1) If $4x^2y^2 - 36xy + k + 1$ is a **perfect square** trinomial ,   then $k =$

A)   82

B)   48

C)   8

D)   80

E)   24

2) The expression $\dfrac{a+b}{a-b} \div \dfrac{a^{-1} + b^{-1}}{a^{-1}b - ab^{-1}}$ simplifies to

A) $a + b$

B) $\dfrac{1}{a-b}$

C) $-a - b$

D) $-a + b$

E) $a - b$

3) Two electerical resistors with resistance R_1 and R_2 are connected in parallel and the total resistance R is given by

$$R = \frac{1}{\dfrac{1}{R_1} + \dfrac{1}{R_2}}$$. If $R_1 = 0.2$ ohms and $R_2 = 0.8$ ohms, then $R =$

A)   0.16 ohms.

B)   16 ohms.

C)   6 ohms.

D)   32 ohms.

E)   160 ohms.

4) If $M = \{y \mid y$ is a real number $0 < y \leq 2\}$ and $N = (-1, 1]$, then
   $M \cup N =$

   A) (0, 1]

   B) (-1, ∞)

   C) {1, 2}

   D) (-∞ , ∞)

   E) (-1, 2]

5) If $(A + 1)(A^2 + 1) = 3$, then $A^4 - 1 =$

   A)   3

   B) – 3

   C) $3A - 1$

   D) $A - 3$

   E) $3A - 3$

6) The **domain** of the expression $\dfrac{\sqrt{x}}{x^2 + x - 2}$ is

A) $(-\infty, \infty)$

B) $(-2, 0) \cup (1, \infty)$

C) $[0, 1) \cup (1, \infty)$

D) $(-2, 0) \cup (0, \infty)$

E) $(0, 2) \cup (2, \infty)$

7) Which **one** of the following statments is **TRUE** ?

A) $\sqrt{A + B} = \sqrt{A} + \sqrt{B}$, for any positive real numbers A and B

B) $(A + B)^3 = (A + B)\left(A^2 + AB + B^2\right)$, for any real numbers A and B

C) $\dfrac{A}{B + C} = \dfrac{A}{C} + \dfrac{A}{B}$, for any real numbers A, B and C

D) $7^{100} + 7^{101} = 8 \times 7^{100}$

E) $\sqrt[4]{A^4} = A$, for any real number A.

8) The **number** of irrational numbers in the set

$$\left\{ -\frac{22}{7} ,\ -\frac{\pi}{3.14} ,\ -\frac{\sqrt{3}}{\sqrt{12}} ,\ -\frac{1}{\sqrt{2}} ,\ \sqrt[3]{27} ,\ \sqrt[4]{32} ,\ 1.5 ,\ 1\frac{2}{3} ,\ 3.1\overline{4} \right\} \quad \text{is}$$

A)   4

B)   3

C)   2

D)   5

E)   6

9) If $x, y > 0$, and $\left(\dfrac{x}{x+y}\right)^{1/2}\left(\dfrac{x}{x+y}\right)^{-1} = \dfrac{(x+y)^a}{x^b}$, then $a + b =$

     A)   2

     B)   1

     C)   0

     D)   4

     E)   8

10) One of the factors of $4y^5 - y^3 + 4y^2 - 1$ is

     A) $y^2 - y + 1$

     B) $y + 2$

     C) $y - 1$

     D) $y^2 + y + 1$

     E) $y - 2$

11) If $x > 0$ and $y > 0$, then $x^2 \sqrt{4xy^3} - 2y \sqrt{(-2)^2 x^5 y} =$

A) $x^2 y \sqrt{xy}$

B) $2x^2 y \sqrt{xy}$

C) $6x^2 y \sqrt{xy}$

D) $-2x^2 y \sqrt{xy}$

E) $-x^2 y \sqrt{xy}$

12) When simplified, the expression $(3x - 1)^3 - 27x \left(x^2 - x + \dfrac{1}{3}\right)$ is

A)   a monomial of degree 0

B)   a binomial of degree 1

C)   a binomial of degree 2

D)   a trinomial of degree 3

E)   a monomial of degree 1

13) In **scientific notation,** the number $\dfrac{(16000)(4.5\times10^{-4})}{0.048} =$

A) 15×10^2

B) 1.5×10^3

C) 1.5×10^2

D) 1.5×10^{-2}

E) 15×10^{-2}

14) If $x < 0$, then the expression $\left| x - \dfrac{1}{4} \right| - \left| \dfrac{1}{2} - x \right|$ simplifies to

A) $2x - \dfrac{1}{4}$

B) $\dfrac{1}{4}$

C) $-\dfrac{1}{4}$

D) $2x - \dfrac{3}{4}$

E) $-2x + \dfrac{3}{4}$

15) $\dfrac{x-1}{3} - \dfrac{2x^2-5x+2}{x^3-8} \cdot \dfrac{x^2+2x+4}{6x-3} =$

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

B) $\dfrac{x-2}{3}$

C) $\dfrac{x}{3}$

D) $\dfrac{x-1}{3}$

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

16) If $18(x+1)^{-1/2} + 2(x+1)^{1/2} = \dfrac{A(x+B)}{(x+1)^{1/2}}$, then $A + B =$

    A)　10

    B)　– 2

    C)　2

    D)　8

    E)　12

17) The property of real numbers illustrated in the statement

    $3y + 2(xy) = 3y + (2x)y$　is the

    A)　associative property of multiplcation

    B)　commutative property of addition

    C)　associative property of addition

    D)　distributive property

    E)　commutative property of multiplcation

18) The expression $\dfrac{2}{2\sqrt{3} - \sqrt{2} + \sqrt{18}}$ simplifies to

A) $-\sqrt{2} - \sqrt{3}$

B) $\sqrt{2} - \sqrt{3}$

C) $\sqrt{2} + \sqrt{3}$

D) $-\sqrt{2} + \sqrt{3}$

E) $2\sqrt{2} - 2\sqrt{3}$

19) If the **coefficient** of xy in the product $(x - y)(x + y) - (Mx + y)^2$ is 8,

then $M =$

A) 4

B) -4

C) -2

D) 8

E) -8

20) $\left(\dfrac{x}{a} + \dfrac{y}{b}\right)^2 - \left(\dfrac{x}{a} - \dfrac{y}{b}\right)^2 =$

     A) $\dfrac{4xy}{ab}$

     B) $\dfrac{2x}{a}$

     C) 0

     D) $\dfrac{xy}{ab}$

     E) $\dfrac{2y}{b}$

1) D
2) C
3) A
4) E
5) E
6) C
7) D
8) B
9) B
10) A
11) D
12) A
13) C
14) C
15) B
16) E
17) A
18) D
19) B
20) A