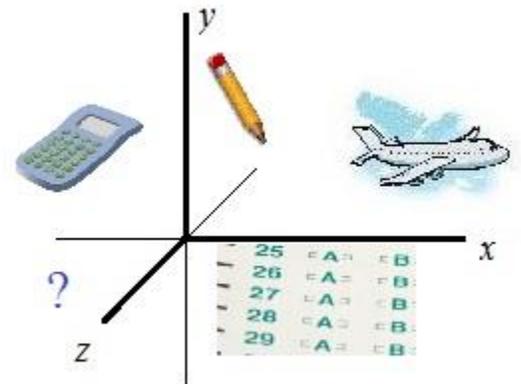# SAT Math Level 2

Practice Test C

24 multiple choice math questions (and solutions)

Topics include probability, exponential functions, matrices, geometry, imaginary numbers, factoring, and more.

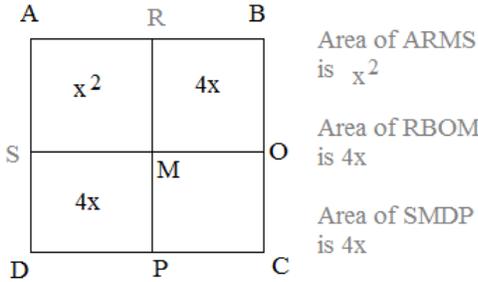1) A game has 2 spinners. Spinner #1 has a probability of landing red of 2/3. And, spinner #2 has a probability of landing red of 1/5.
What is the probability spinner #1 lands red AND spinner #2 does NOT land red?

   a) 2/15

   b) 8/15

   c) 13/15

   d) 1/5

   e) 3/5

2) For some positive real number 'b', the first 3 terms in a geometric sequence (progression) are $b - 1$, $b + 4$, $3b + 2$. What is the numerical value of the fourth term?

   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) $y = 4.4(1.2)^X$

   c) $y = -1.2(4.4)^X$

   d) $y = -4.4(1.2)^X$

   e) $y = 1.2x^{4.4}$

x	-6.7	-1.3	3.2	8.8
y	1.30	3.47	7.89	21.89

4) The figure shows a square region divided into 4 rectangle regions. If the area of ABCD is 100 what is the area of MOCP?
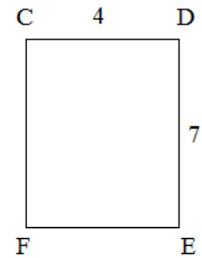
   a) 16

   b) 24

   c) 28

   d) 36

   e) 64

Area of ARMS is x^2

Area of RBOM is 4x

Area of SMDP is 4x

(figure: square ABCD with regions labeled x^2, 4x, 4x; points A, R, B, S, M, O, D, P, C)

5) $\sin(\tan^{-1} 3) =$

   a) $\dfrac{1}{3}$

   b) $\dfrac{3\sqrt{10}}{10}$

   c) $\dfrac{1}{2}$

   d) $\dfrac{\sqrt{2}}{3}$

   e) $\dfrac{3}{10}$

6) If rectangle CDEF is rotated about side DE, it creates a cylinder of volume:

   C   4   D

   a) 28π

   b) 56π
                                                                            7
   c) 98π

   d) 112π

   F   E
   e) 196π

7) Find m and p:

$$\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 0 & m \\ 3 & p \end{bmatrix} = \begin{bmatrix} 9 & 6 \\ 12 & 19 \end{bmatrix}$$

   a) m = 3   b) m = -3   c) m = 1   d) m = 2   e) m = 8
      p = 15   p = 4   p = 16   p = 5   p = -3

8) A pole is 20 feet high. A taut wire that is 46 feet extends from the top of the pole to the ground.
   What is the angle of depression, to the nearest degree, from the top of the pole to the bottom of the wire?

   a) 23

   b) 26

   c) 43

   d) 64

   e) 67

9) Identify the range of the greatest integer function   y = [[x - 3]]   for   -3 < x < 3

   a) -5 < x < 0

   b) -6 < x < 0

   c) -7 < x < -1

   d) x = -6, -5, -4, -3, -2, -1, 0

   e) x = -6, -5, -4, -3, -2, -1

10) $4 \times 2^3 + 6 \div 2 =$

   a) 15

   b) 19

   c) 21

   d) 28

   e) 35

11) If |-2x + 3| > 5, which is a possible value of x?

    a) -4

    b) -1

    c) 0

    d) 1

    e) 4

12) A pizza parlor cuts its 14-inch (diameter) pizzas into 8 equal slices. What is the size (in square inches) of each slice?

    a) 5.5

    b) 19.2

    c) 44.1

    d) 60.4

    e) 77.0

13) A vertical line l passes through the point (2, 3). A horizontal line m passes through the point (-1, 6). Where do lines l and m intersect?

    a) (0, 5)

    b) (2, 6)

    c) (6, 2)

    d) (-1, 3)

    e) (3, -1)

14) If the polar coordinate $(-2, 135^{\circ})$ were converted and placed on a rectangular coordinate plane, which quadrant would it lie?

    a) I

    b) II

    c) III

    d) IV

    e) The point lies on the x-axis

15) What is the measure (in degrees) of angle A ?

    a) 53.4

    b) 58.7

    c) 63.6

    d) 70.1

    e) 80.3
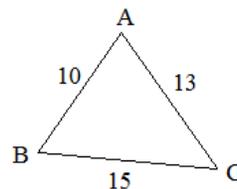
16) What is the maximum value of the function $f(x) = -3(x + 4)(x + 8)$

    a) -36

    b) -3

    c) 0

    d) 12

    e) 36

17) In the complex plane, what is the distance of $4 - 2i$ from the origin?

    a) 2

    b) 3.46

    c) 4.47

    d) 6

    e) 12

18) Evaluate $\displaystyle\lim_{x \to \infty} \frac{(2x + 5)(5 - 2x)}{(x + 1)^2}$

    a) -4

    b) -1

    c) 0

    d) 2

    e) 5/2

19) Which is a factor of $x^3 + 9x^2 - 6x - 4$?

    a) $x + 1$

    b) $x - 1$

    c) $x + 4$

    d) $x - 4$

    e) none of the above

20) What is the <u>4th term</u> in the binomial expansion $(a + b)^{10}$?

    a) $a^7 b^3$

    b) $a^6 b^4$

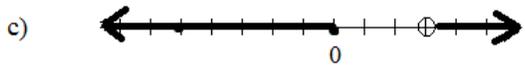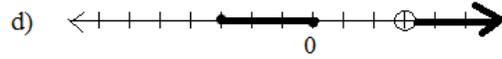   c) $210a^6 b^4$

    d) $120a^7 b^3$

    e) $120a^3 b^7$

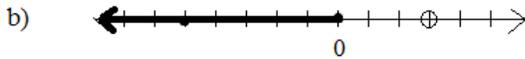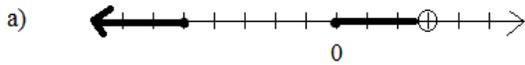21) At the "30% off" book sale, a calculus book costs $56. What is the original price of the book?

    a) 72.80

    b) 77

    c) 80

    d) 82.60

    e) 86
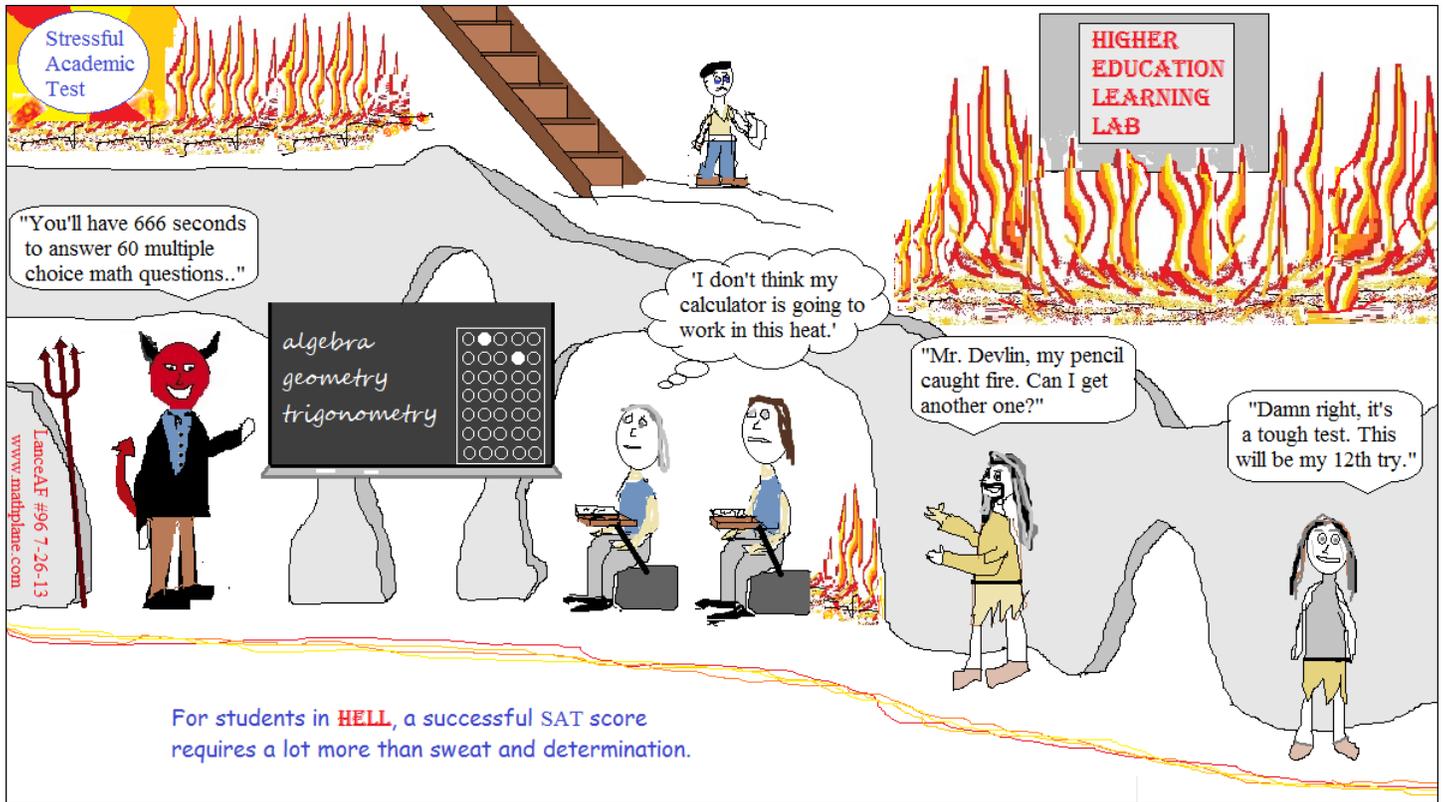
22) A 14-sided regular polygon has how many diagonals?

    a) 14

    b) 28

    c) 77

    d) 154

    e) 182

23) The solution to $y \leq \dfrac{x(x+5)^2}{(x-3)}$ is represented by which number line?

    a)

    b)   d)

    c)   e)
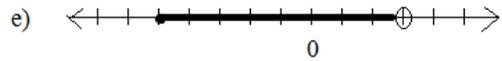
24) Which letter has line symmetry?

    a) a

    b) b

    c) c

    d) d

    e) e

Solutions ->

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

Probability of 2 (independent) events = P(event 1) x P(event 2)

2/3 x 4/5 = 8/15

2) For some positive real number 'b', the first 3 terms in a geometric sequence (progression) are
   $b - 1$, $b + 4$, $3b + 2$. What is the numerical value of the fourth term?

   a) 16

   b) 20

   c) 24

   d) 28

   e) 40

Since this is a *geometric* sequence, there is a common
ratio between terms...

$$\frac{\text{term 2}}{\text{term 1}} \quad \frac{b+4}{b-1} = \frac{3b+2}{b+4} \quad \frac{\text{term 3}}{\text{term 2}}$$

since $b = 6$, the terms are   5, 10, 20,
geometric ratio is 2...   4th term is 40

Cross multiply and solve to find b

$$(b + 4)(b + 4) = (b - 1)(3b + 2)$$

$$b^2 + 8b + 16 = 3b^2 - b - 2$$

$$2b^2 - 9b - 18 = 0$$

$$(2b + 3)(b - 6) = 0$$

$$b = -2/3 \text{ or } 6$$

In this example, 'b' is some positive
real number, so we can eliminate -2/3

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

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

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

   c) $y = -1.2(4.4)^X$

   d) $y = -4.4(1.2)^X$

   e) $y = 1.2x^{4.4}$

x	-6.7	-1.3	3.2	8.8
y	1.30	3.47	7.89	21.89

since all the y outputs are positive, this eliminates
c) and d)...

$(4.4)^{8.8}$ and $(1.2)^{8.8}$ will produce significantly different outputs
(eliminating a)

4) The figure shows a square region divided into 4 rectangle regions. If the area of ABCD is 100
   what is the area of MOCP?

   a) 16

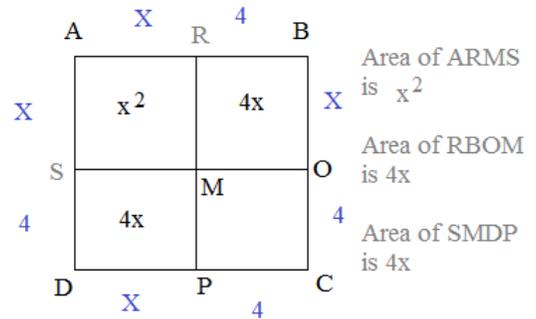   b) 24

   c) 28

   d) 36

   e) 64

MOCP = 4 x 4 = 16

also, $(x + 4)^2 = 100$

$$x^2 + 8x + 16 = 100$$

$$x^2 + 8x - 84 = 0$$

$$(x + 14)(x - 6) = 0$$

$x = 6$ or -14 cannot be
                   negative

Area of ARMS
is x^2

Area of RBOM
is 4x

Area of SMDP
is 4x

5) $\sin(\tan^{-1} 3) =$

   a) $\frac{1}{3}$
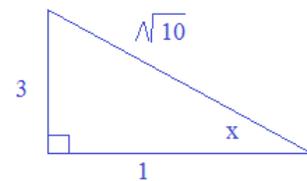
   b) $\frac{3\sqrt{10}}{10}$

   c) $\frac{1}{2}$

   d) $\frac{\sqrt{2}}{3}$
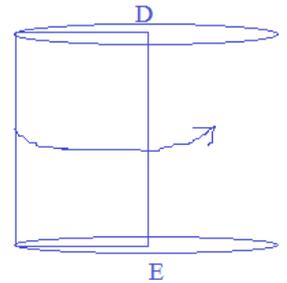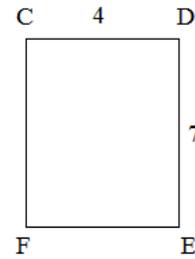
   e) $\frac{3}{10}$

$\sin x = \dfrac{3}{\sqrt{10}}$

$\tan = \dfrac{\text{opposite}}{\text{adjacent}} = \dfrac{3}{1}$

6) If rectangle CDEF is rotated about side DE, it creates a cylinder of volume:

a) 28π

b) 56π

c) 98π

d) 112π

e) 196π

Volume
(cylinder) = area of top(height)

$= \pi r^2$ (height)

$= \pi (4)^2 (7)$

$= 112\pi$

C   4   D

7

F   E

D

E

7) Find m and p:

$$\begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 0 & m \\ 3 & p \end{bmatrix} = \begin{bmatrix} 9 & 6 \\ 12 & 19 \end{bmatrix}$$

a) m = 3
   p = 15

b) m = -3
   p = 4

c) m = 1
   p = 16

d) m = 2
   p = 5

e) m = 8
   p = -3

2m + 3p = 6
-1m + 4p = 19

using combination/elimation:

2m + 3p = 6
-2m + 8p = 38

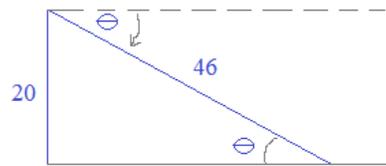11p = 44
p = 4

if p = 4, then
m = -3

8) A pole is 20 feet high. A taut wire that is 46 feet extends from the top of the pole to the ground.
What is the angle of depression, to the nearest degree, from the top of the pole to the bottom of the wire?

a) 23

b) 26

c) 43

d) 64

e) 67

$\sin \Theta = \dfrac{20}{46} = .435$

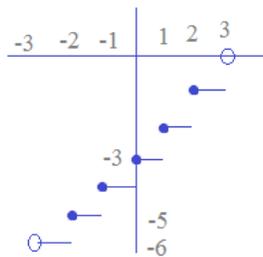(take inverse sine of .435)

$\Theta = 25.8$ (approx)

46

20

9) Identify the range of the greatest integer function $y = [[x - 3]]$ for $-3 < x < 3$

a) $-5 < x < 0$

b) $-6 < x < 0$

c) $-7 < x < -1$

d) x = -6, -5, -4, -3, -2, -1, 0

e) x = -6, -5, -4, -3, -2, -1

-3 -2 -1 | 1 2 3

-3

-5
-6

the y values in the graph
are -1, -2, -3, -4, -5, and -6

10) $4 \times 2^3 + 6 \div 2 =$

a) 15

b) 19

c) 21

d) 28

e) 35

PEMDAS   Parentheses
         Exponent
         Multiplication/Division
         Addition/Subtraction

$4 \times 2^3 + 6 \div 2$

$4 \times 8 + 6 \div 2$

$32 + 3$

35

mathplane.com

11) If $|-2x + 3| > 5$, which is a possible value of x?

a) **-4**

b) -1

c) 0

d) 1

e) 4

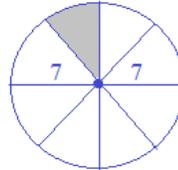$-2x + 3 > 5$ or $-2x + 3 < -5$

$x < -1$ $\qquad$ $x > 1$

12) A pizza parlor cuts its 14-inch (diameter) pizzas into 8 equal slices. What is the size (in square inches) of each slice?

a) 5.5

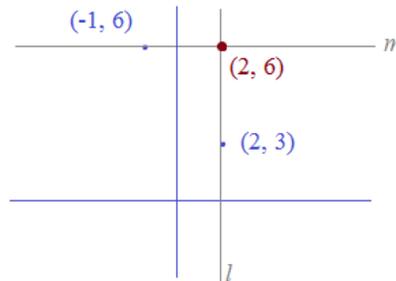b) **19.2**

c) 44.1

d) 60.4

e) 77.0

area of entire pizza:

$\pi r^2 = 49\pi$

each slice: $\dfrac{49\pi}{8} = 19.2$

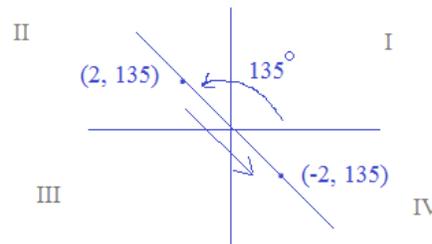

13) A vertical line l passes through the point (2, 3). A horizontal line m passes through the point (-1, 6). Where do lines l and m intersect?

a) (0, 5)

b) **(2, 6)**

c) (6, 2)

d) (-1, 3)

e) (3, -1)

14) If the polar coordinate $(-2, 135°)$ were converted and placed on a rectangular coordinate plane, which quadrant would it lie?

a) I

b) II

c) III

d) **IV**

e) The point lies on the x-axis

15) What is the measure (in degrees) of angle A ?
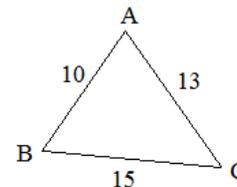
a) 53.4

b) 58.7

c) 63.6

d) 70.1

e) **80.3**

Law of cosines: $a^2 = b^2 + c^2 - 2bc(\cos A)$

$(15)^2 = (13)^2 + (10)^2 - 2(13)(10)(\cos A)$

$225 = 169 + 100 - 260(\cos A)$

$-44 = -260(\cos A)$

$\cos A = .169 \qquad A = 80.25$

SAT Subject Test - Math Level 2 Practice III

SOLUTIONS

16) What is the maximum value of the function $f(x) = -3(x + 4)(x + 8)$

a) -36

b) -3

c) 0

d) 12

e) 36

Since $f(x)$ has a degree of 2, it is a parabola. The coefficient of the lead term will be -3, so the parabola will "face down" (and the maximum value will be the vertex!)

To find the vertex, recognize that the zeros (x-intercepts) will be at -4 and -8.. therefore, the axis of symmetry will be at $x = -6$...
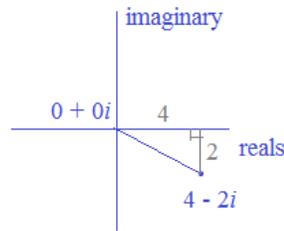
$f(-6) = 12$

so, the vertex is (-6, 12)
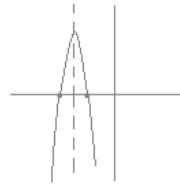
17) In the complex plane, what is the distance of $4 - 2i$ from the origin?

a) 2

b) 3.46

c) 4.47

d) 6

e) 12

$\sqrt{(4 - 0)^2 + (-2 - 0)^2} = \sqrt{20}$

approx 4.47

(also the "magnitude" of the complex number)

imaginary

$0 + 0i$ 4

2   reals

$4 - 2i$

18) Evaluate $\lim_{x \to \infty} \dfrac{(2x + 5)(5 - 2x)}{(x + 1)^2}$

a) -4

b) -1

c) 0

d) 2

e) 5/2

$\dfrac{-4x^2 + 25}{x^2 + 2x + 1}$

For limit approaching infinity, determine degrees of numerator and denominator...

Deg. of num: 2
Deg. of den: 2   since they are equal, look at the lead coefficients...

lead coefficient of num: -4
lead coefficient of den: 1   lim is -4/1

19) Which is a factor of $x^3 + 9x^2 - 6x - 4$?

a) $x + 1$

b) $x - 1$

c) $x + 4$

d) $x - 4$

e) none of the above

Consider the factor/remainder theorem:

$f(-1) = -1 + 9 + 6 - 4 = 10$ not zero

$f(1) = 1 + 9 - 6 - 4 = 0$ 1 is a zero! therefore, x -1 is a factor...

20) What is the 4th term in the binomial expansion $(a + b)^{10}$?

a) $a^7 b^3$

b) $a^6 b^4$

c) $210a^6 b^4$

d) $120a^7 b^3$

e) $120a^3 b^7$

or, 10C2

$a^{10}b^0 + \binom{10}{1}a^9 b^1 + \binom{10}{2} a^8 b^2 + \binom{10}{3}a^7 b^3 + 210a^6 b^4 + ...$

$a^{10} + 10a^9 b + 45 a^8 b^2 + 120 a^7 b^3$

1st   2nd   3rd   4th term..

21) At the "30% off" book sale, a calculus book costs $56. What is the original price of the book?

    a) 72.80

    b) 77

    c) 80

    d) 82.60

    e) 86

original price   discount   cost

$$B \quad + \quad (-.30)B \quad = \quad \$56$$
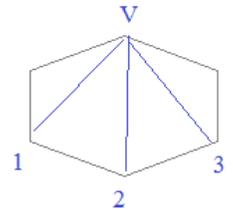
$$.70B \quad = \quad \$56$$

$$B = \$80$$

22) A 14-sided regular polygon has how many diagonals?

    a) 14

    b) 28

    c) 77

    d) 154

    e) 182

$$\text{\# of diagonals} = \frac{n(n-3)}{2} \qquad (\text{where n is the number of sides})$$

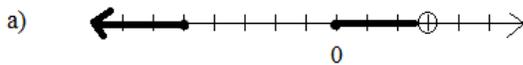$$= \frac{14(14-3)}{2} = 77$$

consider a hexagon:

each vertex connects to another EXCEPT the 2 adjacent ones (and itself)
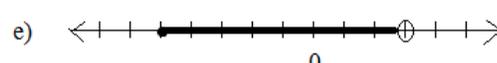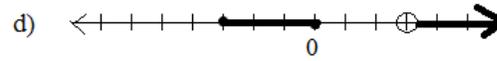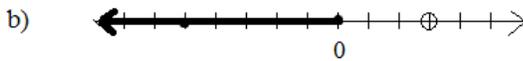
$(n-3)$

V to 1 is the same as 1 to V. So, to avoid "double counting" divide the total by 2 $\dfrac{(n-3)}{2}$

23) The solution to $y \leq \dfrac{x(x+5)^2}{(x-3)}$ is represented by which number line?

    a)

    b)

    c)

Identify key values; then, test regions...   c)

    d)

    e)

24) Which letter has line symmetry?

    a) a

    b) b

    c) c

    d) d

    e) e

C has horizontal line symmetry..

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) $y = 1.2(4.4)^X$

x	-6.7	-1.3	3.2	8.8

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