$f(g(x)) = 2(x^2 - 1) + 1$

$2x^2 - 2 + 1$

$2x^2 - 1$

12) The intersection of line $x + y = 2$ and circle $x^2 + y^2 = 4$ occurs when $x =$

a) $-2, 2$

b) $-2, 0, 2$

c) $-2, 4$

d) $0, 2$

e) $0, 4$

solve algebraically:

$y = -x + 2$

$x^2 + y^2 = 4$

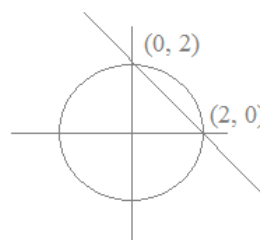
(substitution)

$x^2 + (-x + 2)^2 = 4$

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

$2x^2 - 4x = 0$

$2x(x - 2) = 0$ $x = 0, 2$



13) Which is a zero of the function $f(x) = \sin 2(x) - 1/2$?

a) $-\frac{\pi}{12}$

b) $-\frac{\pi}{3}$

c) $-\frac{\pi}{2}$

d) 0

e) $-\pi$

$\sin 2x - 1/2 = 0$

$\sin 2x = 1/2$

$2x = \frac{\pi}{6}$

$x = \frac{\pi}{12}$

14) A circle is inscribed in a square. If the area of the square is 36 sq. units, what is the area of the circle?

a) 6π

b) 9π

c) 12π

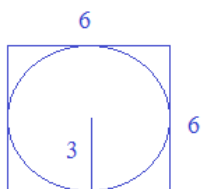
d) 18π

e) 36π

Area of circle = πr^2

area = $\pi 3^2$

= 9π



since area of square is 36, each side is 6...

If a side is 6, then the radius must be 3...

15) Find the sum

a) -100

b) 2250

c) 4500

d) 4550

e) 4850

$\sum_{n=1}^{100} (n - 2)$

$\sum_{n=1}^{100} n - \sum_{n=1}^{100} 2$

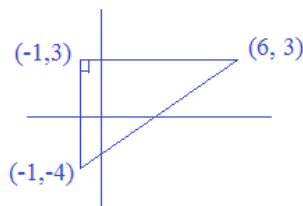
$(100 + 1)(50) - 2(100)$
= 4850

sum formula: $\frac{n(a_1 + a_n)}{2}$
number of terms first term last term

- 16) In the xy -plane, the vertices of a triangle are $(-1, 3)$, $(6, 3)$ and $(-1, -4)$.
The area of the triangle is:

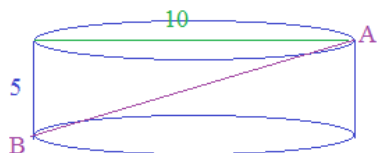
- a) 10
b) 17.5
c) 24.5
d) 35
e) 42

$$\begin{aligned} \text{Area} &= 1/2 (\text{base})(\text{height}) \\ \text{Area} &= 1/2(7)(7) \\ &= 49/2 = 24.5 \end{aligned}$$



- 17) A right cylinder has radius 5 and height 5. If A and B are points on the surface, what is the maximum possible (line) distance between them?

- a) 5
b) $5\sqrt{2}$
c) 10
d) 12.5
e) $5\sqrt{5}$



radius is 5, so the diameter is 10!!

The maximum line distance is the hypotenuse of the "right triangle of the cylinder"

$$5^2 + 10^2 = AB^2 \quad AB = \sqrt{125} = 5\sqrt{5}$$

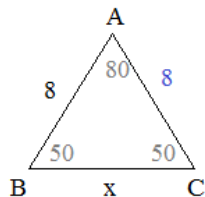
- 18) In the figure, $AB = AC$ and $\angle A = 80$. What is x ?

- a) 8
b) 10.3
c) 11.4
d) 12
e) 12.7

use of law of sines: $\frac{\sin A}{x} = \frac{\sin C}{8}$

$$x = \frac{8 \sin A}{\sin C}$$

$$x = \frac{8(\sin 80)}{\sin 50} = \frac{8(.985)}{(.766)} = 10.3$$



$AB = AC$, so

$$\angle B = \angle C$$

angles $A + B + C = 180$,
so B and C are 50 degrees...

- 19) $f(x) = 2x^2$ is translated 2 units to the right and 1 unit up.

If the resulting graph is $g(x)$, then what is $g(3)$?

- a) 3
b) 11
c) 15
d) 26
e) 31

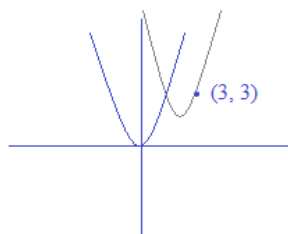
$$f(x) = 2x$$

shift 2 units to the right: $2(x-2)^2$

shift 1 unit up: $2(x-2)^2 + 1$

$$g(x) = 2(x-2)^2 + 1$$

$$g(3) = 2(3-2)^2 + 1 = 3$$



- 20) A sequence is (recursively) defined as $a_1 = 0$, $a_2 = 1$ and, for $n > 2$, $a_n = a_{n-1} - 3a_{n-2}$

- a) -8
b) 1
c) 18
d) 72
e) 109

input	output
1	0
2	1
3	1 \longleftarrow 1 - 3(0)
4	-2 \longleftarrow 1 - 3(1)
5	-5 \longleftarrow -2 - 3(1)
6	1 \longleftarrow -5 - 3(-2)

What is a_6 ?

21) If $\sin \Theta = .47$, then $\sin(\pi - \Theta) =$

- a) $-.47$
- b) $-.43$
- c) 0
- d) $.43$
- e) $.47$**

Using the difference of angles trig identity:

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$\sin \pi \cos \Theta - \cos \pi \sin \Theta$$

$$0 (\cos \Theta) - (-1) \sin \Theta = \sin \Theta$$

22) What is the range of the function defined as $g(x) = \frac{1}{x} + 3$

- a) all real numbers
- b) all real numbers except 0
- c) all real numbers > 3
- d) all real numbers except 3**
- e) all real numbers > 1

(the domain is all real numbers except 0)

The range represents all possible outputs...

Since $1/x$ will never equal zero, 3 will never be an output!

23)

For the matrices $A = \begin{bmatrix} 1 & 3 \\ 0 & -1 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 2 \\ -1 & 4 \end{bmatrix}$

NOTE: $BA \neq AB$

What is BA ?

$$BA = \begin{bmatrix} 2 & 2 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 1 & 3 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} 2(1) + 2(0) & 2(3) + 2(-1) \\ -1(1) + 4(0) & -1(3) + 4(-1) \end{bmatrix}$$

a) $\begin{bmatrix} 3 & 5 \\ -1 & 3 \end{bmatrix}$

b) $\begin{bmatrix} 1 & -1 \\ -1 & 5 \end{bmatrix}$

c) $\begin{bmatrix} -1 & 14 \\ 1 & -4 \end{bmatrix}$

d) $\begin{bmatrix} 2 & 4 \\ -1 & -7 \end{bmatrix}$

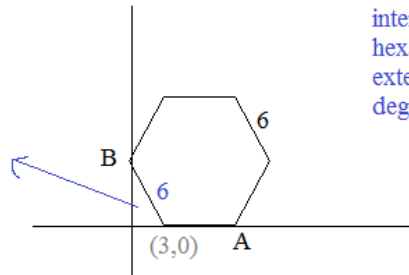
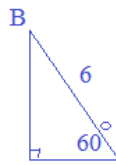
e) none of the above

24) In the figure, there is a regular hexagon with sides of length 6. If the coordinate of A is (9, 0), what is the y-coordinate of B?

- a) 0
- b) 3
- c) $3\sqrt{2}$
- d) $3\sqrt{3}$**
- e) $4\frac{1}{2}$

if hypotenuse of 30-60-90 right triangle is 6, then small side is 3 and middle leg is $3\sqrt{3}$

B is $(0, 3\sqrt{3})$



interior angles of regular hexagon are 120 degrees. exterior angles are 60 degrees

25) A sample of 25 scores has a mean 75, median 79, and standard deviation of 8. If you increase every score by 10, which of the following is true?

- a) I only
- b) II only
- c) I and II only**
- d) none
- e) I, II, and III

- I. The new mean is 85
- II. The new median is 89
- III. The new standard deviation is 18

note: the difference of each score relative to the mean hasn't changed, because all the scores increased together! therefore the standard deviation is unchanged..

How did you do?

Want more test prep questions?

- 1) A game has 2 spinners. Spinner #1 has a probability of landing red of $\frac{2}{3}$. And, spinner #2 has a probability of landing red of $\frac{1}{5}$.
What is the probability spinner #1 lands red AND spinner #2 does NOT land red?

- a) $\frac{2}{15}$
- b) $\frac{8}{15}$
- c) $\frac{13}{15}$
- d) $\frac{1}{5}$
- e) $\frac{3}{5}$

- 2) For some positive real number 'b',
 $b - 1$, $b + 4$, $3b + 2$. What is the

- a) 16
- b) 20
- c) 24
- d) 28
- e) 40

- 3) Which equation best models the following data in the table:

- a) $y = 1.2(4.4)^x$

x	-6.7	-1.3	3.2	8.8
	1.20	2.47	7.80	21.80

150 SAT Subject Test
Math Level 2
Practice Questions
(and, Solutions)

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(\$5 for .pdf or .docx packet)

The proceeds go to site maintenance and treats for Oscar the Dog.

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