1-

The total energy of an electron in orbit is the sum of its potential energy $\frac{-e^2}{r}$, in joules, and its kinetic energy $\frac{e^2}{2r}$, in joules. Which of the following gives the total energy, in joules, of an electron in orbit?

A) $\frac{-e^2}{2r}$

B) 0

C) $\frac{3e^2}{2r}$

D) $\frac{e^2(1-r)}{2r^2}$

2-

Which of the following is equivalent to $x^{\frac{3}{4}}\left(x^{\frac{1}{2}}\right)^{\frac{3}{2}}$

A) $\sqrt{x^3}$

B) $\sqrt[3]{x^2}$

C) $\sqrt[4]{x^3}$

D) $\sqrt[6]{x^5}$

3-

$$\sqrt{k+2} - x = 0$$

In the equation above, k is a constant. If $x = 9$, what is the value of k ?

A) 1

B) 7

C) 16

D) 79

4-

Which of the following is equivalent to $9^{\frac{3}{4}}$?

A) $\sqrt[3]{9}$

B) $\sqrt[4]{9}$

C) $\sqrt{3}$

D) $3\sqrt{3}$

5-

If $\sqrt{x} + \sqrt{9} = \sqrt{64}$, what is the value of x ?

A) $\sqrt{5}$

B) 5

C) 25

D) 55

6-

If $a^{\frac{b}{4}} = 16$ for positive integers a and b, what is one possible value of b ?

7-

Which of the following is equivalent to $(\sqrt{a} + \sqrt{b})^{\frac{2}{3}}$, where $a > 0$ and $b > 0$?

A) $(a + b)^3$

B) $\sqrt[3]{a + b}$

C) $(a + 2\sqrt{ab} + b)^{\frac{1}{3}}$

D) $\sqrt[3]{a + 2ab + b}$

8-

If $y = 5(2^x)$, where $x > 0$, which of the following is true?

A) If x increases by 1, then y doubles.

B) If y increases by 1, then x doubles.

C) If x increases by 1, then y increases by 5.

D) If y increases by 1, then x increases by 5.

9-

The expression $\frac{x^{-2}y^2}{\frac{1}{x^3}y^{-1}}$, where $x > 1$ and $y > 1$, is equivalent to which of the following?

A) $\frac{\sqrt{y}}{\sqrt[3]{x^2}}$

B) $\frac{y\sqrt{y}}{\sqrt[3]{x^2}}$

C) $\frac{y\sqrt{y}}{x\sqrt{x}}$

D) $\frac{y\sqrt{y}}{x^2\sqrt[3]{x}}$

10-

In the equation $(ax + 3)^2 = 36$, a is a constant. If $x = -3$ is one solution to the equation, what is a possible value of a ?

A) -11

B) -5

C) -1

D) 0

11-

Which of the following is equivalent to $a^{\frac{8}{7}}$?

A) $\sqrt[8]{a^7}$

B) $\sqrt[7]{a^8}$

C) $\sqrt[a^8]{a}$

D) $a\sqrt[7]{a^4}$

12-

If $9x^2y^2 = 25$ *and* $xy > 0$

what is the value of $18xy$?

A) 6

B) 30

C) 50

D) 150

13-

$$\sqrt{3-x} + 2 = x - 1$$

What is the solution of the equation above?

A) $x = 1$ only

B) $x = 2$ only

C) $x = 3$ only

D) $x = 2$ and $x = 3$

14-

If $x > 0$ and $\sqrt{x\sqrt{x}} = x^a$, what is the value of a ?

A) $\frac{3}{2}$

B) $\frac{3}{4}$

C) $\frac{1}{2}$

D) $\frac{1}{4}$

15-

$$\sqrt{x+9} = 4$$

Which of the following sets consists of all values of x that satisfy the equation above?

A) {-11, -7 }

B) { -25, 7 }

C) { - 7 }

D) { 7 }

16-

Which of the following expressions is equivalent to

$$x^{\frac{1}{3}} + y^{\frac{1}{3}}$$

A) $\sqrt[3]{x} + \sqrt[3]{y}$

B) $\sqrt[3]{x+y}$

C) $\sqrt[3]{xy}$

D) $\frac{1}{3}\,xy$

17-

What are all values of X for which $\sqrt{x^2-5}$ is a real number?

A) $|x| \geq \sqrt{5}$

B) $|x| \leq \sqrt{5}$

C) $|x| \geq 5$

D) $|x| \leq 5$

18-

$$\sqrt{2x+6} + 4 = x + 3$$

What is the solution set of the equation above?

A) $\{-1\}$

B) $\{5\}$

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

D) $\{0, -1, 5\}$

19-

If $a^{-\frac{1}{2}} = x$, where $a > 0$, what is a in terms of x ?

A) $\sqrt{x}$

B) $-\sqrt{x}$

C) $\frac{1}{x^2}$

D) $-\frac{1}{x^2}$

20-

Which of the following is equivalent to $\frac{x^2 y}{x^4 y^{\frac{1}{2}}}$ for all $x > 0$ and all $y > 0$?

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

B) $\frac{x^2}{y^{\frac{1}{2}}}$

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

D) $x^6\sqrt{y^3}$

21-

For a positive real number x, where $x^8 = 2$, what is the value of x^{24} ?

A) $\sqrt[3]{24}$

B) 4

C) 6

D) 8

22-

Which of the following is an equivalent form of $\sqrt[3]{f^{6a}k^2}$, where $f > 0$ and $k > 0$?

A) $f^{\frac{1}{3a}}k^{-1}$

B) $f^{\frac{1}{2a}}k^{\frac{3}{2}}$

C) $f^{3a}k^{-1}$

D) $f^{2a}k^{\frac{2}{3}}$

23-

$$x - 2 = \sqrt{x + 10}$$

Which of the following values of x is a solution to the equation above?

A) -1

B) 1

C) 4

D) 6

24-

If $2\sqrt{2x} = a$, what is $2x$ in terms of a ?

A) $\frac{a}{2}$

B) $\frac{a^2}{4}$

C) $\frac{a^2}{2}$

D) $4a^2$

25-

Which of the following expressions is equivalent to $(16x^2)^{\frac{1}{2}}$?

A) $4|x|$

B) $8|x|$

C) $\sqrt{8x}$

D) $16x$

26-

If $r > 0$ and $\sqrt[3]{\frac{9r}{2}} = \frac{1}{2}r$, what is the value of r ?

27-

Which of the following expressions is equivalent to $\left(16x^9y^3\right)^{\frac{1}{2}}$, where $x \geq 0$ and $y \geq 0$?

A) $4x^3y^{\frac{3}{2}}$

B) $4x^{\frac{9}{2}}y^{\frac{3}{2}}$

C) $8x^3y^3$

D) $8x^{\frac{9}{2}}y^3$

28-

If $(x^{24})^a = (x^2)^4$, and $x > 1$, what is the value of a ?

A) $\frac{1}{4}$

B) $\frac{1}{3}$

C) $\frac{1}{2}$

D) 2

29-

If $x+y=\sqrt{2(xy+3)}$, what is the value of x^2+y^2?

30-

$$\sqrt{12x} = x + 3$$

What value of x satisfies the equation above?

A) -3
B) 0
C) 3
D) 12

30

If $2x+3y=18$, which of the following gives y in terms of x?

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

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

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

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

31

If $P=2l+2w$, which of the following gives w in terms of P and l?

A) $w=P-2l$

B) $w=P-l$

C) $w=\frac{P}{2}-l$

D) $w=P-\frac{l}{2}$

32

If $c=\frac{a}{a+b}$, which of the following gives a in terms of b and c?

A) $a=\frac{bc}{1-c}$

B) $a=\frac{bc}{1+c}$

C) $a=\frac{bc}{b-c}$

D) $a=\frac{bc}{b+c}$

33

If $\frac{ab-1}{3}=c$, which of the following gives b in terms of the other variables?

A) $b=\frac{3c+1}{a}$

B) $b=\frac{3c-1}{a}$

C) $b=\frac{3c}{a}+1$

D) $b=\frac{3c}{a}-1$

34

If $gh-f=g-h$, which of the following gives g in terms of the other variables?

A) $g=\frac{f+h}{h-1}$

B) $g=\frac{f-h}{h+1}$

C) $g=\frac{f+h}{h+1}$

D) $g=\frac{f-h}{h-1}$

35

If $n=a+(k-1)d$, which of the following gives k in terms of the other variables?

A) $k=\frac{n-a+1}{d}$

B) $k=\frac{n+a-1}{d}$

C) $k=\frac{n-a-d}{d}$

D) $k=\frac{n-a+d}{d}$

36

The sum of three fourths of the number a and 24 is negative 9. What is the value of a?

A) -44

B) -20

C) 20

D) 44

37

A number g is decreased by 23 and then multiplied by $\frac{1}{2}$. The result is 8 more than twice the number g.

A) -13

B) $-\frac{34}{3}$

C) $-\frac{29}{3}$

D) -8

38

The quotient of p and q is twelve less than three times the sum of p and q.

Which of the following equations represents the statement above?

A) $\frac{p}{q} = (3p+q) - 12$

B) $\frac{p}{q} = 12 - (3p+q)$

C) $\frac{p}{q} = 3(p+q) - 12$

D) $\frac{p}{q} = 12 - 3(p+q)$

39

The sum of three consecutive even integers equals 72. What is the product of these integers?

A) 13800
B) 12144
C) 10560
D) 13728

40

The sum of three consecutive integers is 60.

Find the smallest of these three integers

A) 20

B) 22

C) 18

D) 19