Random Topics. Form A

1. What is the product of $i(2-3i)$ *where* $i=\sqrt{-1}$?

(A) $3+2i$
(B) $3-2i$
(C) $2i-3$
(D) 5
(E) $\sqrt{3}+2i$

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

$i^2 = -1$

2. The expression $\frac{2i}{1+i}$ is equivalent to? Note that $i=\sqrt{-1}$

(A) $1+2i$
(B) $2+i$
(C) $1-i$
(D) $1-2i$
(E) $1+i$

$\frac{2i}{1+i} \cdot \frac{1-i}{1-i} = \frac{2i-2i^2}{1-i+i-i^2} = \frac{2i+2}{1-i^2} = \frac{2+2i}{1+1}$

$= \frac{2+2i}{2} = 1+i$

3. Which of the following is a solution to $x^2+4=0$?

(A) $\sqrt{2}$
(B) $2i$
(C) $4i$
(D) -2
(E) $\sqrt{2}i$

$x^2 = -4$

$x = \mp\sqrt{-4} = \mp 2i$

So solutions ar $x = 2i$ or $x = -2i$

4. What is the number 350,000,000 in scientific notation?

(A) 3.5×10^6
(B) 35×10^8
(C) 3.5×10^8
(D) 350×10^9
(E) 3.5×10^{-8}

Left Add Right Subtract
LARS

$3\overset{\uparrow}{5}0,000,000.$
$+8$

5. What is the number 0.00000263 in scientific notation?

(A) 2.63×10^{-6}
(B) 263×10^{-8}
(C) 2.63×10^6

$0.\overset{\downarrow}{0}0000263$
-6

LARS

(D) 1×10^{-263}

(E) 2.63×10^{-8}

6. What is $3.4 \times 10^5 + 9.7 \times 10^6$ equal to?

(A) 10.04×10^7

(B) 10.04×10^{11}

(C) 1.004×10^9

(D) 1.004×10^7

(E) 1.004×10^{-7}

Before we add we need to match the exponents. Convert 3.4×10^5 to have the same exponent as 9.7×10^6. $3.4 \times 10^5 = 0.34 \times 10^6$

$0.34 \times 10^6 + 9.7 \times 10^6 = 10.04 \times 10^6 = 1.004 \times 10^7$

7. What is $(3.4 \times 10^{-2})(6.2 \times 10^6)$ equal to?

(A) 2.108×10^4

(B) 2.108×10^{-12}

(C) 2.108×10^5

(D) 21.08×10^5

(E) 2.108×10^{-5}

$3.4 \times 6.2 = 21.08$

$10^{-2} \times 10^6 = 10^4$

so $21.08 \times 10^4 = 2.108 \times 10^5$

8. $\dfrac{8.4 \times 10^5}{1.4 \times 10^{-2}} = ?$

(A) 6×10^7

(B) 6×10^{-7}

(C) 60×10^8

(D) 60×10^{-8}

(E) 6×10^3

$\frac{8.4}{1.4} = 6$

$\frac{10^5}{10^{-2}} = 10^{5+2} = 10^7$

6×10^7

9. What is the next number in the pattern below?

0, 3, 8, 15, 24, ...

(A) 33

(B) 35

(C 36

(D 40

(E) 37

+3 +5 +7 +9 +11

0, 3, 8, 15, 24, ...?

so $24 + 11 = 35$

10. What is the sum of the next three numbers in the pattern below?

1, 3, 6, 10, 15, 21, ...

(A) 95
(B) 100
(C 99
(D 115
(E) 109

+2 +3 +4 +5 +6 +7 +8 +9

1, 3, 6, 10, 15, 21, 28, 36, 45

$28+36+45=109$

11. The sum of 5 consecutive integers is 505. What is the second number?

(A) 101
(B) 100
(C 105
(D 90
(E) 99

Let a be any integer
The 5 consecutive integers are
$a, a+1, a+2, a+3, a+4$
Their sum
$a+a+1+a+2+a+3+a+4=505$
$5a+10=505 \Rightarrow 5a=495$ so $a=99$.
second number in list is $a+1$ so $99+1=100$

12. The sum of 5 consecutive integers is 35. What is the median of the 5 consecutive integers?

(A) 5
(B) 7
(C) 8
(D) 9
(E) 3

$a, a+1, a+2, a+3, a+4$
$a+a+1+a+2+a+3+a+4=35$
$5a+10=35 \Rightarrow 5a=25 \Rightarrow a=5$

5, 6, 7, 8, 9 Median is 7

13. Which of the following is NOT a solution to $x(x-2)(x+3)(x+5)=0$?

(A) 5
(B) -5
(C) 0
(D) 2
(E) -2

$x=0$ is a solution
$x-2=0$ is a solution so $x=2$
$x+3=0$ is a solution so $x=-3$
$x+5=0$ is a solution so $x=-5$

14. Which of the following is a factor for of the expression x^2-9?

(A) $(x-3)(x-3)$
(B) $(x-1)(x+9)$
(C) $(x-3)(x+3)$
(D) $(x+1)(x-9)$

$x^2-9=(x-3)(x+3)$

(E) $(2x-3)(2x+3)$

15. Which of the following is a factor for of the expression $5x^2 - 13x - 6$?

(A) $(5x+6)(x-1)$
(B) $(5x-6)(x+1)$
(C) $(5x-3)(x-2)$
(D) $(5x+2)(x-3)$ $\Rightarrow 5x^2-15x+2x-6 = 5x^2-13x-6$
(E) $(5x-3)(x+2)$

16. What is the value of the expression $\frac{16!}{14!}$? Note: n!= (n-1)(n-2)(n-3).....(3)(2)(1).

(A) 14
(B) 16
(C) 240
(D) 224
(E) 2

$$\frac{16!}{14!} = \frac{16 \cdot 15 \cdot \cancel{14!}}{\cancel{14!}} = 16 \cdot 15 =$$

17. What is the determinant of the matrix shown below?

$$\begin{vmatrix} 8 & 3 \\ -5 & -2 \end{vmatrix} = (8)(-2) - (-5)(3)$$
$$= -16 + 15 = -1$$

(A) -1
(B) 34
(C) -25
(D) -31
(E) 31

18. Which of the following matrices is equal to

$$\begin{bmatrix} 9 & 8 \\ -4 & 7 \end{bmatrix} + \begin{bmatrix} -6 & 6 \\ 5 & 4 \end{bmatrix}$$

(A) $\begin{bmatrix} 3 & 14 \\ 1 & 11 \end{bmatrix}$

$$\begin{bmatrix} 9-16 & 8+6 \\ -4+5 & 7+4 \end{bmatrix} = \begin{bmatrix} 3 & 14 \\ 1 & 11 \end{bmatrix}$$

(B) $\begin{bmatrix} 3 & 14 \\ 9 & 11 \end{bmatrix}$

(C) $\begin{bmatrix} 15 & 14 \\ 9 & 11 \end{bmatrix}$

(D) $\begin{bmatrix} 17 & 0 \\ 3 & 9 \end{bmatrix}$

(E) $\begin{bmatrix} -14 & 86 \\ 59 & 4 \end{bmatrix}$

19. What must be the value of a for the matrix $\begin{bmatrix} -2 & -3 \\ a & 1 \end{bmatrix}$ *to have a determinant of* 10?

(A) -4
(B) 4
(C) 3
(D) -3
(E) 5

$(-2)(1) - (a)(-3) = 10$

$-2 + 3a = 10$

$3a = 12$

$a = 4$

20. What is the equation of the vertical ellipse(major axis is parallel to the y-axis) centered at (1,8) and with a minor radius of 2 and a major axis of 3?

(A) $\frac{(x-1)^2}{4} + \frac{(y-8)^2}{9} = 1$
(B) $\frac{(x-1)^2}{9} + \frac{(y-8)^2}{4} = 1$
(C) $\frac{(x+1)^2}{4} + \frac{(y+8)^2}{9} = 1$
(D) $\frac{(x+1)^2}{9} + \frac{(y+8)^2}{4} = 1$
(E) $\frac{(x-1)^2}{4} + \frac{(y-8)^2}{9} = 13$

$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$

$a = 2 \qquad b = 3$ major axis

$\frac{(x-1)^2}{2^2} + \frac{(y-8)^2}{3^2} = 1$

Answers

1. A
2. E
3. B
4. C
5. A
6. D
7. C
8. A
11. B
12. B
13. A
14. C
15. D
16. C
17. A
18. A

9. B 19. B
10. E 20. A