1. **C**.

   In general, $(a+b)^2 = a^2 + 2ab + b^2$
   So $\qquad (x+3)^2 = x^2 + 2x(3) + 3^2 = x^2 + 6x + 9$

2. **B**.

   $$\left(\frac{x^{\frac{2}{3}}y^{\frac{3}{2}}}{x^2y}\right)^6 = \left(x^{\frac{2}{3}-2}y^{\frac{3}{2}-1}\right)^6 = \left(x^{-\frac{4}{3}}y^{\frac{1}{2}}\right)^6 = x^{(-\frac{4}{3})(6)}y^{(\frac{1}{2})(6)} = x^{-8}y^3 = y^3x^{-8}$$

3. **D**.

   The answer is "None of the above", since none of the answers contain x, and the x's in the numerator and denominator CANNOT be canceled. Only common <u>factors</u> can be cancelled, but the x in the denominator is a <u>term</u>. <u>Factors</u> are quantities multiplied or divided by one another (these can be cancelled), whereas <u>terms</u> are quantities added or subtracted from one another (these cannot be cancelled). If you cancel the x's (which is incorrect), you might think the given expression would equal $\frac{1}{5}$. But notice that if $x = 2$ for example, then the given expression equals $\frac{2}{7}$, and if $x = 3$ for example, then the given expression equals $\frac{3}{8}$ You can see that the value of the given expression does depend on x. Bottom line: the x's cannot be cancelled.

4. **B**.

   $\sin^2(\theta) + \cos^2(\theta) = 1$
   This is The Fundamental Trig Identity.

5. **A**.

   The least common denominator for 4, 3, and 6 is 12. So make all denominators equal to 12. Then you can add and subtract in the numerator.

   $$\frac{3}{4} + \frac{1}{3} - \frac{x}{6} = \frac{(3)(3)}{(4)(3)} + \frac{(1)(4)}{(3)(4)} - \frac{(x)(2)}{(6)(2)} = \frac{9}{12} + \frac{4}{12} - \frac{2x}{12} = \frac{9+4-2x}{12} = \frac{13-2x}{12}$$

6. **B**.

   $4^{\frac{3}{2}} = \sqrt{4^3} = \sqrt{64} = 8 \qquad \text{or} \qquad 4^{\frac{3}{2}} = (\sqrt{4})^3 = 2^3 = 8$

7. **D**.

$\sin^2(\theta) + \cos^2(\theta) = 1$ so
$\cos^2(\theta) = 1 - \sin^2(\theta)$ so
$\cos^2(\theta) = 1 - (\frac{1}{2})^2$ since $\sin(\theta) = \frac{1}{2}$
$\cos^2(\theta) = 1 - \frac{1}{4} = \frac{3}{4}$ so
$\cos(\theta) = \pm\sqrt{\frac{3}{4}} = \pm\frac{\sqrt{3}}{2}$
But if θ is an angle in quadrant II, then $\cos(\theta) < 0$
So $\cos(\theta) = -\frac{\sqrt{3}}{2}$

8. **B**.

$$\frac{x^{-2}}{y^2} = (x^{-2})\frac{1}{y^2} = \frac{1}{x^2}\frac{1}{y^2} = \frac{1}{x^2y^2}$$

9. **A**.

$$\frac{(x^2+2x-3)(x+2)}{(x+2)(x-1)} = \frac{(x+3)(x-1)(x+2)}{(x+2)(x-1)} = x+3$$
after dividing numerator and denominator by $(x-1)$ and $(x+2)$,

$x+3$ is a simplification of the given expression, but it is a different function than the given expression because their domains are different. The given expression has domain all real numbers except $x = 1$ and $x = -2$ (because division by 0 is not allowed), while the simplified expression $x+3$ has domain all real numbers.

10. **C**.

$$\frac{4x^2+6x}{2x} = \frac{2x(2x+3)}{2x} = 2x+3 \quad \text{after dividing numerator and denominator by } 2x$$

As in #9, $2x+3$ is a simplification of the given expression, but it is a different function than the given expression because their domains are different. The given expression has domain all real numbers except $x = 0$ (because division by 0 is not allowed), while the simplified expression $2x+3$ has domain all real numbers.