Question 1
Apply order of operations
1) $7 - 4 \times 3 - 5(-4)$
2) $7 - 12 + 20$ Multiplication and Division as they occur left to right
3) $-5 + 20$ Addition and Subtraction as they occur left to right
4) $15$ Addition
Answer: B

Question 2
Apply order of operations
1) $-\frac{2}{3} \div \left(-\frac{5}{6}\right) + 12$
2) $-\frac{2}{3} \times \left(-\frac{6}{5}\right) + 12$ Multiplication and Division as they occur left to right
   Rewrite the division (by a fraction) as multiplication
3) $\frac{12}{15} + 12$ Multiplication
4) $12 \frac{12}{15} = 12 \frac{4}{5}$ Addition and simplify
Answer: D

Question 3
Apply order of operations
1) $(7 + 1) - (-20 + 7)$ Parentheses
2) $8 - (-13)$ Parentheses
3) $8 + 13$ Change subtraction to add the opposite
4) $21$
Answer: B
**Question 4**

Apply rule for exponents

1) \( \frac{x^6 x^9 y^8}{x^4 y^2} \)

2) \( \frac{x^{15} y^8}{x^7 y^2} \)  
   Product Rule

3) \( x^{(15-5)} y^{(8-2)} \)  
   Quotient Rule

4) \( x^{10} y^6 \)

Answer: C

**Question 5**

1) \((-3)(-10)^2 - ((-3)(-10))^2\)  
   Substitute values for variables 
   apply order of operations

2) \((-3)(-10)^2 - (30)^2\)  
   Parentheses

3) \((-3)(100) - 900\)  
   Exponents

4) \(-300 - 900\)  
   Multiplication

5) \(-300 + (-900)\)  
   Change subtraction to add the opposite

6) \(-1200\)

Answer: D

**Question 6**

First factor out a GCF and then factor by grouping

1) \(4x^2 - 10x + 6\)

2) \(2(2x^2 - 5x + 3)\)  
   GCF = 2

3) Factor the trinomial in the parentheses by grouping 
   Use the "ac method" also known as the "rainbow method"
   
   \[ a = 2, \quad c = 3 \]
   
   We must find two integers with a product of \(ac = 2(3) = 6\) and a sum of \(b = -5\)
   
   The integers are \(-2, \text{ and } -3\)

4) \(2(2x^2 - 2x - 3x + 3)\)  
   Rewrite the middle term, \(x\), as \(-2x - 3x\)

5) \(2((2x^2 - 2x) + (-3x + 3))\)  
   Group Terms

6) \(2(2x(x - 1) - 3(x - 1))\)  
   Factor each group

7) \(2(x - 1)(2x - 3)\)  
   Factor out \((x - 1)\)

8) \(2(2x - 3)(x - 1)\)

Answer: D
Question 7
Apply rules of radicals
1) \(2\sqrt{27} + 3\sqrt{12}\)
2) \(2\sqrt{9\sqrt{3}} + 3\sqrt{4\sqrt{3}}\)  Product Rule
3) \(2(3\sqrt{3}) + 3(2\sqrt{3})\)  Principal square roots
4) \(6\sqrt{3} + 6\sqrt{3} = 12\sqrt{3}\)  Simplify
Answer: B

Question 8
1) \(4(2x - 7) - 2(4x - 14)\)
2) \(8x - 28 - 8x + 28\)  Distributive Property
3) \(0\)  Collect like terms
Answer: A

Question 9
1) \(2(3x - 7) - (x - 4) = 5\)
2) \(6x - 14 - x + 4 = 5\)  Distributive Property
3) \(5x - 10 = 5\)  Collect like terms
4) \(5x = 15\)  Add 10 to both sides of the equation
5) \(x = 3\)  Divide both sides of the equation by 5
Answer: B

Question 10
1) \(40 - \frac{2}{5}x \geq 36\)
2) \(-\frac{2}{5}x \geq -4\)  Subtract 40 from both sides
3) \((-1\frac{1}{2}) (\frac{2}{3}) x \geq \left(-1\frac{1}{2}\right)(-4)\)  Multiply both sides by \((-1\frac{1}{2})\) and flip inequality
   (flip the inequality symbols when multiplying/dividing by a negative #)
4) \(x \leq \left(-1\frac{1}{2}\right)(-4)\)
5) \(x \leq 10\)
Answer: B
Question 11
We must first find how much work was done by John, Bill, and Sam

Sam did \( \frac{1}{7} \), Bill did \( \frac{1}{6} \), and Sam did \( 2 \left( \frac{1}{7} + \frac{1}{6} \right) \)

1) \( \frac{1}{7} + \frac{1}{6} + 2 \left( \frac{1}{7} + \frac{1}{6} \right) \) \hspace{1cm} \text{Total work done by John, Bill, and Sam}

2) \( \frac{1}{7} + \frac{1}{6} + 2 \left( \frac{7}{42} + \frac{6}{42} \right) \) \hspace{1cm} \text{Rewrite fractions in parentheses with a common denominator of 42}

\( (42 \text{ is the LCD of } 7, \text{ and } 6) \)

3) \( \frac{1}{7} + \frac{1}{6} + 2 \left( \frac{13}{42} \right) \) \hspace{1cm} \text{Parentheses (Order of Operations)}

4) \( \frac{1}{7} + \frac{1}{6} + \frac{26}{42} \) \hspace{1cm} \text{Multiplication}

5) \( \frac{6}{42} + \frac{7}{42} + \frac{26}{42} \) \hspace{1cm} \text{Rewrite fractions with a common denominator of 42, and add}

\( (42 \text{ is the LCD of } 7, 6, \text{ and } 42) \)

6) \( \frac{39}{42} \) \hspace{1cm} \text{Total part of the job that John, Bill, and Sam did}

7) \( 1 - \frac{39}{42} \) \hspace{1cm} \text{Subtract from 1 to find part of job that remains to be done}

8) \( \frac{42}{42} - \frac{39}{42} = \frac{3}{42} = \frac{1}{14} \)

Answer: A

Question 12
We must find the total amount spent by Kim and then subtract

1) Each apple cost 55 cents and she bought \( x \) apples. The total she spent on apples = \( 55x \)

2) Each pear cost 45 cents and she bought \( y \) pears. The total she spent on pears = \( 45y \)

3) \( 55x + 45y \) \hspace{1cm} \text{Total amount of money spent by Kim}

4) \( 10 \text{ dollars} \times \frac{100 \text{ pennies}}{1 \text{ dollar}} = 1000 \text{ pennies} \) \hspace{1cm} \text{Convert dollars to pennies}

5) \( 1000 - (55x + 45y) \) \hspace{1cm} \text{Subtract the money spent from the 10 dollars}

6) \( 1000 - 55x - 45y \) \hspace{1cm} \text{Distributive Property}

Answer: B