Directions: Answer the following question(s).

1 **Select *all* possible values for x in the equation $x^2 = 48$.**

A. $\sqrt{48}$

B. $24\sqrt{2}$

C. $-4\sqrt{3}$

D. $-16\sqrt{3}$

2 **An equation is shown below.**

$$\frac{5 \cdot 5^k}{5^{-8}} = 5^3$$

What value of k makes this equation true?

$k = \boxed{}$

3 **Select *two* possible values for x in the equation $x^2 = 175$.**

A. $5\sqrt{7}$

B. $5\sqrt{35}$

C. $25\sqrt{7}$

D. $\sqrt{175}$

4 **Which of the following is equivalent to $(2^{-4} \cdot 2^3)^3$? Select *all* that apply.**

A. $\dfrac{1}{8}$

B. 8

C. $2^{-12} \cdot 2^9$

D. $2^{-1} \cdot 2^6$

5 **Which of the following is equivalent to $(5 \times 10^3) + (4 \times 10^6)$?**

A. 4.005×10^6

B. 9×10^6

C. 4.005×10^9

D. 9×10^9

6 **How many times larger is 3×10^8 than 3×10^2?**

A. 1×10^{-6}

B. 1×10^4

C. 1×10^6

D. 1×10^{10}

7 **Enter the value of n for the equation $(3^n \bullet 3^2)^4 = 3^{28}$.**

$n = \boxed{}$

8 **The Hawaiian Islands formed as a result of tectonic plate movement over a volcanic hot spot. The rate of plate movement can be calculated using the distance that an island is from the hot spot and the age of the island.**

A scientist determines that one of the islands is 4860 kilometers from the hot spot and is 6.5×10^7 years old. Which of the following statements are true? Select *three* that apply.

A. The rate of plate movement is approximately 7.5 cm per year.

B. The rate of plate movement is approximately 7.5×10^{-5} km per year.

C. In a million years, the plate has moved a distance of approximately 75 m.

D. In a million years, the plate has moved a distance of approximately 7.5×10^7 mm.

Directions: Answer the following question(s).

9 **Which of these equations are correct? Select *three* that apply.**

A. $69,000,000 - (2.7 \times 10^6) = 42,000,000$

B. $(7.4 \times 10^7) - 3,100,000 = 70,900,000$

C. $750,000,000 - (3.2 \times 10^7) = 718,000,000$

D. $(6.6 \times 10^6) - 150,000 = 64,500,000$

E. $8,800,000,000 - (5.6 \times 10^8) = 8,240,000,000$

F. $(4.9 \times 10^8) - 3,500,000,000 = 1,400,000,000$

10 **Which of these pairs of distances are 5 times the other distance? Select *two* that apply.**

A.   a distance of 2×10^3 km and a distance of 2×10^{15} km

B.   a distance of 2×10^4 km and a distance of 2×10^9 km

C.   a distance of 2×10^7 km and a distance of 4×10^8 km

D.   a distance of 4×10^{13} km and a distance of 2×10^{14} km

E.   a distance of 8×10^5 km and a distance of 4×10^6 km

F.   a distance of 8×10^{16} km and a distance of 8×10^{17} km

11 **Which of these statements are correct? Select *three* that apply.**

A.   A solution to the equation $x^2 = 4$ is $x = 16$.

B.   A solution to the equation $x^2 = 64$ is $x = 4$.

C.   A solution to the equation $x^2 = 81$ is $x = 9$.

D.   A solution to the equation $x^3 = 8$ is $x = 24$.

E.   A solution to the equation $x^3 = 125$ is $x = 5$.

F.   A solution to the equation $x^3 = 216$ is $x = 6$.

12 **Which of these equations are correct? Select *three* that apply.**

A. $\dfrac{2^4}{2^8} = \dfrac{1}{16}$

B. $\dfrac{3^6}{3^4} = \dfrac{1}{9}$

C. $\dfrac{4^9}{4^3} = 64$

D. $\dfrac{5^8}{5^6} = 25$

E. $\dfrac{6^7}{6^1} = 36$

F. $\dfrac{8^2}{8^5} = \dfrac{1}{512}$

13 **Scientists are analyzing the half-lives of three radioactive isotopes. The half–life of isotope A is about 3×10^{-21} seconds, the half–life of isotope B is about 9×10^{-24} seconds, and the half–life of isotope C is about 6×10^{-18} seconds. Which of these statements is correct? Select three that apply.**

A.   The half–life of isotope A is about 3000 times that of isotope B.

B.   The half–life of isotope A is about 0.0005 times that of isotope C.

C.   The half–life of isotope B is about 0.003 times that of isotope A.

D.   The half–life of isotope B is about 0.000015 times that of isotope C.

E.   The half–life of isotope C is about 2000 times that of isotope A.

F.   The half–life of isotope C is about 1,500,000 times that of isotope B.

Directions: Answer the following question(s).

14 **Scientists are analyzing three earthquakes that occurred during January, April, and September of a particular year. The January earthquake released 2×10^{14} Joules of energy, the April earthquake released 8×10^{10} Joules, and the September earthquake released 4×10^{16} Joules. Which of these statements is correct? Select three that apply.**

A.   The January earthquake released 2500 times as much energy as the April earthquake.

B.   The January earthquake released 0.05 times as much energy as the September earthquake.

C.   The April earthquake released 0.00004 times as much energy as the January earthquake.

D.   The April earthquake released 0.000002 times as much energy as the September earthquake.

E.   The September earthquake released 200 times as much energy as the January earthquake.

F.   The September earthquake released 50,000 times as much energy as the April earthquake.

15 **The radius of the Sun is about 700,000,000 meters, the radius of the planet Venus is about 6,000,000 meters, and the radius of the supergiant star Betelgeuse is about 500,000,000,000 meters. Which of these statements is correct? Select three that apply.**

A.   The radius of the Sun is about 7×10^7 meters, and the radius of Venus is about 6×10^6 meters.

B.   The radius of the Sun is about 7×10^8 meters, and the radius of Betelgeuse is about 5×10^{11} meters.

C.   The radius of Venus is about 6×10^6 meters, and the radius of the Sun is about 7×10^8 meters.

D.   The radius of Venus is about 6×10^7 meters, and the radius of Betelgeuse is about 5×10^{11} meters.

E.   The radius of Betelgeuse is about 5×10^{10} meters, and the radius of the Sun is about 7×10^8 meters.

F.   The radius of Betelgeuse is about 5×10^{11} meters, and the radius of Venus is about 6×10^6 meters.

16 **Which of these expressions is equivalent to $10^{-5} \times 10^2$? Select *two* that apply.**

A. 100^{-3}

B. 10^3

C. $\left(\dfrac{1}{1000}\right)^{-3}$

D. $\left(\dfrac{1}{10}\right)^3$

E. $\dfrac{1}{1000}$

F. $10,000$

Directions: Answer the following question(s).

17 **Which of these equations is correct? Select *three* that apply.**

A. $(2^2)^4 = 2^6$

B. $(3^5)^{-2} = \dfrac{1}{3^{-10}}$

C. $(4^{-4})^2 = 4^{-8}$

D. $(5^{-3})^6 = \dfrac{1}{5^{18}}$

E. $(6^{-5})^{-3} = 6^{15}$

F. $(8^3)^2 = 8^9$

18 **Including both end zones, a football field is 4320 inches long. What is this value expressed in scientific notation?**

A. 4.32×10^{-4}

B. 4.32×10^{-3}

C. 4.32×10^3

D. 4.32×10^4

19 **An equation is shown below.**

$$\frac{2^n \cdot 2}{2^{-5}} = 2^2$$

Enter the value of *n* that makes this equation true.

n = ⬚

20 **A builder uses 2×10^3 pieces of lumber to build four walls of a square shed. The builder's neighbor used approximately 1×10^4 pieces of lumber to build the four walls of his square shed.**

Determine how many times larger the neighbors shed is in comparison to the builders shed.