

# Rational Expressions and Functions: math test solutions, Grade 11 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

## 1 Simplifying

/ 3 pts

a.  $\frac{(x+5)(x-3)}{(x-3)(x+3)} = \frac{x+5}{x+3}$  (1.5 pt) with  $x \neq 3$  and  $x \neq -3$  (0.5 pt).

b.  $\frac{6x^3y}{15xy^2} = \frac{2x^2}{5y}$  (0.5 pt) with  $x \neq 0$  and  $y \neq 0$  (0.5 pt).

## 2 Multiplying and dividing

/ 4 pts

a.  $\frac{(x-5)(x+5)}{x+2} \cdot \frac{x(x+2)}{x-5}$  (1 pt)  $= x(x+5)$  (1 pt).

b.  $\frac{(x-4)(x+3)}{(x-1)(x+1)} \cdot \frac{x+1}{x-4}$  (1 pt)  $= \frac{x+3}{x-1}$  (1 pt).

### 3 Adding and subtracting

/ 4 pts

a. LCD  $(x - 3)(x + 3)$  (0.5 pt):  $\frac{4(x + 3) + 2(x - 3)}{(x - 3)(x + 3)}$  (0.5 pt) =  $\frac{6x + 6}{x^2 - 9}$  (1 pt).

b. LCD  $(x - 5)(x + 1)$  (0.5 pt):  $\frac{x(x + 1) - 3(x - 5)}{(x - 5)(x + 1)}$  (0.5 pt) =  $\frac{x^2 - 2x + 15}{(x - 5)(x + 1)}$  (1 pt).

### 4 Analyzing a function

/ 4 pts

a. Vertical asymptote  $x = 4$  (1 pt); horizontal asymptote  $y = 2$  (1 pt).

b.  $2x + 6 = 0$  gives the  $x$ -intercept  $-3$  (0.5 pt);  $f(0) = \frac{6}{-4} = -1.5$  (0.5 pt).

c.  $f(6) = \frac{18}{2} = 9$  (0.5 pt) and  $f(2) = \frac{10}{-2} = -5$  (0.5 pt).

### 5 Solving an equation

/ 3 pts

Multiply by  $(x - 2)(x + 2)$ :  $3(x + 2) + (x^2 - 4) = 12$  (1 pt), so  $x^2 + 3x - 10 = 0$  and  $(x + 5)(x - 2) = 0$  (1 pt).

$x = 2$  makes a denominator zero, so it is extraneous;  $x = -5$  works:  $-\frac{3}{7} + 1 = \frac{4}{7} = \frac{12}{21}$ .

The only solution is  $x = -5$  (1 pt).

### 6 Travel time

/ 2 pts

$k = rt = 45 \cdot 4 = 180$  (1 pt). So  $t = \frac{180}{60} = 3$ : the trip takes 3 hours (1 pt).



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