

Rio Salado's Online College Algebra Accuplacer Review Questions (2013-2014)

#1. Teresa has 5 shirts, 3 pairs of shorts and 2 hats. How many different outfits can she wear consisting of one of each?

- A) 45    **B) 30**    C) 60    D) 14    E) 11

$5 \cdot 3 \cdot 2 = 30$

#2a. Factor:  $25a^2 - 9b^2 = (5a)^2 - (3b)^2 = (5a-3b)(5a+3b)$

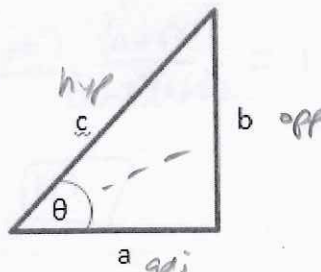
- A)  $16a^2b^2$     B)  $(5a+3b)^2$     C)  $(5a-3b)^2$     D)  $(25a-9b)(25a+9b)$     **E)  $(5a-3b)(5a+3b)$**

#2b. Factor:  $(x+2)^2 - 4y^2 = (x+2)^2 - (2y)^2 = (x+2-2y)(x+2+2y)$

- A)  $(x+2-2y)(x+2+2y)$**     B)  $(x+2-2y)^2$     C)  $(x+2-4y)(x+2+4y)$   
D)  $(x+2+2y)^2$     E)  $x^2+4-4y^2$

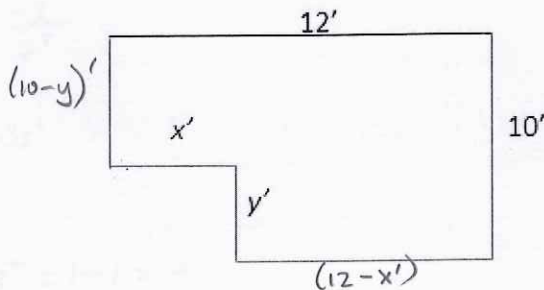
#3. In the right triangle shown,  $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{b}{c}$

- A)  $\frac{a}{b}$     B)  $\frac{a}{c}$     C)  $\frac{b}{a}$     **D)  $\frac{b}{c}$**     E)  $\frac{c}{b}$



#4a. A rectangular room has dimensions as shown: What is its perimeter in feet?

- A)  $44-x-y$     B)  $22+x+y$     **C) 44**  
D)  $44+x+y$     E)  $22-(x+y)$



#4b. A rectangular room has dimensions  $x+4$  by  $x-3$ . What is its area in terms of  $x$ ?

- A)  $x^2-x+12$     B)  $x^2-12$     C)  $2x+1$     D)  $4x+2$     **E)  $x^2+x-12$**      $(x+4)(x-3)$   
 $x^2+x-12$

#5a.  $\frac{2}{\cos 2x} = \frac{2}{1} \cdot \frac{1}{\cos 2x} = \frac{2}{1} \cdot \frac{\sec 2x}{1} = 2 \sec 2x$

- A)  $\tan 2x$     **B)  $2 \sec 2x$**     C)  $\frac{1}{2} \sec x$     D)  $\sin 2x$     E)  $\frac{1}{2} \cos 2x$

#5b.  $\frac{2}{\cot 3\theta} = \frac{2}{1} \cdot \frac{1}{\cot 3\theta} = \frac{2}{1} \cdot \frac{\tan 3\theta}{1} = 2 \tan 3\theta$

- A)  $2 \sin 3\theta$     B)  $\frac{\tan 3\theta}{2}$     C)  $\frac{2 \cos \theta}{3}$     **D)  $2 \tan 3\theta$**     E)  $6 \tan \theta$

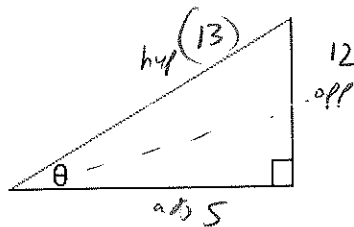
#6. If  $a = \frac{b}{2}$ , what is the value of  $4(a+1)^2$  in terms of  $b$ ?

- A)  $2b^2 + 4b + 4$     B)  $b^2 + 2b + 1$     C)  $4b^2 + 2b + 4$     D)  $2b^2 + 2b + 1$     **E)  $b^2 + 4b + 4$**

$$4\left(\frac{b}{2} + 1\right)^2 = 4\left(\frac{b}{2} + 1\right)\left(\frac{b}{2} + 1\right) = 4\left(\frac{b^2}{4} + b + 1\right) = b^2 + 4b + 4$$

#7. If  $\tan \theta = \frac{12}{5}$ , then  $\sec \theta = \frac{1}{\cos \theta} = \frac{1}{\left(\frac{5}{13}\right)} = \frac{13}{5}$

- A)  $\frac{5}{12}$     **B)  $\frac{13}{5}$**     C)  $\frac{13}{12}$     D)  $\frac{12}{13}$     E)  $\frac{5}{13}$



#8. If  $\begin{cases} a+b+c=7 \\ a+c=2 \\ 2a+b+c=11 \end{cases}$ , what is the value of  $a$ ?

$$\begin{array}{r} 2a+b+c=11 \\ -a-b-c=-7 \\ \hline a=4 \end{array}$$

- A) 5    B) 3    C) -2    D) 7    **E) 4**

#9. Simplify:  $\left(\frac{a^2-3a+2}{a-1}\right) \cdot \left(\frac{a+2}{a^2-4}\right) = \frac{(a-1)(a-2)}{(a-1)} \cdot \frac{(a+2)}{(a-2)(a+2)} = 1$

- A)  $\frac{a+2}{a-2}$     B)  $\frac{3a+2}{a-2}$     C)  $a$     D)  $\frac{a-2}{a+2}$     **E) 1**

#10. If  $\left(\frac{-3xy}{z^2}\right)^2 = -3p(x^2y^2)$ , then  $p = \frac{9x^2y^2}{-3z^4x^2y^2} = \frac{-3}{z^4}$

- A)  $\frac{-3}{z^4}$**     B)  $3z^4$     C)  $\frac{-1}{z^4}$     D)  $\frac{-3xy}{z^4}$     E)  $-3z^4$

#11. If  $f(x) = x^3 - 3^{(x-1)}$ , then  $f(1) = (1)^3 - 3^{(1-1)} = 1 - 3^0 = 1 - 1 = 0$

- A) 4    B) 3    C) 2    D) 1    **E) 0**

#12. If  $|3x-5|=10$ , then  $x =$

- A) 5 or -5    B)  $-\frac{5}{3}$  only    **C) 5 or  $-\frac{5}{3}$**     D)  $\frac{5}{3}$  only    E) 5 only

$$\begin{array}{ll} 3x-5=10 & \text{or } 3x-5=-10 \\ 3x=15 & 3x=-5 \\ x=5 & x=-\frac{5}{3} \end{array}$$

#13. If  $f(x) = \frac{3}{x+1}$  and  $g(x) = x+1$ , then  $f(g(x)) = \frac{3}{(x+1)+1} = \frac{3}{x+2}$

- A)  $3x+3$     **B)  $\frac{3}{x+2}$**     C)  $\frac{3}{x+1}$     D) 3    E)  $3x+1$

#14. What is the domain of  $g(x) = \frac{x-2}{\sqrt{x^2-4}}$

$x^2 - 4 > 0$   
 $x^2 > 4$  (outside case)  $x > 2$  or  $x < -2$

- A)  $x > 2$  or  $x < -2$     B) All Real numbers    C) All Real numbers except 2 and -2  
 D)  $-2 < x < 2$     E) All Real numbers except -2

#15a. If  $\csc \theta$  is undefined, then  $\sin \theta$  is

$\csc \theta = \frac{\text{something}}{0}$  so  $\sin \theta = \frac{0}{\text{something}} = 0$

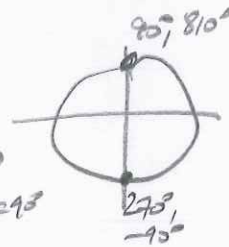
- A) undefined    B)  $\frac{1}{2}$     C) 1    D) 0    E) -1

#15b. If  $\sec \theta$  is undefined, then  $\theta$  could not be

$\sec \theta = \frac{\text{something}}{0}$

$\cos \theta = \frac{0}{\text{something}} = 0$

$\frac{270^\circ = 90^\circ}{-90^\circ}$



- A)  $300^\circ$     B)  $90^\circ$     C)  $-90^\circ$     D)  $270^\circ$     E)  $810^\circ$

#16. Which of the following is **not** in the solutions set of  $|x-3| \leq 2$ ?

$-2 \leq x-3 \leq 2$   
 $+3 \quad +3 \quad +3$   
 $1 \leq x \leq 5$

- A) 3    B) 4    C) 1    D) 0    E) 2

#17. What is the difference between the largest and the smallest y values of the function  $y = 2 \sin 3x$ ?

$2(\pm 1) = \pm 2$

- A) 3    B) 2    C) 6    D) 4    E) 1

#18. If  $a_n$  is a sequence whose  $n^{\text{th}}$  term is  $2^{(n+1)} - 2^{(n-1)}$ , then what is  $a_4$ ?

$2^{(4+1)} - 2^{(4-1)} = 2^5 - 2^3$   
 $= 32 - 8 = 24$

- A) 32    B) 4    C) 64    D) 8    E) 24

#19a. If f is a quadratic function that has zeros that are the same distance in opposite directions from the origin, which of these is f?

E)  $x^2 - 4$   
 $(x+2)(x-2)$   
 $-2 \quad 2$

- A)  $x^2 - 2x + 1$     B)  $x^2 + 1$     C)  $x^2 + 4x$     D)  $x^2 - x$

#19b. If f is a quadratic function that has zeros seven units apart, which of these is f?

A)  $x^2 - 6x - 7$     B)  $x^2 - 8x + 7$     C)  $x^2 + x - 12$     D)  $x^2 - 8x + 12$     E)  $x^2 - 7x + 6$   
 $(x-7)(x+1)$      $(x-1)(x-7)$      $(x+4)(x-3)$      $(x-6)(x-2)$      $(x-1)(x-6)$   
 $7 \quad -1$      $1 \quad 7$      $-4 \quad 3$      $6 \quad 2$      $1 \quad 6$   
 $(d=8)$      $(d=6)$      $(d=7)$      $(d=4)$      $(d=5)$

#20a. Which of the following lines has slope  $-\frac{3}{4}$ ?

- A)  $4x - 3y = 1$     B)  $4x + 3y = 6$     C)  $3x + 4y = 2$     D)  $3x - 4y = 12$     E)  $x + y = -\frac{3}{4}$

$4y = -3x + 2$   
 $y = -\frac{3}{4}x + \frac{1}{2}$

#20b. Which of the following lines has intercepts at  $x = 3$ , and  $y = 2$ ?

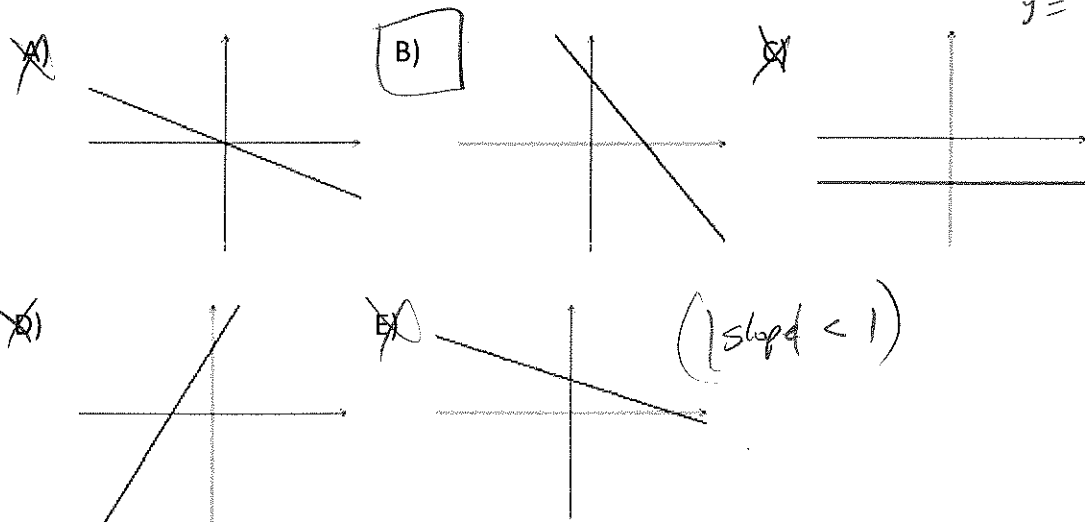
- A)  $4x - 3y = 1$     B)  $4x + 3y = 6$     C)  $3x + 4y = 2$     D)  $3x - 4y = 12$     E)  $x + y = \frac{3}{4}$

A)  $2x + 3y = 6$     B)  $2x - y = 6$     C)  $3x - 2y = 6$     D)  $2x - 3y = 6$     E)  $3x + 2y = 6$   
 $x=3$      $x=3$      $x=2$      $x=3$      $x=2$   
 $y=2$      $y=-6$      $y=-3$      $y=-2$      $y=3$

20c. Which of the following graphs could represent  $3x + 2y = 12$ ?

$$2y = -3x + 12$$

$$y = -\frac{3}{2}x + 6$$



#21a. Which of the following functions contains the points (0, 1) and (2, 1)?

- ~~A)  $y = 2|x-1|$~~    ~~B)  $y = |x+1|$~~    **C)  $y = |x-1|$**    ~~D)  $y = |x-2|$~~    ~~E)  $y = |2x-1|$~~

plug in → check

#21b. Which of the following quadratic functions contains the points (-2, 0) and (3, 0)?

- ~~A)  $y = x^2 + x + 6$~~    **B)  $y = x^2 - x - 6$**    ~~C)  $y = x^2 + 3x - 2$~~    ~~D)  $y = x^2 + x - 6$~~    ~~E)  $y = 9x^2 - 4$~~

plug in → check

#22a. The curve  $y = 4^x$  intersects the line  $y = 8$  at which of the following points?

- A) (2, 8)   B) (4, 8)   C) (1, 8)   D)  $(\frac{2}{3}, 8)$    **E)  $(\frac{3}{2}, 8)$**

$$8 = 4^x$$

$$2^3 = (2^2)^x$$

$$2^3 = 2^{2x} \quad 2x = 3$$

$$x = \frac{3}{2}$$

#22b. At which x value(s) does the curve  $y = x^2 + 2$  intersect the line  $y = 6$ ?

- A) no values   B) 4 only   C) 4 and -4   **D) 2 and -2**   E) 2 only

$$6 = x^2 + 2$$

$$x^2 = 4$$

$$x = \pm 2$$

#23a. If  $\frac{6}{3+\sqrt{3}} = a - b\sqrt{3}$ , then  $a - b =$

- A) 6   B) 3   C) 9   **D) 2**   E) 1

$$\frac{6(3-\sqrt{3})}{(3+\sqrt{3})(3-\sqrt{3})} = \frac{18-6\sqrt{3}}{9-3} = \frac{18}{6} - \frac{6\sqrt{3}}{6}$$

$$= 3 - \sqrt{3}$$

$$a = 3 \quad b = 1$$

$$3 - 1 = 2$$

#23b. Where it is defined  $\frac{\sqrt{x}-2}{x-4}$  is equivalent to

- A)  $\frac{1}{\sqrt{x}} + \frac{1}{2}$    B)  $\sqrt{x} - 2$    C)  $\frac{1}{\sqrt{x}} + 2$    D)  $\sqrt{x} + 2$

**E)  $\frac{1}{\sqrt{x}+2}$**

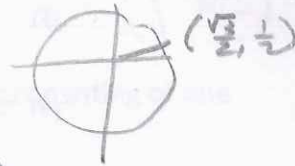
$$\frac{(\sqrt{x}-2)(\sqrt{x}+2)}{(x-4)(\sqrt{x}+2)}$$

$$\frac{x-4}{x\sqrt{x}+2x-4\sqrt{x}-8}$$

$$\frac{1}{\sqrt{x}+2} = \frac{(x+4)}{(x+4)(\sqrt{x}+2)} = \frac{(x-4)}{\sqrt{x}(x-4)+2(x-4)}$$



#24. Which of the following functions contains the point  $\left(\frac{\pi}{6}, 2\right)$ ?



- A)  $y = 2 \sin x$   $2\left(\frac{\sqrt{3}}{2}\right)$   
 B)  $y = \csc x$   $\frac{1}{\left(\frac{1}{2}\right)}$   
 C)  $y = \tan x$   $\frac{1/2}{\sqrt{3}/2}$   
 D)  $y = 2 \sec x$   $2\left(\frac{1}{\frac{1}{2}}\right)$   
 E)  $y = 2 \cot x$   $2\left(\frac{\sqrt{3}/2}{1/2}\right)$

#25.  $\sum_{k=2}^1 \frac{2k}{k+3} = ?$

- A)  $\frac{9}{2}$  B)  $-4$  C)  $5$  D)  $-\frac{9}{2}$  E)  $-5$

Handwritten calculations for #25:

$\frac{2(-2)}{(-2)+3}$	$\frac{2(-1)}{(-1)+3}$	$\frac{2(0)}{(0)+3}$	$\frac{2(1)}{(1)+3}$	
$\frac{-4}{1}$	$\frac{-2}{2}$	$\frac{0}{3}$	$\frac{2}{4}$	$-5 + \frac{1}{2}$
$-4$	$-1$	$0$	$\frac{1}{2}$	$\frac{-10}{2} + \frac{1}{2} = -\frac{9}{2}$

#26a.  $f$  contains the points  $(3, 1)$  and  $(1, -3)$ . If  $f^{-1}$  is the inverse of  $f$ , what is the value of  $f^{-1}(f(3))$ ?

- A)  $\frac{1}{3}$  B)  $-\frac{1}{3}$  C)  $3$  D)  $-1$  E)  $1$

Handwritten calculation for #26a:  $f^{-1}(1) = 3$

#26b. A linear function  $f$  has slope 2 and y-intercept 3. What are the slope and y-intercept of its inverse  $f^{-1}$ ?

- A)  $\frac{1}{2}$  and  $-3$  B)  $-2$  and  $\frac{1}{3}$  C)  $\frac{1}{2}$  and  $-\frac{3}{2}$  D)  $\frac{1}{2}$  and  $\frac{1}{3}$  E)  $-2$  and  $-3$

Handwritten calculations for #26b:

$$y = 2x + 3$$

$$x = \frac{y-3}{2}$$

$$2y = x - 3$$

$$y = \frac{1}{2}x - \frac{3}{2}$$

#27. The line  $y = 3x + 1$  intersects the line  $y = kx - 2$  where  $x = 1$ . What is the value of  $k$ ?

- A) 4 B) 7 C) 6 D) 1 E) 2

Handwritten calculations for #27:

$$y = 3(1) + 1$$

$$y = 4$$

$$y = k(1) - 2$$

$$y = k - 2$$

$$k - 2 = 4$$

$$k = 6$$

#28a. If  $(2+i)(3+i) = a+bi$ , what is the value of  $a+b$ ?

- A) 3 B) 2 C) 10 D) 5 E) 9

Handwritten calculations for #28a:

$$6 + 5i + i^2$$

$$6 + 5i - 1$$

$$5 + 5i$$

$$5 + 5 = 10$$

$$9 + 6i + i^2$$

$$8 + 6i$$

$$8 + 6 = 14$$

#28b. If  $(3+i)^2 = a+bi$ , what is the value of  $a+b$ ?

- A) 15 B) 8 C) 5 D) 14 E) 16

#29a. Mary's age now is 6 years more than twice the sum of the ages of her two children. In 3 years her age will be 22 years less than three times the sum of their ages. How old is Mary now?

- A) 32 B) 35 C) 27 D) 29 E) 26



#29b. If Tanya could increase her running speed by 1 mph, she could complete a six mile race in 18 minutes less time. What is her current rate in mph?

- A) 4 B) 5 C) 3.5 D) 4.5 E) 3



#30a. If  $x-3$  is a factor of  $x^3 + bx^2 - 9$ , then  $b =$

- A) 9 B) 1 C)  $-3$  D)  $-2$  E) 3



#30b. If  $2x^3 - cx + 3$  is divided by  $x+2$ , the remainder is  $-3$ . What is the value of  $c$ ?

- A) 5 B) 3 C) 1 D) 2 E)  $-3$



29a

m a b

$$m = 6 + 2(a+b)$$

$$m+3 = 3(a+b+3) - 22$$

$$m+3 = 3(a+b) + 18 - 22$$

$$m+3 = 3(a+b) - 4$$

$$(a+b) = \frac{m-6}{2}$$

$$m(a+b) = \frac{m+3+4}{3} = \frac{m+7}{3}$$

$$\frac{m-6}{2} = \frac{m+7}{3}$$

$$3m - 18 = 2m + 14$$

$$m = 32$$

29b

$$18 \text{ min} = \frac{18}{60} = \frac{6(3)}{6(10)} = \frac{3}{10} \text{ hrs}$$

$$d = rt$$

$$6 = rt \rightarrow t = \frac{6}{r}$$

$$6 = (r+1)(t - \frac{3}{10})$$

$$rt = (r+1)(t - \frac{3}{10})$$

$$rt = rt - \frac{3}{10}r + t - \frac{3}{10}$$

$$-\frac{3}{10}r + t - \frac{3}{10} = 0$$

$$-\frac{3}{10}r + \frac{6}{r} - \frac{3}{10} = 0$$

$$-\frac{3}{10}r^2 - \frac{3}{10}r + 6 = 0$$

$$-3r^2 - 3r + 60 = 0$$

$$3r^2 + 3r - 60 = 0$$

$$r^2 + r - 20 = 0$$

$$(r+5)(r-4) = 0$$

$$r = -5 \text{ or } 4$$

4 mph

30a

$$\begin{array}{r}
 x^2 + (b+3)x + 3 \\
 x-3 \overline{) x^3 + bx^2 + 0x - 9} \quad \text{no remainder} \\
 \underline{-(x^3 - 3x^2)} \\
 (b+3)x^2 + 0x \\
 \underline{-((b+3)x^2 - 3(b+3)x)} \\
 3(b+3)x - 9 \\
 \underline{-(3x - 9)} \\
 (3(b+3) - 3)x \quad 0 \leftarrow \text{remainder} \\
 3(b+3) - 3 = 0 \\
 3(b+3) = 3 \\
 b+3 = 1 \\
 \boxed{b = -2}
 \end{array}$$

check:

$$\begin{array}{r}
 x^2 + x + 3 \\
 x-3 \overline{) x^3 - 2x^2 + 0x - 9} \\
 \underline{-(x^3 - 3x^2)} \\
 3x - 9 \\
 \underline{3x - 9} \\
 0 \quad \checkmark
 \end{array}$$

30b

$$\begin{array}{r}
 2x^2 - 4x + 3 \\
 x+2 \overline{) 2x^3 + 0x^2 - cx + 3} \quad \text{remainder } -3 \\
 \underline{-(2x^3 + 4x^2)} \\
 -4x^2 - cx \\
 \underline{-(-4x^2 - 8x)} \\
 (-c+8)x + 3 \\
 \underline{-(3x + 6)} \\
 -3 \leftarrow
 \end{array}$$

$$-c+8-3=0$$

$$-c+8=3$$

$$\boxed{c=5}$$

check:

$$\begin{array}{r}
 2x^2 - 4x + 3 \\
 x+2 \overline{) 2x^3 + 0x^2 - 5x + 3} \\
 \underline{-(2x^3 + 4x^2)} \\
 -4x^2 - 5x \\
 \underline{-(-4x^2 - 8x)} \\
 3x + 3 \\
 \underline{-(3x + 6)} \\
 -3
 \end{array}$$

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#1. Teresa has 5 shirts, 3 pairs of shorts and 2 hats. How many different outfits can she wear consisting of one of each?

- A) 45    B) 30    C) 60    D) 14    E) 11

#2a. Factor:  $25a^2 - 9b^2$

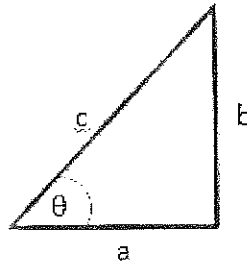
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#2b. Factor:  $(x+2)^2 - 4y^2$

- A)  $(x+2-2y)(x+2+2y)$     B)  $(x+2-2y)^2$     C)  $(x+2-4y)(x+2+4y)$   
 D)  $(x+2+2y)^2$     E)  $x^2+4-4y^2$

#3. In the right triangle shown,  $\sin \theta =$

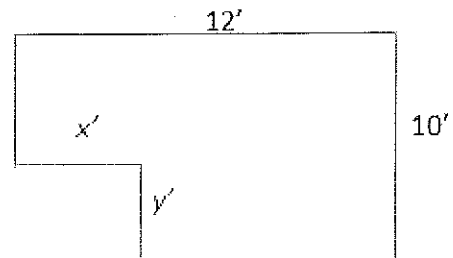
- A)  $\frac{a}{b}$     B)  $\frac{a}{c}$     C)  $\frac{b}{a}$     D)  $\frac{b}{c}$     E)  $\frac{c}{b}$



#4a. A rectangular room has dimensions as shown:

What is its perimeter in feet?

- A)  $44 - x - y$     B)  $22 + x + y$     C) 44  
 D)  $44 + x + y$     E)  $22 - (x + y)$



#4b. A rectangular room has dimensions  $x+4$  by  $x-3$ . What is its area in terms of  $x$ ?

- A)  $x^2 - x + 12$     B)  $x^2 - 12$     C)  $2x + 1$     D)  $4x + 2$     E)  $x^2 + x - 12$

#5a.  $\frac{2}{\cos 2x} =$

- A)  $\tan 2x$     B)  $2 \sec 2x$     C)  $\frac{1}{2} \sec x$     D)  $\sin 2x$     E)  $\frac{1}{2} \cos 2x$

#5b.  $\frac{2}{\cot 3\theta} =$

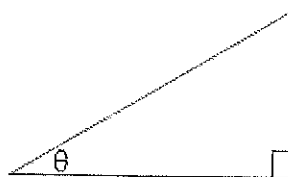
- A)  $2 \sin 3\theta$     B)  $\frac{\tan 3\theta}{2}$     C)  $\frac{2 \cos \theta}{3}$     D)  $2 \tan 3\theta$     E)  $6 \tan \theta$

#6. If  $a = \frac{b}{2}$ , what is the value of  $4(a+1)^2$  in terms of  $b$ ?

- A)  $2b^2 + 4b + 4$     B)  $b^2 + 2b + 1$     C)  $4b^2 + 2b + 4$     D)  $2b^2 + 2b + 1$     E)  $b^2 + 4b + 4$

#7. If  $\tan \theta = \frac{12}{5}$ , then  $\sec \theta =$

- A)  $\frac{5}{12}$     B)  $\frac{13}{5}$     C)  $\frac{13}{12}$     D)  $\frac{12}{13}$     E)  $\frac{5}{13}$



#8. If  $\begin{cases} a+b+c=7 \\ a+c=2 \\ 2a+b+c=11 \end{cases}$ , what is the value of  $a$ ?

- A) 5    B) 3    C) -2    D) 7    E) 4

#9. Simplify:  $\left(\frac{a^2-3a+2}{a-1}\right) \cdot \left(\frac{a+2}{a^2-4}\right)$

- A)  $\frac{a+2}{a-2}$     B)  $\frac{3a+2}{a-2}$     C)  $a$     D)  $\frac{a-2}{a+2}$     E) 1

#10. If  $\left(\frac{-3xy}{z^2}\right)^2 = -3p(x^2y^2)$ , then  $p =$

- A)  $\frac{-3}{z^4}$     B)  $3z^4$     C)  $\frac{-1}{z^4}$     D)  $\frac{-3xy}{z^4}$     E)  $-3z^4$

#11. If  $f(x) = x^3 - 3^{(x-1)}$ , then  $f(1) =$

- A) 4    B) 3    C) 2    D) 1    E) 0

#12. If  $|3x-5|=10$ , then  $x =$

- A) 5 or -5    B)  $-\frac{5}{3}$  only    C) 5 or  $-\frac{5}{3}$     D)  $\frac{5}{3}$  only    E) 5 only

#13. If  $f(x) = \frac{3}{x+1}$  and  $g(x) = x+1$ , then  $f(g(x)) =$

- A)  $3x+3$     B)  $\frac{3}{x+2}$     C)  $\frac{3}{x+1}$     D) 3    E)  $3x+1$



#14. What is the domain of  $g(x) = \frac{x-2}{\sqrt{x^2-4}}$

- A)  $x > 2$  or  $x < -2$       B) All Real numbers      C) All Real numbers except 2 and -2  
D)  $-2 < x < 2$       E) All Real numbers except -2

#15a. If  $\csc \theta$  is undefined, then  $\sin \theta$  is

- A) undefined      B)  $\frac{1}{2}$       C) 1      D) 0      E) -1

#15b. If  $\sec \theta$  is undefined, then  $\theta$  could **not** be

- A)  $300^\circ$       B)  $90^\circ$       C)  $-90^\circ$       D)  $270^\circ$       E)  $810^\circ$

#16. Which of the following is **not** in the solutions set of  $|x-3| \leq 2$  ?

- A) 3      B) 4      C) 1      D) 0      E) 2

#17. What is the difference between the largest and the smallest  $y$  values of the function  $y = 2\sin 3x$  ?

- A) 3      B) 2      C) 6      D) 4      E) 1

#18. If  $a_n$  is a sequence whose  $n^{\text{th}}$  term is  $2^{(n+1)} - 2^{(n-1)}$ , then what is  $a_4$ ?

- A) 32      B) 4      C) 64      D) 8      E) 24

#19a. If  $f$  is a quadratic function that has zeros that are the same distance in opposite directions from the origin, which of these is  $f$ ?

- A)  $x^2 - 2x + 1$       B)  $x^2 + 1$       C)  $x^2 + 4x$       D)  $x^2 - x$       E)  $x^2 - 4$

#19b. If  $f$  is a quadratic function that has zeros seven units apart, which of these is  $f$ ?

- A)  $x^2 - 6x - 7$       B)  $x^2 - 8x + 7$       C)  $x^2 + x - 12$       D)  $x^2 - 8x + 12$       E)  $x^2 - 7x + 6$

#20a. Which of the following lines has slope  $-\frac{3}{4}$ ?

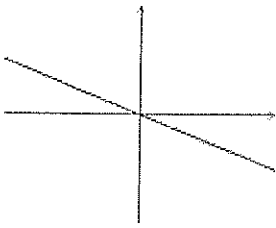
- A)  $4x - 3y = 1$       B)  $4x + 3y = 6$       C)  $3x + 4y = 2$       D)  $3x - 4y = 12$       E)  $x + y = -\frac{3}{4}$

#20b. Which of the following lines has intercepts at  $x = 3$ , and  $y = 2$ ?

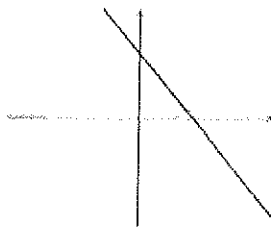
- A)  $2x + 3y = 6$       B)  $2x - y = 6$       C)  $3x - 2y = 6$       D)  $2x - 3y = 6$       E)  $3x + 2y = 6$

#20c. Which of the following graphs could represent  $3x + 2y = 12$ ?

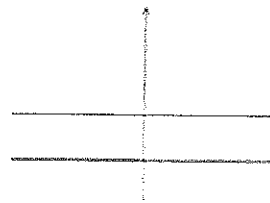
A)



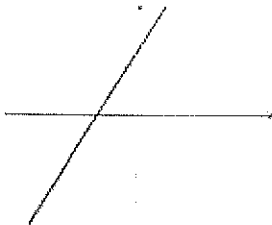
B)



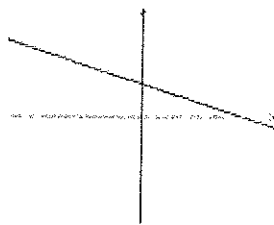
C)



D)



E)



#21a. Which of the following functions contains the points  $(0, 1)$  and  $(2, 1)$ ?

- A)  $y = 2|x - 1|$     B)  $y = |x + 1|$     C)  $y = |x - 1|$     D)  $y = |x - 2|$     E)  $y = |2x - 1|$

#21b. Which of the following quadratic functions contains the points  $(-2, 0)$  and  $(3, 0)$ ?

- A)  $y = x^2 + x + 6$     B)  $y = x^2 - x - 6$     C)  $y = x^2 + 3x - 2$     D)  $y = x^2 + x - 6$     E)  $y = 9x^2 - 4$

#22a. The curve  $y = 4^x$  intersects the line  $y = 8$  at which of the following points?

- A)  $(2, 8)$     B)  $(4, 8)$     C)  $(1, 8)$     D)  $\left(\frac{2}{3}, 8\right)$     E)  $\left(\frac{3}{2}, 8\right)$

#22b. At which  $x$  value(s) does the curve  $y = x^2 + 2$  intersect the line  $y = 6$ ?

- A) no values    B) 4 only    C) 4 and -4    D) 2 and -2    E) 2 only

#23a. If  $\frac{6}{3 + \sqrt{3}} = a - b\sqrt{3}$ , then  $a - b =$

- A) 6    B) 3    C) 9    D) 2    E) 1

#23b. Where it is define,  $\frac{\sqrt{x} - 2}{x - 4}$  is equivalent to

- A)  $\frac{1}{\sqrt{x}} + \frac{1}{2}$     B)  $\sqrt{x} - 2$     C)  $\frac{1}{\sqrt{x}} + 2$     D)  $\sqrt{x} + 2$     E)  $\frac{1}{\sqrt{x} + 2}$

#24. Which of the following functions contains the point  $\left(\frac{\pi}{6}, 2\right)$ ?

- A)  $y = 2 \sin x$     B)  $y = \csc x$     C)  $y = \tan x$     D)  $y = 2 \sec x$     E)  $y = 2 \cot x$

#25.  $\sum_{k=-2}^1 \frac{2k}{k+3} = ?$

- A)  $\frac{9}{2}$     B)  $-4$     C)  $5$     D)  $-\frac{9}{2}$     E)  $-5$

#26a.  $f$  contains the points  $(3, 1)$  and  $(1, -3)$ . If  $f^{-1}$  is the inverse of  $f$ , what is the value of  $f^{-1}(f(3))$ ?

- A)  $\frac{1}{3}$     B)  $-\frac{1}{3}$     C)  $3$     D)  $-1$     E)  $1$

#26b. A linear function  $f$  has slope 2 and y-intercept 3. What are the slope and y-intercept of its inverse  $f^{-1}$ ?

- A)  $\frac{1}{2}$  and  $-3$     B)  $-2$  and  $\frac{1}{3}$     C)  $\frac{1}{2}$  and  $-\frac{3}{2}$     D)  $\frac{1}{2}$  and  $\frac{1}{3}$     E)  $-2$  and  $-3$

#27. The line  $y = 3x + 1$  intersects the line  $y = kx - 2$  where  $x = 1$ . What is the value of  $k$ ?

- A)  $4$     B)  $7$     C)  $6$     D)  $1$     E)  $2$

#28a. If  $(2+i)(3+i) = a+bi$ , what is the value of  $a+b$ ?

- A)  $3$     B)  $2$     C)  $10$     D)  $5$     E)  $9$

#28b. If  $(3+i)^2 = a+bi$ , what is the value of  $a+b$ ?

- A)  $15$     B)  $8$     C)  $5$     D)  $14$     E)  $16$

#29a. Mary's age now is 6 years more than twice the sum of the ages of her two children. In 3 years her age will be 22 years less than three times the sum of their ages. How old is Mary now?

- A)  $32$     B)  $35$     C)  $27$     D)  $29$     E)  $26$

#29b. If Tanya could increase her running speed by 1 mph, she could complete a six mile race in 18 minutes less time. What is her current rate in mph?

- A)  $4$     B)  $5$     C)  $3.5$     D)  $4.5$     E)  $3$

#30a. If  $x-3$  is a factor of  $x^3 + bx^2 - 9$ , then  $b =$

- A)  $9$     B)  $1$     C)  $-3$     D)  $-2$     E)  $3$

#30b. If  $2x^3 - cx + 3$  is divided by  $x+2$ , the remainder is  $-3$ . What is the value of  $c$ ?

- A)  $5$     B)  $3$     C)  $1$     D)  $2$     E)  $-3$