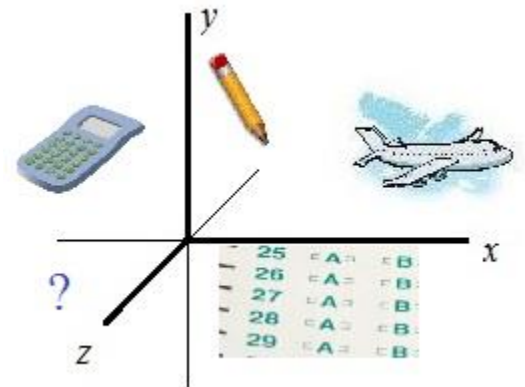# SAT Math Level 2

Practice Test B

## 24 multiple choice math questions (and solutions)

Mathplane.com

Topics include ratios, quadratics, area, graphing, trigonometry, probability, exponential equations, logarithms, and more.

1) 20% of students in college are seniors. 40% of seniors are taking a math class. What percentage of students in college are seniors enrolled in a math class?

    a) 8%

    b) 30%

    c) 40%

    d) 60%

    e) 80%

2) In the figure, $BC \parallel DE$ and $\dfrac{AB}{AD} = \dfrac{3}{4}$

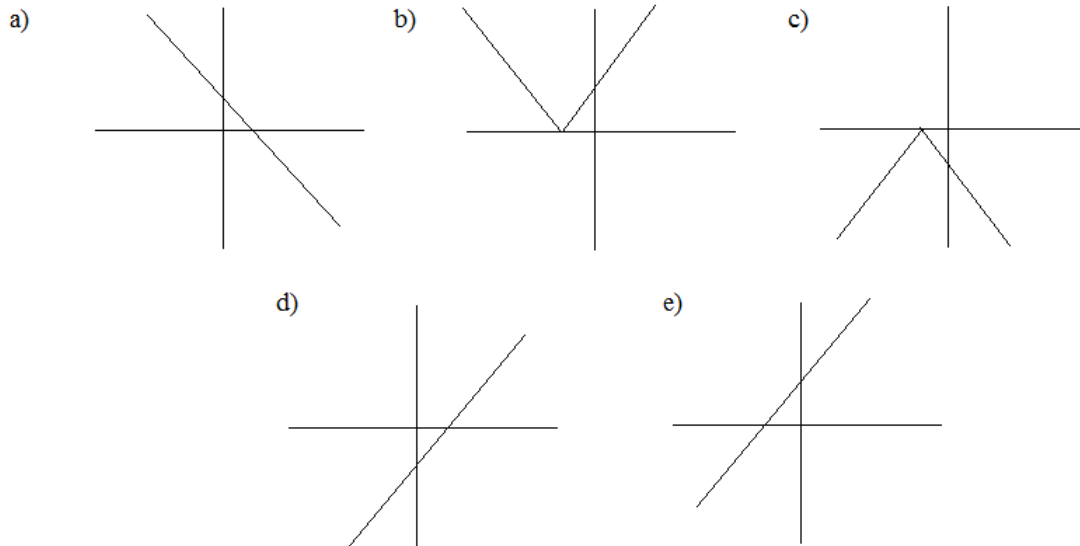What is the ratio between the area of $\triangle ABC$ and $\triangle ADE$?
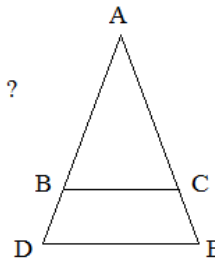
    a) 3/4

    b) 9/32

    c) 3/8

    d) 9/16

    e) 8/9

3) $x^2 - 3xb + 5 = 0$ If $x = 1$ is a solution, what is b?

    a) -1

    b) 1

    c) 2

    d) 3

    e) 5

4) Which value x satisfies the inequality $|3x| < x + 4$?

    a) -3

    b) -2

    c) 1

    d) 2

    e) 3

5) Each edge in a cube is 5cm. What is the surface area in square cm?

    a) 25

    b) 30

    c) 100

    d) 125

    e) 150

6) If $\sin x = \dfrac{1}{2}$ and $\cos x < 0$, then $x =$

     a) $-\dfrac{\pi}{6}$ b) $\dfrac{\pi}{6}$ c) $\dfrac{\pi}{2}$ d) $\dfrac{2\pi}{3}$ e) $\dfrac{5\pi}{6}$

7) If $f(x) = x + 1$, then, the graph of $-|f(x)|$ looks like:

   a)   b)   c)

   d)   e)

8) If $ax^3 + bx^2 + c$ is divided by $(x - 3)$, then the remainder is:

    a) $-27a + 9b + c$
    b) $-27a - 9b$
    c) $27a + 9b + c$
    d) $27a + 9b$
    e) $-27a + 9b$

9) 10 men and 5 women apply for a six-person math committee. If the six are selected at random, what is the probability that the committee has an equal number of men and women?

    a) .18

    b) .26

    c) .31

    d) .35

    e) .40

10) For some real number t, the first 3 terms of an arithmetic sequence are
    3t, 4t + 2, and 7t − 4.   What is the numerical value of the 4th term?

    a) 15

    b) 19

    c) 26

    d) 30

    e) 36

11) In a group of 10 people, 70% take vitamins. If you randomly choose 2 of them,
    what is the probability <u>neither</u> person selected takes vitamins?

    a) .07

    b) .09

    c) .30

    d) .47

    e) .49

12) If $2^{x+1} = 8^{x-3}$, then x is

    a) 2

    b) 3

    c) 4

    d) 5

    e) 6

13) A $500 investment account decreases 10% the first year. Then, in year 2, the account
    balance increases 10%. How much is in the account after year 2?

    a) 450

    b) 495

    c) 505

    d) 510

    e) 550

14) $2x^3 + 6x^2 + 4x = 0$ has the following solution set:

    a) {1, 2}

    b) {-1, -2}

    c) {1, -2}

    d) {-2, -1, 0}

    e) {0, 1, 2}

15) If $t = 45°$, what is $\sec(t)\sin(t) - \csc(t)\cos(t)$?

    a) -2

    b) -1

    c) 0

    d) $\dfrac{\pi}{2}$

    e) $\dfrac{\pi}{2}$

16) What are the polar coordinates of a point with (-3, 3) rectangle coordinates?

    a) $(3, 135°)$

    b) $(-3, 135°)$

    c) $(3\sqrt{2}, 45°)$

    d) $(3\sqrt{2}, 135°)$

    e) $(-3\sqrt{2}, 45°)$

17) Let $\log(x) = 3$ and $\log(y) = 5$;   Find $\log(x^2 y)$

    a) 11

    b) 14

    c) 15

    d) 28

    e) 45

18) What is the least common multiple of 10 and 20?

    a) 2

    b) 5

    c) 10

    d) 20

    e) 200

19) Find $(5 + 2i)(5 - 2i)$ $i^2 = -1$

    a) $25 - 4i$

    b) $25 - 20i$

    c) 21

    d) 29

    e) 0

20) Using a hose, it takes 9 hours to fill a swimming pool. Using an irrigation pump, it takes 3 hours.
    If you use both the hose and pump together, how long will it take to fill the pool?

    a) 2 hours

    b) 2 hours 15 minutes

    c) 2 hours 45 minutes

    d) 3 hours

    e) 6 hours

21) A rectangular prism with dimensions 3' x 4' x 6' is filled with water.
     If a solid cube with 3-foot edges were placed inside the prism, how much water would
     remain (after the excess was displaced).

    a) 15 cubic feet

    b) 27 cubic feet

    c) 45 cubic feet

    d) 60 cubic feet

    e) 63 cubic feet

22) Evaluate: $$\lim_{x \to -3} \frac{x^3 + 27}{x + 3}$$
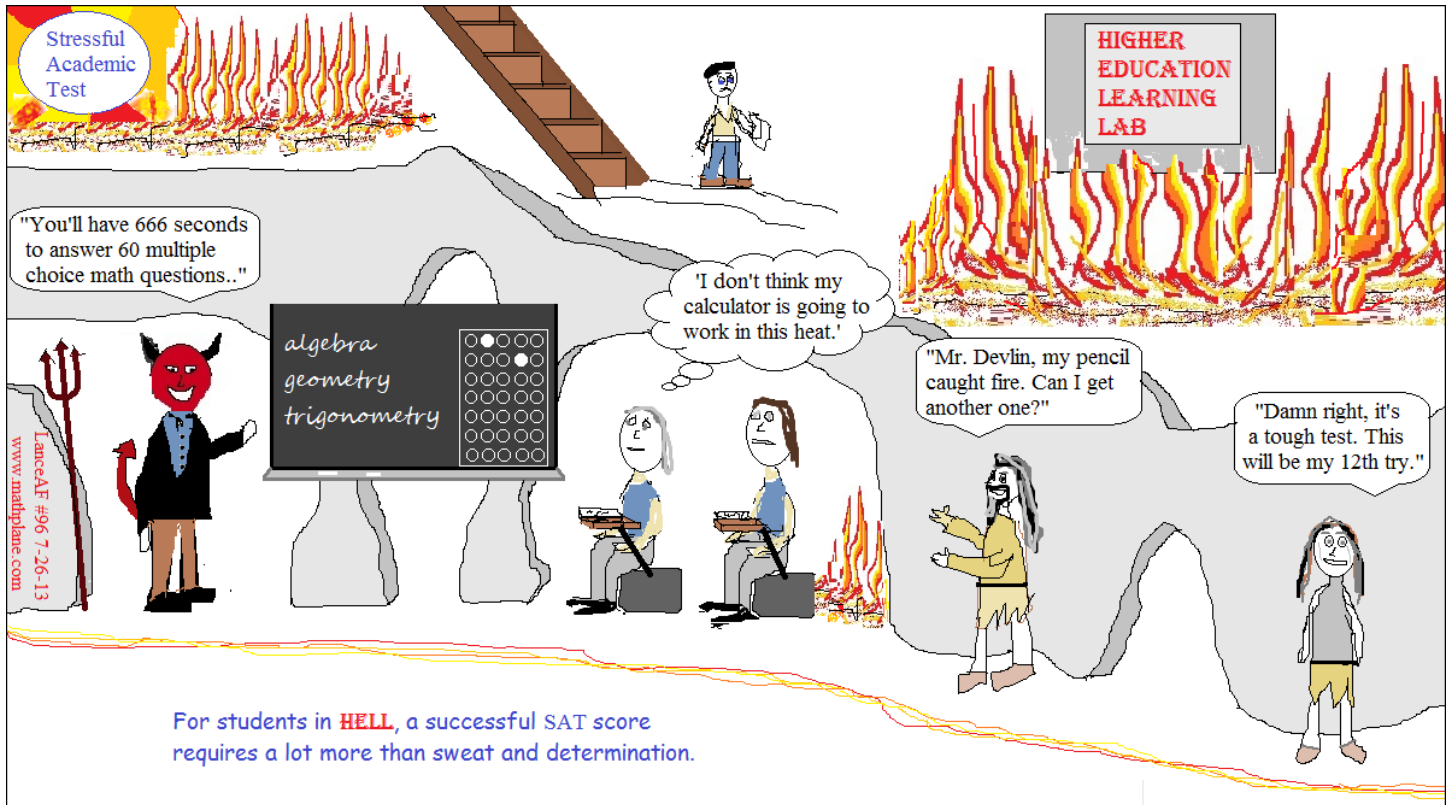
    a) 0

    b) 9

    c) 27

    d) − 3

    e) Undefined

23) The point (3, 0, -4) lies on the

    a) y-axis
    b) z-axis
    c) xy-plane
    d) xz-plane
    e) yz-plane

24) If $f(x) = 4\sqrt[3]{x + 1}$, what is $f^{-1}(7)$?

    a) -7
    b) 8
    c) 4.4
    d) 1.75
    e) 7.2

Solutions ->

SOLUTIONS

1) 20% of students in college are seniors. 40% of seniors are taking a math class. What percentage of students in college are seniors enrolled in a math class?

   a) 8%

   b) 30%   (dependent events)   .20 x .40 = .08   8%

   c) 40%

   d) 60%   ex: assume 100 students in the college..

   e) 80%   20 are seniors...   then, 40% of 20 seniors is 8..

2) In the figure, $BC \parallel DE$ and $\dfrac{AB}{AD} = \dfrac{3}{4}$

What is the ratio between the area of $\triangle ABC$ and $\triangle ADE$?

   a) 3/4

   b) 9/32   Triangles are similar, so all corresponding parts have a 3:4 ratio..

   c) 3/8 $A = 1/2(\text{base})(\text{height})$

   d) 9/16

            $A = 1/2[(3/4)\text{base}][(3/4)\text{height}]$

   e) 8/9 $= 1/2[9/16(\text{base})(\text{height})]$

3) $x^2 - 3xb + 5 = 0$ If $x = 1$ is a solution, what is b?

   a) -1   (plug in x = 1)

   b) 1 $1^2 + 3(1)b + 5 = 0$

   c) 2

   d) 3 $6 + 3b = 0$
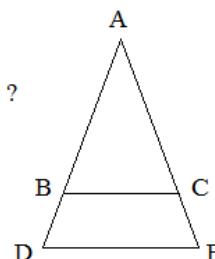
   e) 5 $b = 2$

4) Which value x satisfies the inequality $|3x| < x + 4$?

   a) -3 $|-9| < 1$ no

   b) -2 $|-6| < 2$ no

   c) 1 $|3| < 5$ yes

   d) 2 $|6| < 6$ no

   e) 3 $|9| < 7$ no

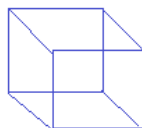5) Each edge in a cube is 5cm. What is the surface area in square cm?

   a) 25

   b) 30   cube has 6 congruent sides..

   c) 100   each side is 5cm x 5cm

   d) 125

   e) 150 $25\text{cm}^2 \times 6 = 150 \text{ cm}^2$

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SOLUTIONS

6) If $\sin x = \dfrac{1}{2}$ and $\cos x < 0$, then x =

a) $-\dfrac{\pi}{6}$ b) $\dfrac{\pi}{6}$ c) $\dfrac{\pi}{2}$ d) $\dfrac{2\pi}{3}$ e) $\dfrac{5\pi}{6}$
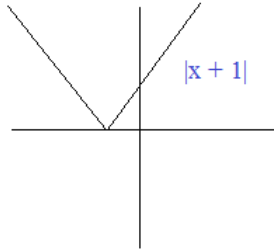
quadrant III
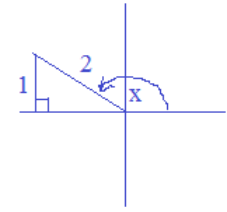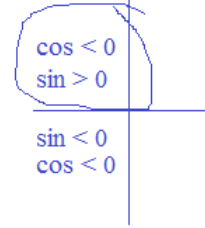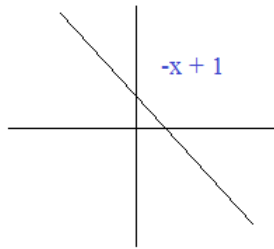
cos < 0
sin > 0

sin < 0
cos < 0

7) If $f(x) = x + 1$, then, the graph of $-\lvert f(x) \rvert$ looks like:

a)   -x + 1

b) |x + 1|

c)   -|x + 1|

d)   x - 1

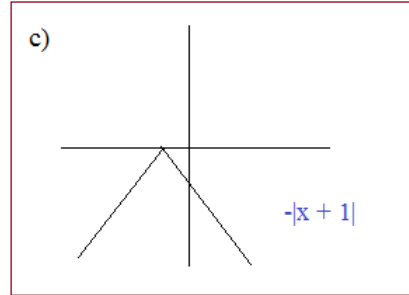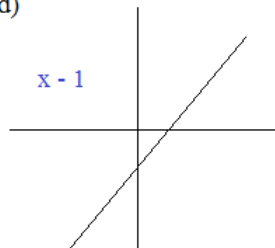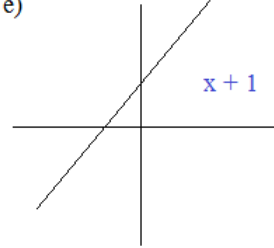e)   x + 1

8) If $ax^3 + bx^2 + c$ is divided by $(x - 3)$, then the remainder is:

a) -27a + 9b + c
b) -27a − 9b
c) 27a + 9b + c
d) 27a + 9b
e) -27a + 9b

(remainder theorem) $a(3)^3 + b(3)^2 + c$ is the remainder

27a + 9b + c

If a polynomial $f(x)$ is divided by a linear term $(x - a)$ ---
and the remainder is r --- then $f(a) = r$

9) 10 men and 5 women apply for a six-person math committee. If the six are selected at random, what is the probability that the committee has an equal number of men and women?

a) .18

b) .26

c) .31

d) .35

e) .40

$\text{probability} = \dfrac{\#\ \text{successful outcomes}}{\#\ \text{of possibilities}} = \dfrac{10C3 \cdot 5C3}{15C6} = \dfrac{\frac{10!}{3!\,7!} \cdot \frac{5!}{3!\,2!}}{\frac{15!}{6!\,9!}}$

$\cong .26$

10) For some real number t, the first 3 terms of an arithmetic sequence are
3t, 4t + 2, and 7t − 4.   What is the numerical value of the 4th term?

a) 15

b) 19

c) 26

d) 30

e) 36

since it is an arithmetic sequence, there is a common
difference (a) between terms..

$(3t) + a = (4t + 2)$ ⟶ $t = a - 2$

$(4t + 2) + a = (7t − 4)$ ⟶ $3t = a + 6$

12, 18, 24, 30...

$3(a - 2) = a + 6$

$3a - 6 = a + 6$

$2a = 12$

$a = 6$ the 'common difference' is 6

$t = 4$

11) In a group of 10 people, 70% take vitamins. If you randomly choose 2 of them,
what is the probability <u>neither</u> person selected takes vitamins?

a) .07

b) .09

c) .30

d) .47

e) .49

Since there is no "replacement", the events are dependent.
(i.e. the probability of the 2nd person depends on outcome of the 1st
person)

p(neither) = p(1st doesn't take) · p(2nd doesn't take)

$= \frac{3}{10} \cdot \frac{2}{9} = \frac{1}{15}$ approx. .07

12) If $2^{x+1} = 8^{x-3}$, then x is

a) 2

b) 3

c) 4

d) 5

e) 6

$2^{x+1} = (2^3)^{x-3}$

$2^{x+1} = 2^{3x-9}$

$x + 1 = 3x - 9$

$x = 5$

13) A $500 investment account decreases 10% the first year. Then, in year 2, the account
balance increases 10%. How much is in the account after year 2?

a) 450

b) 495

c) 505

d) 510

e) 550

year 1: $500 − 10% -----> $500 − $50 = $450

year 2: $450 + 10% -----> $450 + $45 = $495

14) $2x^3 + 6x^2 + 4x = 0$ has the following solution set:

a) {1, 2}

b) {-1, -2}

c) {1, -2}

d) {-2, -1, 0}

e) {0, 1, 2}

factor out GCF $2x(x^2 + 3x + 2) = 0$

$2x(x + 2)(x + 1) = 0$

$x = 0, -2, -1$

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15) If t = 45° , what is sec(t)sin(t) − csc(t)cos(t) ?

a) -2

b) -1

c) 0

d) $\dfrac{\pi}{2}$

e) $\dfrac{\pi}{2}$

trig identities: sec = 1/cos
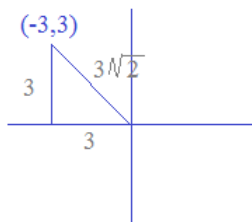   csc = 1/sin

$\tan x = \dfrac{\sin x}{\cos x}$

$\cot x = \dfrac{\cos x}{\sin x}$

$\dfrac{1}{\cos(t)}$ sin(t) − $\dfrac{1}{\sin(t)}$ cos(t)

= tan(t) − cot(t)

if t = 45° , tan(t) - cot(t) = 1 - 1 = 0

16) What are the polar coordinates of a point with (-3, 3) rectangle coordinates?

a) (3, 135°)

b) (-3, 135°)

c) (3$\sqrt{2}$, 45°)

d) (3$\sqrt{2}$, 135°)

e) (-3$\sqrt{2}$, 45°)

(-3,3)

$3\sqrt{2}$

3

3

x = r cos $\ominus$

y = r sin $\ominus$

17) Let log(x) = 3 and log(y) = 5;   Find log(x^2 y)

a) 11

b) 14

c) 15

d) 28

e) 45

logarithm "product/addition" rule:

log(AB) = logA + logB

log(x^2 y) = logx + logx + logy = 11

18) What is the least common multiple of 10 and 20?

a) 2

b) 5

c) 10

d) 20

e) 200

multiples of 10: 10, 20, 30, 40....
multiples of 20: 20, 40, 60, 80, ...

Least common multipe is 20

19) Find (5 + 2i)(5 − 2i) i^2 = -1

a) 25 − 4i

b) 25 − 20i

c) 21

d) 29

e) 0

FOIL: 25 − 10i + 10i − 4i^2

25 − 4(-1) = 29

20) Using a hose, it takes 9 hours to fill a swimming pool. Using an irrigation pump, it takes 3 hours.
    If you use both the hose and pump together, how long will it take to fill the pool?

a) 2 hours

b) 2 hours 15 minutes

c) 2 hours 45 minutes

d) 3 hours

e) 6 hours

hose + pump = 1 pool

$t\dfrac{1 \text{ pool}}{9 \text{ hours}} + t\dfrac{1 \text{ pool}}{3 \text{ hours}} = 1 \text{ pool}$

multiply by 27 hours & divide out the "pool"

3t   +   9t   = 27hours

t = 27/12 = 2.25 hours   2 hours 15 minutes

d = rate(time)   or   pool = rate(time)

$\text{rate} = \dfrac{\text{pool}}{\text{time}}$

$\text{rate}_{hose} = \dfrac{1 \text{ pool}}{9 \text{ hours}}$ $\text{rate}_{pump} = \dfrac{1 \text{ pool}}{3 \text{ hours}}$

21) A rectangular prism with dimensions 3' x 4' x 6' is filled with water.
    If a solid cube with 3-foot edges were placed inside the prism, how much water would
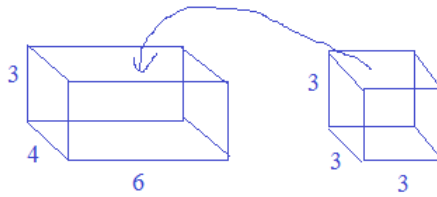   remain (after the excess was displaced).

a) 15 cubic feet

b) 27 cubic feet

c) 45 cubic feet

d) 60 cubic feet

e) 63 cubic feet

will displace 27,
leaving 45 cubic feet of
water..

volume: 72 cubic feet   volume: 27 cubic feet

22) Evaluate:

$\displaystyle\lim_{x \to -3} \dfrac{x^3 + 27}{x + 3}$

a) 0

b) 9

c) 27

d) − 3

e) Undefined

$\dfrac{0}{0}$ so, use L'Hospital's rule

derivative (numerator) $\dfrac{3x^2}{1}$
derivative (denominator)

limit approaching -3: 27

or, factor the numerator and divide

$\dfrac{(x + 3)(x^2 - 3x + 9)}{(x + 3)}$ ----> $\displaystyle\lim_{x \to -3} (x^2 - 3x + 9) = 27$

23) The point (3, 0, -4) lies on the
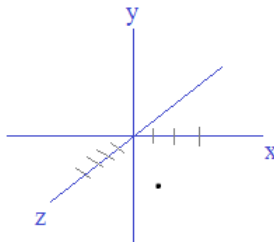
a) y-axis

b) z-axis

c) xy-plane

d) xz-plane

e) yz-plane

moves 3 along x-axis,
neither up or down along y-axis,
and moves -4 along z-axis

24) If $f(x) = 4\sqrt[3]{x + 1}$, what is $f^{-1}(7)$?

a) -7

b) 8

c) 4.4

d) 1.75

e) 7.2

$7 = 4\sqrt[3]{x + 1}$

$\dfrac{7}{4} = \sqrt[3]{x + 1}$

$\dfrac{343}{64} = x + 1$ $x = \dfrac{279}{64} = 4.36$

if $f(c) = 7$, then (c, 7) is point in the function..

therefore, (7, c) is a point in the inverse of $f(x)$

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Want more test prep questions?

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

    a) 2/15

    b) 8/15

    c) 13/15

    d) 1/5

    e) 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

150 SAT Subject Test Math Level 2 Practice Questions

(and, Solutions)

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

    a) $y = 1.2(4.4)^X$

    b) $y = 4.4(1.2)^X$

x	-6.7	-1.3	3.2	8.8
	1.30	3.47	7.80	21.80

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($5 for .pdf or .docx packet)

Proceeds go to site maintenance and treats for Norway the Husky.

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