1. The equation $h = 241m^{-\frac{1}{4}}$ predicts a mammal's heart rate, h, in beats per minute, based on the mammal's mass, m, in kilograms. What is the **approximate** heart rate, in beats per minute, of a polar bear with a mass of 326 kilograms?

    A   57

    B   67

    C   82

    D   92

2. What is the logarithmic form of the equation $y = 20^{-\frac{3}{2}}$?

    A $\log_{20} y = \frac{-3}{2}$

    B $\log_{\frac{3}{2}} 20 = y$

    C $^{-}\log_{\frac{3}{2}} y = 20$

    D $\log_{20}\left(\frac{-3}{2}\right) = y$

3. Solve for x: $6^{3x} = 30$

    A $x = 3 \ln 5$

    B $x = \ln 30 - 3 \ln 6$

    C $x = \frac{\ln 10}{\ln 6}$

    D $x = \frac{\ln 30}{3 \ln 6}$

4. What is the solution of the equation $e^x e^{2x} = 4$?

    A $x = \sqrt{\frac{\ln 4}{2}}$

    B $x = \frac{4}{3e}$

    C $x = \ln\left(\frac{4}{3}\right)$

    D $x = \frac{\ln 4}{3}$

5. Simplify: $(2 + 6i) - (3 - 5i) - (5 - 3i)$

    A $^-6 - 2i$

    B $^-6 + 14i$

    C $^-4 - 4i$

    D $^-4 + 16i$

6. Which expression below is equivalent to $4i(12 - 7i)$?

    A $^-28 + 48i$

    B $28 + 48i$

    C $48 + 28i$

    D $^-48 + 28i$

7. Simplify: $\dfrac{1 + 2i}{2 - 3i}$

    A $\dfrac{8 + i}{7}$

    B $\dfrac{^-4 + 7i}{13}$

    C $\dfrac{8 + 7i}{7}$

    D $^-4 + 7i$

8. What are the values of x and y when $(3 - 2i) - (x + yi) = (2 - 3i)$?

    A $x = {}^-1, y = {}^-i$

    B $x = 1, y = i$

    C $x = 1, y = 5$

    D $x = 1, y = 1$

9. Divide $\left(x^3 - 2x^2 + 6x - 8\right)$ by $(x - 2)$.

    A $x^2 + 6 + \dfrac{4}{x - 2}$

    B $x^2 - 4x + 14 - \dfrac{36}{x - 2}$

    C $x^2 - 3x + 1 - \dfrac{9}{x - 2}$

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

10. Which expression is equivalent to
     $\dfrac{x^2 - 9}{2x^2 + 5x - 3}$?

     A $\dfrac{x - 3}{2x - 1}$

     B $\dfrac{x + 3}{2x + 1}$

     C $\dfrac{x - 3}{2x - 3}$

     D $\dfrac{x + 3}{2x + 3}$

11. Which binomial is a factor of
     $\left(9x^2 - 12x + 4\right)$?

     A $3x + 4$

     B $3x + 2$

     C $3x + 1$

     D $3x - 2$

12. Simplify: $\dfrac{\frac{1}{x} + 1}{\frac{1}{x} - 1}$

     A $\dfrac{1 + x}{1 - x}$

     B $\dfrac{1 - x}{1 + x}$

     C $\dfrac{1}{x}$

     D $^-1$

13. Expand: $\left(x + y\right)^4$

     A $x^4 + y^4$

     B $x^4 + 4xy + y^4$

     C $x^4 + 4x^3y + 4x^2y^2 + 4xy^3 + y^4$

     D $x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$

14. Simplify: $\dfrac{3x^{-1}}{y^{-1}} \cdot \dfrac{2y}{15x^2}$

     A $\dfrac{2y^2}{45x^3}$

     B $\dfrac{45x^3}{2y^2}$

     C $\dfrac{5x^3}{2y^2}$

     D $\dfrac{2y^2}{5x^3}$

15.   Matrix G shows the gallons of milk sold at a dairy over a two-week period. Matrix D shows the dollar amount per gallon.

Gallons of Milk Sold

		Whole	Low Fat	Skim
	Week 1	181	450	102
$G =$	**Week 2**	194	530	127

Dollar Amount per Gallon

		Revenue ($)	Advertising Fee ($)
	Whole	2.89	0.29
$D =$	**Low Fat**	2.79	0.32
	Skim	2.69	0.35

If matrix P is the product of G and D, which element in matrix P represents the total advertising fees for Week 1?

$$P = G \times D = \begin{bmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{bmatrix}$$

A p_{11}

B p_{21}

C p_{12}

D p_{22}

16. Suppose x varies jointly as y and z, and $x = 9$ when $y = 2$ and $z = 7$. What is the ***approximate*** value of x when $y = 12$ and $z = 2$?

   A   2.6

   B   15.4

   C   37.3

   D   54.0

17. The amount of simple interest earned on a savings account varies jointly with time, t (in years), and the principal, p (in dollars). After 5 years, interest on $800 in this savings account is $260.00. What is the annual interest rate (constant of variation)?

   A   7.4%

   B   6.5%

   C   5.4%

   D   2.7%

End of Goal 1 Sample Items

1   **Objective: 1.01**
         Simplify and perform operations with rational exponents and logarithms (common and
         natural) to solve problems.
         Thinking Skill: Applying   **Correct Answer:**   A

2   **Objective: 1.01**
         Simplify and perform operations with rational exponents and logarithms (common and
         natural) to solve problems.
         Thinking Skill: Applying   **Correct Answer:**   A

3   **Objective: 1.01**
         Simplify and perform operations with rational exponents and logarithms (common and
         natural) to solve problems.
         Thinking Skill: Applying   **Correct Answer:**   D

4   **Objective: 1.01**
         Simplify and perform operations with rational exponents and logarithms (common and
         natural) to solve problems.
         Thinking Skill: Applying   **Correct Answer:**   D

5   **Objective: 1.02**
         Define and compute with complex numbers.
         Thinking Skill: Applying   **Correct Answer:**   B

6   **Objective: 1.02**
         Define and compute with complex numbers.
         Thinking Skill: Applying   **Correct Answer:**   B

7   **Objective: 1.02**
         Define and compute with complex numbers.
         Thinking Skill: Applying   **Correct Answer:**   B

8   **Objective: 1.02**
         Define and compute with complex numbers.
         Thinking Skill: Applying   **Correct Answer:**   D

9   **Objective: 1.03**
         Operate with algebraic expressions (polynomial, rational, complex fractions) to solve
         problems.
         Thinking Skill: Applying   **Correct Answer:**   A

10   **Objective: 1.03**
Operate with algebraic expressions (polynomial, rational, complex fractions) to solve problems.
Thinking Skill: Applying   **Correct Answer:**   A

11   **Objective: 1.03**
Operate with algebraic expressions (polynomial, rational, complex fractions) to solve problems.
Thinking Skill: Applying   **Correct Answer:**   D

12   **Objective: 1.03**
Operate with algebraic expressions (polynomial, rational, complex fractions) to solve problems.
Thinking Skill: Applying   **Correct Answer:**   A

13   **Objective: 1.03**
Operate with algebraic expressions (polynomial, rational, complex fractions) to solve problems.
Thinking Skill: Applying   **Correct Answer:**   D

14   **Objective: 1.03**
Operate with algebraic expressions (polynomial, rational, complex fractions) to solve problems.
Thinking Skill: Applying   **Correct Answer:**   D

15   **Objective: 1.04**
Operate with matrices to model and solve problems.
Thinking Skill: Analyzing   **Correct Answer:**   C

16   **Objective: 1.05**
Model and solve problems using direct, inverse, combined and joint variation.
Thinking Skill: Applying   **Correct Answer:**   B

17   **Objective: 1.05**
Model and solve problems using direct, inverse, combined and joint variation.
Thinking Skill: Applying   **Correct Answer:**   B