

M114 Skills Test

Things common to all problems:

- If you perform an operation on one side of an equation, you must also do it to the other side.
 - Pay attention to the operation that connects the problem's terms or factors. Do the inverse to separate them (e.g. if two factors are connected by multiplication, use division to separate them).
 - To add or subtract fractions, find a common denominator.
 - To divide fractions, flip the bottom fraction and multiply.
 - Check your answers!
-

Linear Equations

- Highest power on the variables is 1
- Strategy
 - Collect all terms with the variable on one side and all terms without the variable on the other side of the equation.
 - Divide by any constants to isolate the variable.
- Common mistake: *errors with fractions*

Examples

a. $34 - \frac{5}{6}x = 32 - \frac{1}{2}x$

b. $\frac{x-10}{4} = x - \frac{10}{3}$

Literal Equations

- Equations with many variables with directions to solve for one of the variables
- Strategy
 - Collect all terms with the indicated variable on one side and all terms without it on the other side.
 - Divide by any 'constants'.
- Common mistake: *forgetting about factoring*

Examples

a. Solve for b_2 : $A = \frac{1}{2}h(b_1 + b_2)$

b. Solve for u : $y = \frac{u+1}{u-1}$

Quadratic Equations

- Highest power on the variables is 2
 - Strategy: Examine the form of the problem. Chose to use the square root method or the factoring/quadratic formula method.
 - Square root method
 - Isolate the squared quantity.
 - Take the square root of both sides. Remember to use \pm when taking the square root of a number.
 - Solve the resulting (usually linear) equation.
 - Factoring/quadratic formula method
 - Combine all like terms on one side of the equation setting the other side to zero.
 - If possible, factor the equation and use the zero product rule.
 - If the equation is not easily factored, use the quadratic formula. Answers do not have to be in simplest form for the skills test.
- Common mistakes: *not using \pm , simplifying results of the quadratic formula incorrectly*

Examples

a. $(a-2)(a+1) = 2a^2 + 3a$

b. $4(2m-5)^2 - 100 = 0$

Rational Equations

- Equations with rational expressions (polynomials divided by polynomials), i.e. equations with variables in the denominator
- Strategy
 - Factor each denominator.
 - Determine the least common denominator.
 - Clear the fractions by multiplying each term by the LCD.
 - Solve the resulting problem as a linear or quadratic equation.
 - Check solutions!
- Common mistake: *not checking solutions*

Examples

a. $\frac{2}{x-3} - \frac{3}{x+1} = \frac{x-5}{x^2-2x-3}$ b. $\frac{1}{x-4} - \frac{5}{x+2} = \frac{6}{x^2-2x-8}$

Radical Equations

- Equations with radical expressions (e.g. square root, cube root)
- Strategy for radical equations involving square roots
 - Isolate the radical (move all other terms and factors to the other side of the equation).
 - Square both sides (if the equation involves cube roots cube both sides). Be sure to 'FOIL' if necessary.
 - Solve the resulting equation (linear or quadratic).
 - Check your solutions!
- Strategy for equations involving more than one radical:
 - Isolate one of the radicals.
 - Square both sides.
 - Isolate the other radical.
 - Square both sides.
 - Solve the resulting equation.
 - Check your solutions.
- Common mistake: *not checking solutions*

Examples

a. $\sqrt{2a+1} + 4 = 6$ b. $\sqrt{2x+2} - \sqrt{x+2} = 1$

Practice Problems

1. $\sqrt{y+3} = 1 + \sqrt{y}$

2. $a^2 + 45 = 14a$

3. $5b^2 - 3b = 3 - 3b + 2b^2$

4. $\frac{2}{x-6} - \frac{x}{x+6} = \frac{3}{x^2-36}$

5. $\frac{x-3}{4} - \frac{x-4}{3} = 2$

6. Solve for F : $\frac{5}{9}(F - 32) = C$

7. Solve for f : $\frac{1}{f} = \frac{1}{y} + \frac{1}{z}$

8. $9k^2 = 25$

9. $\sqrt{a+1} + a = 1$

10. $\frac{3}{x+2} - \frac{2}{x-1} = 5$

11. $\sqrt{13-2v} - v = 1$

12. $\frac{9}{z^2+5z} + \frac{6}{5z} = \frac{3}{10z}$

13. Solve for b : $5ab - 2a = 3ab + 2b$

14. Solve for s : $\frac{2s+3}{3s-2} = r$

15. $-\frac{7-t}{3} = 3(t-1) + 2(t+2)$

Solutions

Linear Equations a) $x = 6$ b) $x = \frac{10}{9}$

Literal Equations: a) $b_2 = \frac{2A}{h} - b_1$ OR $b_2 = \frac{2A - hb_1}{h}$ b) $u = \frac{y+1}{y-1}$

Quadratic Equations: a) $a = \frac{-4 \pm \sqrt{8}}{2}$ OR $a = -2 \pm \sqrt{2}$ b) $m = 5$ or $m = 0$

Rational Equations: a) $x = 8$ b) No solution

Radical Equations: a) $a = \frac{3}{2}$ b) $x = 7$

Practice Problems:

1. $y = 1$ 2. $a = 9$ or $a = 5$ 3. $b = \pm 1$ 4. $x = -1$ or 9

5. $x = -17$ 6. $F = \frac{9}{5}C + 32$ 7. $f = \frac{yz}{y+z}$ 8. $k = \pm \frac{5}{3}$ 9. $a = 0$

10. $x = \frac{-4 \pm \sqrt{76}}{10}$ 11. $v = 2$ 12. $z = -15$

13. $b = \frac{2a}{2a-2}$ OR $b = \frac{a}{a-1}$ 14. $s = \frac{-3-2r}{2-3r}$ OR $s = \frac{3+2r}{3r-2}$ 15. $t = -\frac{5}{7}$