



MATHS

BOOKS - KAPLAN INC MATHS

(ENGLISH)

EXPONENTS, RADICALS, POLYNOMIALS, AND RATIONAL EXPRESSIONS

How Much Do You Know

1. Which expression is equivalent to

$$2(-4j^3k^{-4})^{-3}?$$

A. $-\frac{k^{12}}{512j^9}$

B. $-\frac{k^{12}}{32j^9}$

C. $-\frac{j^9}{32j^9}$

D. $-\frac{k^{12}}{128j^9}$

Answer: B



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$$2. T = 2\pi \sqrt{\frac{L}{g}}$$

The formula above was created by Italian scientist Galileo Galilei in the early 1600s to demonstrate that the time it takes for a pendulum to complete a swing-called its period, T-can be found using only the length of the pendulum, L, and the force of gravity, g. He proved that the mass of the pendulum did not affect its period. Based on the equation above, which of the following equations could be used to find the length of the pendulum given its period ?

$$\text{A. } L = \frac{gT}{2\pi}$$

$$\text{B. } L = \frac{gT^2}{4\pi^2}$$

$$\text{C. } L = \frac{T^2}{4\pi^2 g}$$

$$\text{D. } L = \frac{g}{4\pi^2 T^2}$$

Answer: B



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3. Which of the following represents $\frac{\sqrt[6]{x^{10}y^{12}}}{\sqrt[3]{x^5y^6}}$

written in simplest form, given that

$x > 0$ and $y > 0$?

A. 1

B. 2

C. $x^2 y^3 \sqrt{x}$

D. $xy^2 \sqrt[3]{x^2}$

Answer: A



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4. What is the result when $4x^3 - 5x^2 + x - 3$ is divided by $x - 2$?

A. $4x + 3 + \frac{11}{x - 2}$

B. $4x^2 + 3x - 6$

C. $4x^2 + 3x + 18$

D. $4x^2 + 3x + 7 + \frac{11}{x - 2}$

Answer: D



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5. The function f is a parabolic function that intersects the x -axis. Which of the following statements must be true ?

- A. The function has at least one real root.
- B. The function has no real roots.
- C. The function intersects the positive y axis.
- D. The function has two zeros.

Answer: A



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6. In the equation

$$ax^4 + bx^3 + cx^2 - dx = 0, a, b, c \text{ and } d \text{ are}$$

constants. If the equations crosses the x-axis

at 0, - 2, 3, and 5 which of the following is

a factor of $ax^4 + bx^3 + cx^2 - dx$?

A. $x - 2$

B. $x + 3$

C. $x - 5$

D. $x + 5$

Answer: C



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$$7. \frac{8x}{3(x-5)} + \frac{2x}{3x-15} = \frac{50}{3(x-5)}$$

What value (s) of x satisfy the equation above
?

A. 0

B. 5

C. No solution

D. Any value such that $x \neq 5$

Answer: C



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8.

if

$$\frac{6}{2x - 3} + 6a = \frac{10}{2x - 3} + 4b \text{ and } 3a - 2b = 2,$$

what is the value of x ?

A. $\frac{1}{2}$

B. 2

C. No solution

D. The value cannot be determined from the information given.

Answer: B



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Try On Your Own

1. What is the value of $\frac{3^5 \times 27^3}{81^3}$?



2. $\frac{18x^4 + 27x^3 - 36x^2}{9x^2}$ if $x \neq 0$, which of the following is equivalent to the expression above ?

A. $2x^2 + 3x - 4$

B. $2x^2 + 3x - 6$

C. $2x^4 + 3x^3 - 4x^2$

D. $2x^6 + 3x^5 - 4x^4$

Answer: A



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3. Human blood contains three primary cell types: red blood cells (RBC), white blood cells (WBC), and platelets. In an adult male, a single microliter (1×10^{-3} milliliters) of blood contains approximately 5.4×10^6 RBC, 7.5×10^3 WBC, and 3.5×10^5 platelets on average. What percentage of an adult male's total blood cell count is comprised of red blood cells ?

A. 1.30 %

B. 6.21 %

C. 60.79 %

D. 93.79 %

Answer: D



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4. If $n^3 = -8$, what is the value of $\frac{(n^2)^3}{\frac{1}{n^2}}$?



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5. If $r + s = 6$, what is the value of t in the equation above ?

A. 6

B. 12

C. 18

D. 30

Answer: B



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6. What do you need to do before squaring both sides ?

For what value of x is the equation above true ?

A. -10

B. -2

C. 19

D. No solution

Answer: A



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$$7. 3x = x + 14$$

$$\sqrt{3z^2 - 11} + 2x = 22$$

If $z > 0$, what is the value of z ?

A. 1

B. 3

C. 5

D. 8

Answer: C



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8. Which of the following expressions is equivalent to $-x^{\frac{1}{4}}$?

A. $-\frac{1}{4x}$

B. $-\frac{1}{x^4}$

C. $-\sqrt[4]{x}$

D. $\frac{1}{\sqrt[4]{-x}}$

Answer: C



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9. When simplified, $8^{\frac{4}{3}}$ is what number ?



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10. $\sqrt{3a + 16} - 3 = a - 1$

In the equation above, if $a > 0$, which of the following is a possible value of a ?

A. 3

B. 2

C. 1

D. -4

Answer: A



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11. What is the sum of the polynomials

$6a^2 - 17a - 9$ and $-5a^2 + 8a - 2$?

A. $a^2 - 9a - 11$

B. $a^2 - 25a - 7$

C. $11a^2 - 9a - 11$

D. $11a^2 - 25a - 7$

Answer: A



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12. What is the difference when $3x^3 + 7x - 5$ is subtracted from $8x^2 + 4x + 10$?

A. $5x^2 - 3x + 15$

B. $-3x^3 - 3x + 5$

$$C. 3x^3 - 8x^2 + 3x - 15$$

$$D. -3x^3 + 8x^2 - 3x + 15$$

Answer: D



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13.

if

$$A = 4x^2 + 7x - 1 \text{ and } B = -x^2 - 5x + 3,$$

then what is $\frac{3}{2}A - 2B$?

$$A. 4x^2 + \frac{31}{2}x - \frac{9}{2}$$

$$\text{B. } 4x^2 + \frac{41}{2}x - \frac{15}{2}$$

$$\text{C. } 8x^2 + \frac{31}{2}x - \frac{9}{2}$$

$$\text{D. } 8x^2 + \frac{41}{2}x - \frac{15}{2}$$

Answer: D



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14. If $x^3 - 9x = 9 - x^2$, which of the following CANNOT be the value of x ?

A. -3

B. -1

C. 1

D. 3

Answer: C



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15.

$$(2x^2 + 3x - 4)(3x + 2) = 6x^3 + ax^2 - 6x - 8$$

In the above equation, a is a constant. If the

equation is true for all value of x , what is the value of a ?

A. 4

B. 9

C. 13

D. 16

Answer: C



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16. Which of the following is equivalent to

$$\frac{2a^2 - 5a - 1}{a - 3} ?$$

A. $2a - 2$

B. $2a + 1 - \frac{2}{a - 3}$

C. $2a + \frac{2}{a - 3}$

D. $2a + 1 + \frac{2}{a - 3}$

Answer: D



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17. $\frac{6x^2 + 19x + 10}{2x + 5}$

If $ax + b$ represents the simplified form of the expression above, then what is the value of $a + b$?

A. 2

B. 3

C. 5

D. 6

Answer: C



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18. Which of the following is equivalent to

$$\frac{4x^2 - 6x}{2x + 2} ?$$

A. $2x - \frac{10}{2x + 2}$

B. $2x - 5 + \frac{10}{2x + 2}$

C. $2x - 3$

D. $2x + 5 - \frac{10}{2x + 2}$

Answer: B



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19. The equation

$$\frac{36^2 + 16x - 21}{tx - 4} = -9x + 5 - \frac{1}{tx - 4} \quad \text{is}$$

true for all values of x for which $x \neq \frac{4}{t}$,

where t is a constant. What is the value of t ?

A. -20

B. -4

C. 4

D. 12

Answer: B



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20. If the polynomial $f(x)$ is evenly divisible by $x - 5$ and the polynomial $g(x) = f(x) + 4$, what is the value of $g(5)$?

A. -4

B. 0

C. 4

D. 9

Answer: C



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21. If function f has exactly two distinct real zeros, which of the following graphs could be the complete graph of $f(x)$?

A. 

B. 

C. 

D. 

Answer: A



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22. The graph of $f(x) = -(x - 3)^2 + 9$ above approximates the trajectory of a water balloon shot from a cannon at ground level. In terms of the trajectory what information is represented by a root of this function ?

A. The maximum height achieved by the balloon.

B. The total horizontal distance traveled by the balloon.

C. The maximum speed of the balloon.

D. The initial acceleration of the balloon.

Answer: B



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23. The manager of a health club determines that the club's membership has increased at a rate of 16 percent per year for the past four

years. The club currently has 42 members. If this trend continues, how many years will it take for the club's membership to exceed 100 members ?

- A. 4 years
- B. 5 years
- C. 6 years
- D. 7 years

Answer: C



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24. Radioactive carbon dating can determine how long ago an organism lived by measuring how much of the ^{14}C in the sample has decayed. ^{14}C is an isotope of carbon that has a half-life of 5,600 years. Half-life is the amount of time it takes for half of the original amount to decay. If a sample of a petrified tree contains 6.25 percent of its original ^{14}C , how long ago did the tree die ?

A. 22,400 years

B. 28,000 years

C. 35,000 years

D. 89,600 years

Answer: A



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25. Penelope receives the same amount of money each month for her allowance. Each month she spends half of her allowance and puts the rest in a piggy bank. On penelope's

8th birthday, the piggy bank contains \$40. If the piggy bank contains \$244 after 2 years, what is her monthly allowance? (Ignore the dollar sign when gridding your response.)



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26. At a certain bank, month held in account X earns a monthly interest equal to 2 percent of the original investment, while account Y earns a monthly interest equal to 2 repercent of the current value of the account. If \$500 is

invested into each account, what is the positive difference between the value of account X and account Y after three years ? (Round your answer to the nearest dollar and ignore the dollar sign when gridding your response.)



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27. Given the equation $\frac{6}{x} = \frac{3}{k+2}$ and the constraints $x \neq 0$ and $k \neq -2$, what is x in terms of k ?

A. $x = 2k + 4$

B. $x = 2k + 12$

C. $x = 2k - \frac{1}{4}$

D. $x = \frac{1}{4}k + 12$

Answer: A



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28. $\frac{3a + 9}{(a - 3)^2} + \frac{-9}{3a - 9}$

In the expression above, $(a - 3)^2 = 6$. What

is the value of the expression ?



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29. If $a > 6$, which of the following is

equivalent to $\frac{\frac{2}{a}}{\frac{1}{a-2} + \frac{1}{a-6}}$?

A. $2a^2 - 16a + 24$

B. $a(2a - 8)$

C. $\frac{a^2 - 8a + 12}{a^2 - 4a}$

D. $\frac{2a - 80}{a^2 - 8a + 12}$

Answer: C



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30. If $\frac{5}{x+2} = \frac{2}{x+1} + \frac{1}{2}$ and $x > 1$,

what is the value of x ?

A. 2

B. 3

C. 6

D. 9

Answer: B



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31. If $\frac{16}{7x + 4} + A$ is equivalent to $\frac{49x^2}{7x + 4}$,

what is A in terms of x ?

A. $7x + 4$

B. $7x - 4$

C. $49x^2$

D. $49x^2 + 4$

Answer: B



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32.
$$\frac{c + 5}{6c} + \frac{2}{2c - 4} = 0$$

The equation above is true for all values of c such that $c \neq -6$ and $c \neq 2$. if $c < 0$, what is the value of c ?

A. -20

B. -10

C. 1

D. 10

Answer: B



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33. The expression $\frac{3x - 1}{x - 4}$ is equivalent to which of the following ?

A. $\frac{1}{2}$

B. $3x - \frac{1}{x - 4}$

C. $3 - \frac{11}{x - 4}$

$$\text{D. } 3 + \frac{11}{x - 4}$$

Answer: D



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34. An object launched upwards at an angle has parabolic motion. The height h , of a projectile at time t is given by the equation $h = \frac{1}{2}at^2 + v_yt + h_0$, where a is the acceleration due to gravity, v_y is the vertical component of the velocity, and h_0 is the initial

height. Which of the following equations correctly represents the object's acceleration due to gravity in terms of the other variables ?

A. $a = \frac{h - v_v t - h_0}{t}$

B. $a = \frac{h - v_v t - h_0}{2t^2}$

C. $a = \frac{2(h - v_v t - h_0)}{t^2}$

D. $a = t\sqrt{2(h - v_v t - h_0)}$

Answer: C



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35. If $(16^{3x})(32^x)(8^{3x}) = \frac{(4^{6x})(32^{3x})}{4}$, then

what is the value of x ?

A. -2

B. -1

C. 1

D. 2

Answer: D



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36.

Given

that

$$\frac{y}{\sqrt{x} - 3} = \frac{\sqrt{x} + 3}{3} \text{ and } 2x + 42 = 9x - 63,$$

what is the value of y ?



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$$37. y = \frac{3x^2 + 7}{x - 3}$$

Which of the following expressions is equivalent to y ?

A. $3x + 9 - \frac{20}{x - 3}$

B. $3x + 9 + \frac{34}{x - 3}$

C. $3x + 43$

D. $3x^2 + \frac{9}{x - 3}$

Answer: B



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38. $z = 15x^2 + 10xy - 6x - 4y$

For which of the ordered pairs, (x,y) , below is

$z \neq 0$?

A. $(-3, 2)$

B. $(-2, 3)$

C. $\left(\frac{2}{5}, 0\right)$

D. $\left(\frac{2}{5}, 10\right)$

Answer: A



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39. $\sqrt{27^{\frac{2}{3}} + 128^{\frac{4}{7}}} =$



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40. Which of the following is equivalent to

$$\frac{4x^2 - 8}{2x + 3} ?$$

A. $2x - 3 + \frac{1}{2x + 3}$

B. $2x - 2$

C. $2x + 3 - \frac{1}{2x + 3}$

D. $2x + 4$

Answer: A



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41. $g(x) = \frac{2}{2x^3 - 12x^2 - 14x}$

For Which of the following values of x is the function g (x) dewfined ?

A. - 1

B. 0

C. 1

D. 7

Answer: C



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42. $x^3 + 4 = 3x^2 - 7x + 25$

For what real value of x is the above equation valid ?

A. 0

B. 3

C. 4

D. 7

Answer: B



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43. Which of the following equations has a graph for which all roots are greater than 0 ?

A. $y = 4|x|$

B. $y = x^2 - 4$

C. $y = (x - 2)^2$

D. $y = x(x - 2)^2$

Answer: C



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44. A marketing team conducted a study on the use of smartphones. In a certain metropolitan area, there were 1.6 million smartphone users at the end of 2018. The marketing team predicted that the number of smartphone users would increase by 35 percent each year beginning in 2019. If y represents the number of smartphone users in this metropolitan area after x years, then which of the following equations best models the number of smartphone users in this area over time ?

A. $y = 1,600,000(1.35)^x$

B. $y = 1,600,000(35)^x$

C. $y = 35 + 1,600,000$

D. $y = 1.35x + 1,600,000$

Answer: A



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Exponents

1. The expression $x(x^3y^2)^{-4}$ is equivalent to which of the following

A. $\frac{1}{y^2}$

B. $\frac{1}{x^4}$

C. $\frac{1}{x^{11}y^8}$

D. $\frac{1}{x^{16}y^8}$

Answer: C



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Polynomials

1. If $-2x^2 + 5x - 8$ is multiplied by $4x - 9$, what is the coefficient of x in the resulting polynomial?

A. -77

B. -45

C. -32

D. -13

Answer: A



View Text Solution

Polynomial Division

1. Which of the following is equivalent to

$$\frac{x^2 + 3x + 7}{x + 4} ?$$

A. $\frac{3 + 7}{4}$

B. $x + \frac{3}{4}$

C. $3 + \frac{7}{x + 4}$

D. $x - 1 + \frac{11}{x + 4}$

Answer: D



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Modeling Growth And Decay

1. A certain car costs \$20,000. If the car loses 15 percent of its value each year, approximately how much will the car be worth after 5 years ?

A. \$5,000

B. \$8, 900

C. \$11, 200

D. \$15, 000

Answer: B



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Rational Expressions And Equations

$$1. \frac{5y + 7}{(y + 4)^2} - \frac{5}{(y + 4)}$$

if the expression above the equal to

$$\frac{-b}{(y + 4)^2}, \text{ where } b \text{ is a positive constatan and}$$

$y \neq -4$, what is the value of b ?

A. 4

B. 7

C. 13

D. 27

Answer: C



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