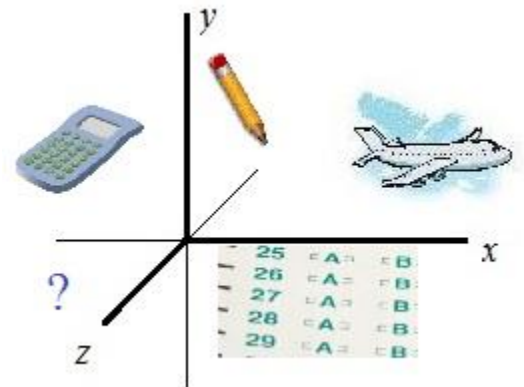


SAT Math Level 2

Practice Test B

24 multiple choice math questions (and solutions)



Mathplane.com

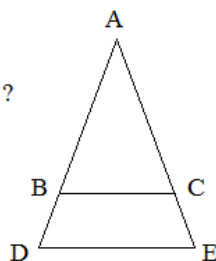
Topics include ratios, quadratics, area, graphing, trigonometry, probability, exponential equations, logarithms, and more.

- 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 $\frac{AB}{AD} = \frac{3}{4}$

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

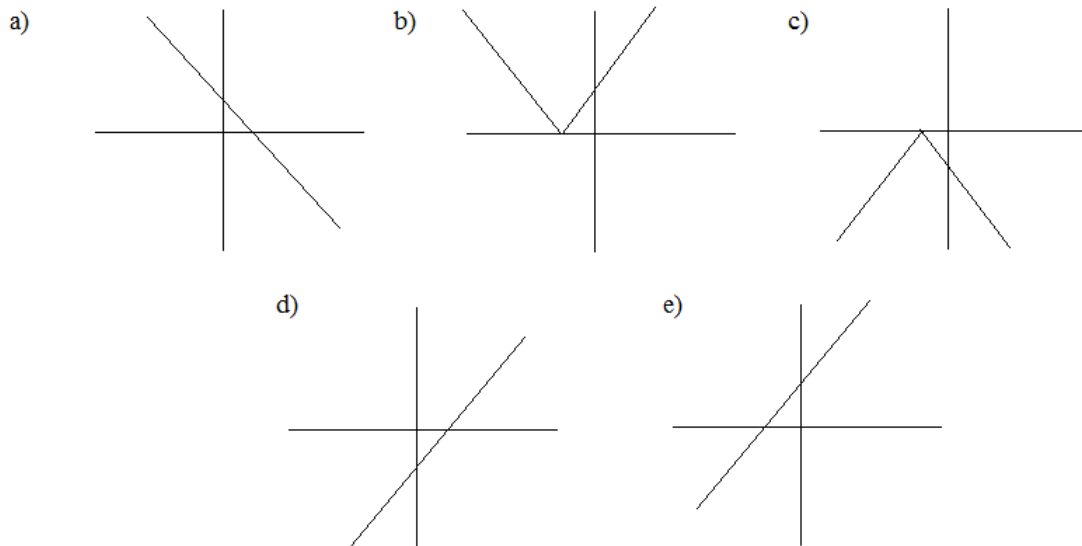


- a) $\frac{3}{4}$
b) $\frac{9}{32}$
c) $\frac{3}{8}$
d) $\frac{9}{16}$
e) $\frac{8}{9}$
- 3) $x^2 - 3xb + 5 = 0$ If $x = 1$ is a solution, what is b ?
- a) -1
b) 1
c) 2
d) 3
e) 5
- 4) Which value x satisfies the inequality $|3x| < x + 4$?
- a) -3
b) -2
c) 1
d) 2
e) 3
- 5) Each edge in a cube is 5cm. What is the surface area in square cm?
- a) 25
b) 30
c) 100
d) 125
e) 150

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

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

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



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 neither 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 $t = 45^\circ$, what is $\sec(t)\sin(t) - \csc(t)\cos(t)$?

- a) -2
- b) -1
- c) 0
- d) $\frac{-\pi}{2}$
- e) $\frac{-\pi}{2}$

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

- a) $(3, 135^\circ)$
- b) $(-3, 135^\circ)$
- c) $(3\sqrt{2}, 45^\circ)$
- d) $(3\sqrt{2}, 135^\circ)$
- e) $(-3\sqrt{2}, 45^\circ)$

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:

$$\lim_{x \rightarrow -3} \frac{x^3 + 27}{x + 3}$$

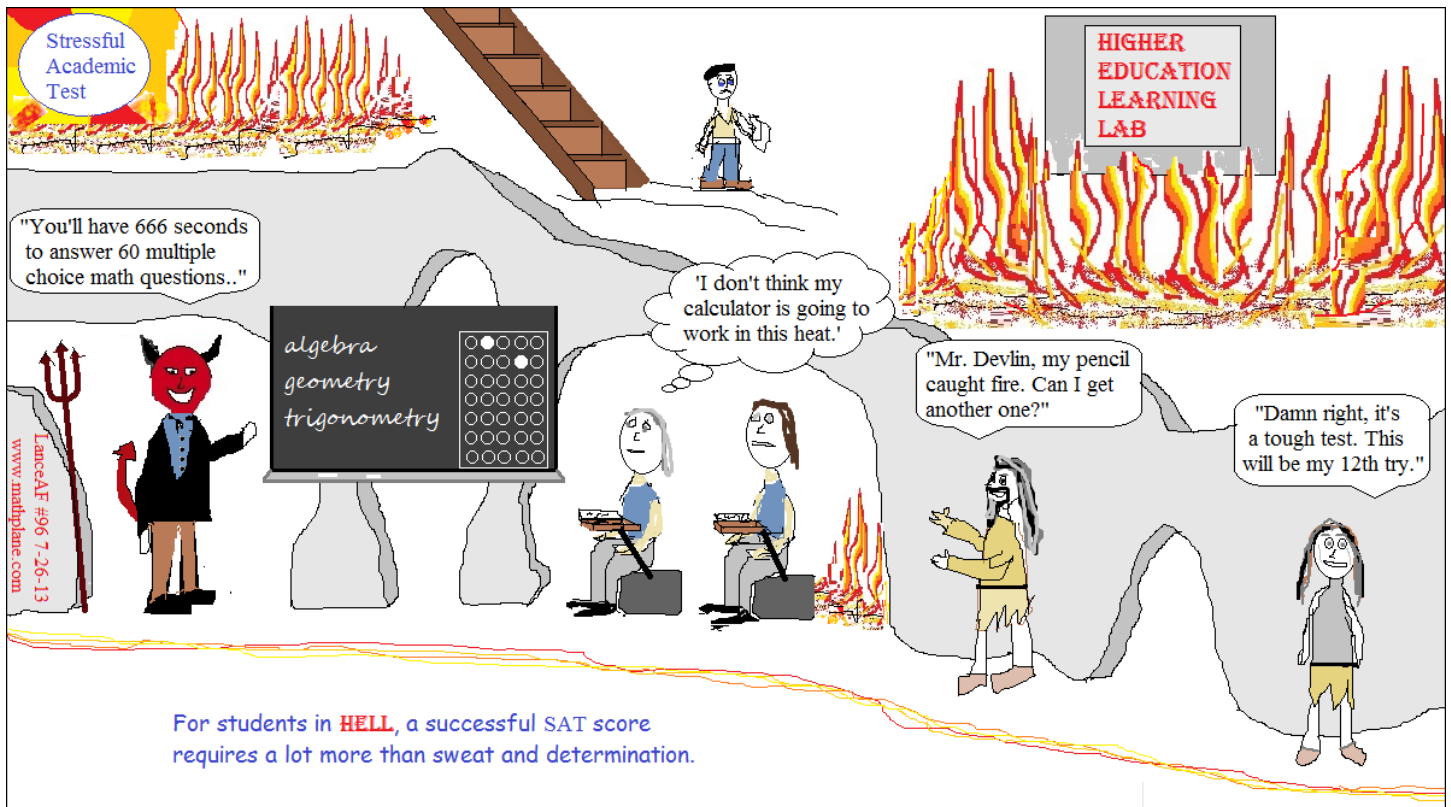
a) 0
b) 9
c) 27
d) -3
e) Undefined

- 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 -→

- 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%

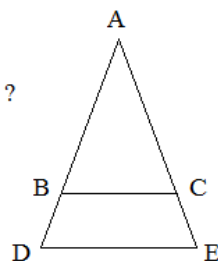
(dependent events) $.20 \times .40 = .08$ 8%

ex: assume 100 students in the college..

20 are seniors... then, 40% of 20 seniors is 8..

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

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) $8/9$

Triangles are similar, so all corresponding parts have a 3:4 ratio..

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

$$\begin{aligned} A &= 1/2[(3/4)\text{base}][(3/4)\text{height}] \\ &= 1/2[9/16(\text{base})(\text{height})] \end{aligned}$$

- 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

(plug in $x = 1$)

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

$$6 + 3b = 0$$

$$b = -2$$

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

a) -3

b) -2

c) 1

d) 2

e) 3

$$|-9| < 1 \text{ no}$$

$$|-6| < 2 \text{ no}$$

$$|3| < 5 \text{ yes}$$

$$|6| < 6 \text{ no}$$

$$|9| < 7 \text{ no}$$

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

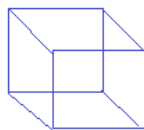
a) 25

b) 30

c) 100

d) 125

e) 150



cube has 6 congruent sides..
each side is 5cm x 5cm

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

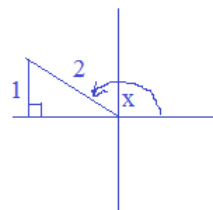
6) If $\sin x = \frac{1}{2}$ and $\cos x < 0$, then $x =$

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

quadrant III

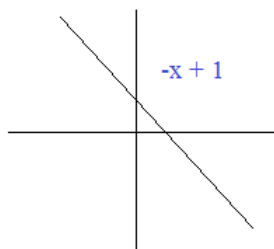
$$\begin{aligned} \cos < 0 \\ \sin > 0 \end{aligned}$$

$$\begin{aligned} \sin < 0 \\ \cos < 0 \end{aligned}$$

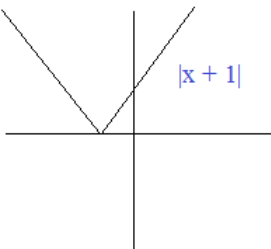


7) If $f(x) = x + 1$, then, the graph of $-|f(x)|$ looks like:

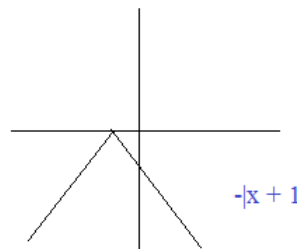
a)



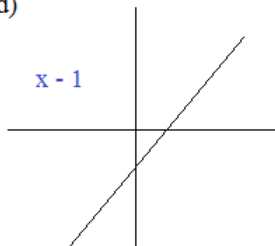
b)



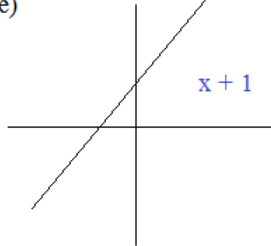
c)



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) $-27a + 9b$

(remainder theorem)

$$a(3)^3 + b(3)^2 + c \text{ is the remainder}$$

$$27a + 9b + c$$

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

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

$$\cong .26$$

- 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..

12, 18, 24, 30...

$$\begin{array}{lcl} (3t) + a = (4t + 2) & \longrightarrow & t = a - 2 \\ (4t + 2) + a = (7t - 4) & \longrightarrow & 3t = a + 6 \end{array} \quad \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} 3(a - 2) = a + 6 \\ 3a - 6 = a + 6 \\ 2a = 12 \\ a = 6 \\ t = 4 \end{array}$$

the 'common difference' is 6

- 11) In a group of 10 people, 70% take vitamins. If you randomly choose 2 of them, what is the probability neither 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)

$$p(\text{neither}) = p(\text{1st doesn't take}) \cdot p(\text{2nd doesn't take})$$

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

- 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

$$\text{year 1: } \$500 - 10\% \longrightarrow \$500 - \$50 = \$450$$

$$\text{year 2: } \$450 + 10\% \longrightarrow \$450 + \$45 = \$495$$

- 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}

$$\text{factor out GCF} \quad 2x(x^2 + 3x + 2) = 0$$

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

$$x = 0, -2, -1$$

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

a) -2

b) -1

c) 0

d) $\frac{\pi}{2}$ e) $\frac{\pi}{2}$

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

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

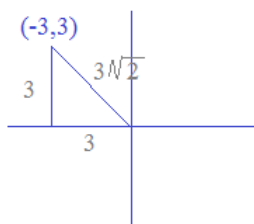
$$\cot x = \frac{\cos x}{\sin x}$$

$$\frac{1}{\cos(t)} \sin(t) - \frac{1}{\sin(t)} \cos(t)$$

$$= \tan(t) - \cot(t)$$

$$\text{if } t = 45^\circ, \tan(t) - \cot(t) = 1 - 1 = 0$$

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

a) $(3, 135^\circ)$ b) $(-3, 135^\circ)$ c) $(3\sqrt{2}, 45^\circ)$ d) $(3\sqrt{2}, 135^\circ)$ e) $(-3\sqrt{2}, 45^\circ)$ 

$$x = r \cos \Theta$$

$$y = r \sin \Theta$$

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:

$$\log(AB) = \log A + \log B$$

$$\log(x^2 y) = \log x + \log x + \log y = 11$$

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 multiple is 20

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

a) $25 - 4i$ b) $25 - 20i$

c) 21

d) 29

e) 0

$$\text{FOIL: } 25 - 10i + 10i - 4i^2$$

$$25 - 4(-1) = 29$$

- 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

$$\text{hose} + \text{pump} = 1 \text{ pool}$$

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

multiply by 27 hours & divide out the "pool"

$$3t + 9t = 27 \text{ hours}$$

$$t = 27/12 = 2.25 \text{ hours} \quad 2 \text{ hours } 15 \text{ minutes}$$

$$d = \text{rate}(\text{time}) \quad \text{or} \quad \text{pool} = \text{rate}(\text{time})$$

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

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

- 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).

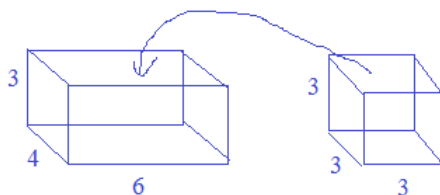
a) 15 cubic feet

b) 27 cubic feet

c) 45 cubic feet

d) 60 cubic feet

e) 63 cubic feet



volume: 72 cubic feet

volume: 27 cubic feet

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

- 22) Evaluate:

a) 0

b) 9

c) 27

d) -3

e) Undefined

$$\lim_{x \rightarrow -3} \frac{x^3 + 27}{x + 3}$$

$$\frac{0}{0}$$

so, use L'Hospital's rule

$$\frac{\text{derivative (numerator)}}{\text{derivative (denominator)}} = \frac{3x^2}{1}$$

limit approaching -3: 27

or, factor the numerator and divide

$$\frac{(x+3)(x^2-3x+9)}{(x+3)} \rightarrow \lim_{x \rightarrow -3} (x^2-3x+9) = 27$$

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

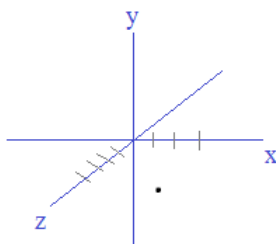
a) y-axis

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

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

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

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

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

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

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) $y = 1.2(4.4)^x$

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

x	-6.7	-1.3	3.2	8.8
	1.20	2.45	5.80	21.80

150 SAT Subject Test Math Level 2 Practice Questions

(and, Solutions)

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