1) The <u>number</u> of rational numbers in the set

$$\left\{ \frac{3}{2} , 0 , \frac{3.14}{31.4} , 0.\overline{25} , 3.14 , 0.272232227\cdots , \sqrt{7} , \frac{22}{7} , \frac{\pi}{2} , \sqrt{9} \right\} \text{ is:}$$

A) 7

B) 6

C) 5

D) 4

E) 8

2) The expression $\quad x \sqrt[3]{81\, x^4\, y^8} \; - y\sqrt[3]{-24\, x^7\, y^5} \quad$ simplifies to:

A) $\quad 5\, x^2\, y^2 \sqrt[3]{3x\, y^2}$

B) $\quad 105\, x^2\, y^2 \sqrt[3]{3x\, y^2}$

C) $\quad 5\, x^2 y \sqrt[3]{3 x^2 y}$

D) $\quad 5\, x^2 y \sqrt[3]{x^2\, y^2}$

E) $\quad x^2 y \sqrt[3]{x^2\, y^2}$

3) Let $M = \{\, -4, -3, -2, 0, 4, 5, 6, 7, 8, 9 \,\}$, and

$N = \{\, n \mid n \text{ is an odd integer } -4 \leq n < 10 \,\}$, then $M \cap N =$

A) $\{-3, 5, 7, 9\}$

B) $\varnothing$

C) $\{-1, 5, 7, 9\}$

D) $\{0, 5, 7, 9\}$

E) $\{1, 3, 5\}$

4) $\left|3 - \pi\right| - \left|\pi - 4\right| =$

A) $2\pi - 7$

B) $\pi - 4$

C) $7 + 2\pi$

D) -7

E) 1

5)   If $x > 0$, $y > 0$, and $\left(\dfrac{y^2\sqrt{x}}{2\sqrt[4]{y}}\right)^4 \left(\dfrac{64\,x^{-2}y^{-4}}{y^2}\right)^{1/2} = \dfrac{x^m y^n}{a}$,   then $m + n + a =$

A)   7

B)   9

C)   38

D)   5

E)   6

6) $\left(1 + \dfrac{1}{x}\right)^2 - \left(1 - \dfrac{1}{x}\right)^2 =$

A) $\dfrac{4}{x}$

B) x

C) $\dfrac{1}{x}$

D) $\left(\dfrac{1}{x}\right)^2$

E) $4 + \dfrac{4}{x}$

7) One factor of $6y^2 (y + 3)^{\frac{1}{2}} - 3 y^3 (y + 3)^{-\frac{1}{2}}$ is:

     A) $y + 6$

     B) $2y + 7$

     C) $2y + 3$

     D) $2y + 5$

     E) $y + 3$

8) If $M = 0.000000003$ and $N = 2300000000000$, then MN in <u>scientific notation</u> is equal to:

     A) 6.9×10^{3}

     B) 6.9×10^{2}

     C) 6.9×10^{-4}

     D) 6.9×10^{4}

     E) 6.9×10^{-3}

9) The expression $\dfrac{x^{-1}y - xy^{-1}}{x^{-1} - y^{-1}}$ simplifies to:

A) $x + y$

B) $\dfrac{y + x}{xy}$

C) $y - x$

D) $\dfrac{xy}{x + y}$

E)   1

10) $\dfrac{x - 7}{x - 2} + \dfrac{5}{x^2 + 2x + 4} \div \dfrac{x^2 - 4x + 4}{x^3 - 8} =$

A)   1

B) -1

C) $\dfrac{x + 1}{x - 2}$

D) $\dfrac{x}{x - 2}$

E) $\dfrac{1}{x - 2}$

11) The solution set of $2 + \dfrac{5}{x-4} = \dfrac{x+1}{x-4}$ is :

     A) $\varnothing$

     B)   {- 4}

     C)   {0}

     D)   {4}

     E)   {2}

12) The **product** of all the solutions of the equation $6\,x^{\frac{2}{3}} - 24 = 0$ is:

     A)   - 64

     B)   64

     C)   - 8

     D)   24

     E)   - 6

13) The <u>coefficient</u> of x^3 in the expansion of $2x^2 \left(3x - \dfrac{1}{3}\right)(3x + 4)$ is:

A) 22

B) 24

C) 6

D) 10

E) - 2

14) If $\dfrac{14}{\sqrt[14]{(\sqrt{2} - 3)^{14}}} = a + b\sqrt{2}$ then $a + b =$

A) 8

B) 4

C) 14

D) 28

E) 30

15) One of the factors of $3x^3 - 2x^2 - 12x + 8$ is:

    A) $x + 2$

    B) $3x + 2$

    C) $x - 4$

    D) $x + 4$

    E) $x - 1$

16) The <u>domain</u> of the expression $\dfrac{(x-2)(x+2)}{(x-2)(x-3)}$ is:

    A) $\{x \mid x \neq 2 \text{ and } x \neq 3\}$

    B) $\{x \mid x \neq 3\}$

    C) $\{x \mid x \neq 2 \text{ and } x \neq -2\}$

    D) $\{x \mid x \neq 2\}$

    E) $(-\infty, \infty)$

17) The expression $\left(-\dfrac{8}{27}\right)^{-2/3} - 2^2 + (-3)^2 + \dfrac{3}{4}(-5)^0$ simplifies to :

     A)   8

     B)   16

     C) $\dfrac{9}{4}$

     D) $-\dfrac{3}{4}$

     E) -4

18) Which ONE of the following statements is <u>FALSE</u>?

     A)   every rational number has a multiplicative inverse

     B)   every real number is either rational or irrational

     C) $5.12\overline{37}$ is a rational number

     D) $\dfrac{22}{7} \neq \pi$

     E)   the multiplicative inverse of $-2\dfrac{3}{5}$ is $-\dfrac{5}{13}$

19) The <u>solution</u> of the linear equation $\quad 3x - \dfrac{5x}{2} = \dfrac{x+1}{3} - \dfrac{1}{6}\quad$ is:

     A)   1

     B)   0

     C)   -1

     D) $\dfrac{2}{3}$

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

20) If $\left(x^2 - \sqrt{3x-1} \right)\left(x^2 + \sqrt{3x-1} \right) = x^4 + mx + n$, then $\quad m + n =$

     A)   - 2

     B)   2

     C)   -4

     D)   1

     E)   - 1