Algebra 2 Chapter 9 Test

Matching: Choose a function from the function bank that we could use to best model the following scenarios. (2 pts each)

1. Under its long distance plan, The Phone Company phone company charges 15 cents per minute or part of a minute (on top of the monthly $5 fee).

2. With a daily cost of running the business at around $300, The Pizza Place pizza place generates a profit charging $15 per pizza.

3. The punter for the Footballers, a local football team, can kick his punts almost 60 yards. (Hint: Draw a picture of the path the ball might travel).

4. North Manchester’s Ham Market, an open-air market specializing in ham, uses a meat thermometer to check the internal temperature of its hams. They (the thermometers) are normally accurate to within plus or minus 4°F.

5. A scientist is calculating the density of 200 grams of many liquids.

\[
\text{Density can be found using the formula } D = \frac{m}{V} \text{ where } m \text{ is the mass of the liquid in grams and } V \text{ is the volume in cubic centimeters.}
\]

**Function Bank**

<table>
<thead>
<tr>
<th>Constant</th>
<th>Linear</th>
<th>Greatest Integer</th>
<th>Absolute Value</th>
<th>Quadratic</th>
<th>Rational</th>
<th>Square Root</th>
</tr>
</thead>
</table>

(2 pts) 6

\[
\begin{align*}
A. \quad & \frac{41p^2}{85q^3} \\
B. \quad & \frac{41p}{85q^3} \\
C. \quad & \frac{41p^2}{85q(r-5)^2} \\
D. \quad & \frac{41p}{85q(r-5)^2}
\end{align*}
\]

(2 pts) 7

Jimmy has attempted to solve the rational equation 

\[
\frac{s}{s+2} + \frac{5s+8}{s+2} = \frac{5s+8}{s+2}
\]

He claims his answers are 4 and -2. Which of his answers can you eliminate and why?
8. Write a rational expression that is equivalent to \[ \frac{a}{a-3}. \] (Hint: \( \frac{1}{2} \) and \( \frac{2}{4} \) are equivalent fractions.)

(2 pts)

9. \[ \frac{5(a^2 + 5a + 6)}{3(a^2 - 49)} + \frac{61(a + 3)}{30(a + 7)} \]
   A. \[ \frac{50(a + 2)}{61(a - 7)} \]
   B. \[ \frac{50(a + 3)(a + 2)}{61(a + 7)(a - 7)} \]
   C. \[ \frac{50(a + 2)}{61(a + 7)} \]
   D. \[ \frac{50(a + 3)(a - 2)}{61(a - 7)} \]

(2 pts)

10. Consider the following graph and answer the questions.

\[ f(x) = \frac{6}{x-2} \]

<table>
<thead>
<tr>
<th>V.A.</th>
<th>H.A.</th>
<th>Intercepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>x = 2</td>
<td>y = 0</td>
<td>y-int: 0</td>
</tr>
<tr>
<td></td>
<td>y = 0</td>
<td>(0, -3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>x-int: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 = ( \frac{6}{x} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>x = 2</td>
</tr>
</tbody>
</table>

As \( x \) gets closer to 2 from the left side of the asymptote,

what is happening to \( y \)?

As \( x \) gets really big (increasingly more positive), what is happening to \( y \)?


The formula \( \frac{1}{q} = \frac{1}{f} - \frac{1}{p} \) describes how far the film should be placed from the lens of a camera to create a perfect photograph (\( q \) is the distance from the lens to the film, \( f \) represents the focal length of the lens, and \( p \) represents the distance from the object to the lens).

a. Solve the formula for \( p \) (Write a single rational expression containing \( f \) and \( q \).)

\[
(3 \text{ pts})
\]

b. If a camera has a focal length of 8 centimeters and the lens is 10 centimeters from the film, how far should an object be from the lens so that the picture will be in focus?

\[
(2 \text{ pts})
\]

c. \[
\begin{align*}
19 & \quad 7y \\
\frac{12y + 38}{y + 2} & \quad \frac{19}{y^2 - 4} \\
(y + 2)(y - 2) & \quad (y + 2)(y - 2)
\end{align*}
\]

A. \[
\frac{19 - 7y}{(y + 2)(y - 2)}
\]

B. \[
\frac{12y + 38}{(y + 2)(y - 2)}
\]

C. \[
\frac{12y - 38}{(y + 2)(y - 2)}
\]

D. \[
\frac{12y - 38}{(y + 2)(y^2 - 4)}
\]
13. The sum of a number and 8 times its reciprocal is 6. Find the number(s).

Label variables. Don't Guess and Check.

(6 pts)

14. Simplify
\[
\frac{4x^2 - 4}{32x^2 - 3x}
\]

(4 pts)

15. Determine the equations of any vertical asymptotes and the values of x for any holes in the graph of the following rational function. Then describe how an asymptote or hole affects the shape of the graph of a rational function. (Hint: Compare it to a graph you can draw without lifting your pencil.)

\[
f(x) = \frac{7}{n^2 - 7n + 10}
\]

A) B)
With the hose on full blast, the North Manchester Community Pool can be filled in about 12 hours. It can be emptied by a drainpipe in 18 hours. While filling it last week, an employee mistakenly left the drain open. How long did it take to fill the pool? (Hint: The work the drain is doing takes away from the work of the hose).

Match each graph with its equation. (2 pts each)

17. ________________ 18. ________________

19. ________________ 20. ________________

\[ A \ y = |x-1| \quad B \ y = -2 \quad C \ y = -\sqrt{x} \quad D \ y = \frac{2}{x} \]
21. Graph \( f(x) = \frac{x+3}{x-2} \). Be sure to use what we have been using in class (vertical asymptotes or holes, horizontal asymptotes, intercepts, and a table of values).

22. Solve the following rational equation:

\[
\frac{n}{n-3} + n = \frac{7n-18}{n-3}
\]

23. Solve the following rational inequality:

\[
9 + \frac{2}{x} \geq 47
\]