Rational Functions

1. Jim can paint a house in 25 hours. Alex can paint the same house in 20 hours.

Write an equation that can be used to find the time in hours, *t*, it would take Jim and Alex to paint the house together assuming they both work at the rates they work when working alone.
2. What value of *x* makes the equation $\frac{1}{\sqrt{5-x}}=3$ true?
3. What value of *t* makes the equation $\frac{2}{t+3}=\frac{1}{t}$ true?
4. Select whether each equation has no real solutions, one real solution, or
infinitely many real solutions.

| **Equation** | **No Real Solutions** | **One Real Solution** | **Infinitely Many Real Solutions** |
| --- | --- | --- | --- |
| $$-2x^{2}-\frac{3}{x}=0$$ |  |  |  |
| $$\frac{3}{x}=\frac{3}{x+20}$$ |  |  |  |
|  $\frac{x}{5}=\frac{2x+10}{10}-1$ |  |  |  |

1. Select Yes or No to indicate whether each value of *b* is a solution to the given equation.

 $3=\frac{9}{b+5}$

| **Solution** | **Yes** | **No** |
| --- | --- | --- |
| *b* = –8 |  |  |
| *b* = –5 |  |  |
| *b* = –2 |  |  |
| *b* = 22 |  |  |

1. Beth is solving this equation: $\frac{1}{x}+3=\frac{3}{x}$.

She says, “I can multiply both sides by *x* and get the linear equation 1 + 3*x* = 3,
whose solution is *x* = $\frac{2}{3}$.”

Which of the following statements makes this a correct argument, or shows that it is incorrect? Select **all** that apply.

A. You can assume $x\ne 0$ because both sides are undefined if *x* = 0.
B. After multiplying both sides by *x* you need to subtract 1 from both sides.
C. You cannot multiply both sides by *x* because you do not know what *x* is.
D. The equation is not linear, so you cannot use the methods normally used for solving

 linear equations.

**Teacher Material**

A-SSE.A

Interpret the structure of expressions.

A-CED.A

Create equations that describe numbers or relationships.

A-REI.A

Understand solving equations as a process of reasoning and explain the reasoning.

F-IF.A

Understand the concept of a function and use function notation.

F-BF.A

Build a function that models a relationship between two quantities.

| **Question** | **Claim** | **Key/Suggested Rubric** |
| --- | --- | --- |
| 1[[1]](#footnote-1) | 1 | **1 point:** $\frac{1}{20}+\frac{1}{25}=\frac{1}{t}$, or equivalent |
| 2[[2]](#footnote-2) | 1 | **1 point:** *x* = 4$\frac{8}{9}$ |
| 32 | 1 | **1 point:** *t* = 3 |
| 42 | 1 | **1 point:**

| **Equation** | **No Real Solutions** | **One Real Solution** | **Infinitely Many Real Solutions** |
| --- | --- | --- | --- |
| $$-2x^{2}-\frac{3}{x}=0$$ |  | x |  |
| $$\frac{3}{x}=\frac{3}{x+20}$$ | x |  |  |
| $$\frac{x}{5}=\frac{2x+10}{10}-1$$ |  |  | x |

 |
| 5[[3]](#footnote-3) | 1 | **1 point:**

| **Solution** | **Yes** | **No** |
| --- | --- | --- |
| *b* = –8 |  | x |
| *b* = –5 |  | x |
| *b* = –2 | x |  |
| *b* = 22 |  | x |

 |
| 6[[4]](#footnote-4) | 3 | **1 point:** Selects A OR Selects A and B |

1. Adapted from Smarterbalanced.org. Grade 11, Claim 1, Target G Item Specifications. Internet. Available from <http://www.smarterbalanced.org/smarter-balanced-assessments/>; accessed 11/2015. [↑](#footnote-ref-1)
2. Adapted from Smarterbalanced.org. Grade 11, Claim 1, Target H Item Specifications. Internet. Available from <http://www.smarterbalanced.org/smarter-balanced-assessments/>; accessed 11/2015. [↑](#footnote-ref-2)
3. Adapted from Smarterbalanced.org. Grade 11, Claim 1, Target H Item Specifications. Internet. Available from <http://www.smarterbalanced.org/smarter-balanced-assessments/>; accessed 11/2015. [↑](#footnote-ref-3)
4. Adapted from Smarterbalanced.org. Grades 11, Claim 3 Item Specifications. Internet. Available from <http://www.smarterbalanced.org/smarter-balanced-assessments/>; accessed 11/2015. [↑](#footnote-ref-4)