

A2.A.23: Solve rational equations and inequalities

1. 010825a, P.I. A2.A.23

If $\frac{5}{n} - \frac{1}{2} = \frac{3}{6n}$, what is the value of n ?

- [A] 2 [B] -2 [C] 9 [D] $\frac{2}{7}$

2. 080818b, P.I. A2.A.23

One root of the equation $\frac{3x}{2} + \frac{1}{x} = -\frac{3x}{4}$ is

- [A] $\frac{4i}{9}$ [B] $\frac{2i}{3}$ [C] $\frac{2}{3}$ [D] $\frac{4}{9}$

3. 060212b, P.I. A2.A.23

What is the solution set of the equation

$$\frac{x}{x-4} - \frac{1}{x+3} = \frac{28}{x^2 - x - 12}?$$

- [A] {4} [B] {4,-6} [C] {-6} [D] {}

4. 060429b, P.I. A2.A.23

Solve for x and express your answer in

simplest radical form: $\frac{4}{x} - \frac{3}{x+1} = 7$

5. 080529b, P.I. A2.A.23

Solve for all values of x : $\frac{9}{x} + \frac{9}{x-2} = 12$

6. 010927a, P.I. A2.A.23

When 5 is divided by a number, the result is 3 more than 7 divided by twice the number. What is the number?

- [A] $\frac{1}{2}$ [B] 5 [C] 2 [D] 1

7. 010224b, P.I. A2.A.23

A rectangle is said to have a golden ratio

when $\frac{w}{h} = \frac{h}{w-h}$, where w represents width

and h represents height. When $w = 3$, between which two consecutive integers will h lie?

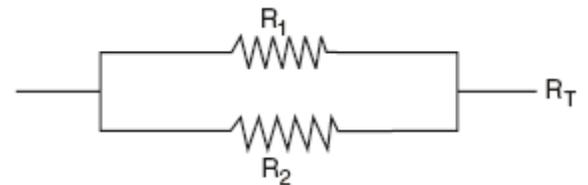
8. 080125b, P.I. A2.A.23

Working by herself, Mary requires 16 minutes more than Antoine to solve a mathematics problem. Working together, Mary and Antoine can solve the problem in 6 minutes. If this situation is represented by the equation $\frac{6}{t} + \frac{6}{t+16} = 1$, where t represents the

number of minutes Antoine works alone to solve the problem, how many minutes will it take Antoine to solve the problem if he works by himself?

9. 080234b, P.I. A2.A.23

Electrical circuits can be connected in series, one after another, or in parallel circuits that branch off a main line. If circuits are hooked up in parallel, the reciprocal of the total resistance in the series is found by adding the reciprocals of each resistance, as shown in the accompanying diagram.



$$\frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{R_T}$$

If $R_1 = x$, $R_2 = x + 3$, and the total resistance, R_T , is 2.25 ohms, find the positive value of R_1 to the nearest tenth of an ohm.

10. 080227b, P.I. A2.A.23

The cost (C) of selling x calculators in a store is modeled by the equation

$$C = \frac{3,200,000}{x} + 60,000.$$

The store profit (P) for these sales is modeled by the equation $P = 500x$. What is the minimum number of calculators that have to be sold for profit to be greater than cost?

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[1] C _____

[2] B _____

[3] C _____

[4] $\frac{-3 \pm \sqrt{37}}{7}$ or an equivalent answer, and appropriate work is shown.

[3] A correct quadratic equation is written and appropriate work is shown, but one computational or simplification error is made.

or [3] An incorrect quadratic equation of equal difficulty is solved appropriately.

[2] A correct quadratic equation is written and appropriate work is shown, but two or more computational or simplification errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] A correct quadratic equation is written in standard form, but no further correct work is shown.

[1] An incorrect equation of a lesser degree of difficulty is solved appropriately.

or [1] $\frac{-3 \pm \sqrt{37}}{7}$ or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure.

[4] 3 and $\frac{1}{2}$, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] Appropriate work is shown, but only one of the values is found.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The correct quadratic equation is written in standard form, but no further correct work is shown.

or [2] An incorrect quadratic equation of equal difficulty is solved appropriately.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] An incorrect equation of a lesser degree of difficulty is solved appropriately.

or [1] 3 and $\frac{1}{2}$ but no work is shown.

[0] 3 or $\frac{1}{2}$, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[5] _____

[6] A _____

[2] 1 and 2, $1 < h < 2$, or $1 < 1.854 < 2$, and appropriate work is shown.

[1] $\frac{3}{h} = \frac{h}{3-h}$ is shown, but one

computational error is made.

or [1] The positive root, 1.854, is obtained from the quadratic, but the two correct consecutive integers are not stated.

or [1] 1 and 2, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[7] incorrect procedure.

[2] 8 or an equivalent answer, and appropriate work is shown.

[1] The denominators are cleared correctly, such as $6(t + 16) + 6t = t(t + 16)$, but the factoring is incorrect, or one error is made using the quadratic formula.

or [1] The denominators are not cleared correctly, but an equation of equal difficulty is solved.

or [1] 8 or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[8] incorrect procedure.

[6] 3.5, and appropriate work is shown.

[5] Appropriate work is shown, but one computational or rounding error is made.

[4] A substitution error is made, resulting in an incorrect quadratic equation of equal difficulty, but the incorrect equation is solved appropriately.

[3] A correct substitution is made, resulting in the correct quadratic equation in standard form, but the equation is not solved.

[2] A substitution error is made, resulting in an incorrect equation of equal difficulty, and one computational or rounding error is made.

[1] 3.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[9] incorrect procedure.

[4] 161, and appropriate work is shown, such as $500x > \frac{3,200,000}{x} + 60,000$.

[3] Appropriate work is shown, but one computational error is made or -40 is not rejected.

[2] A correct inequality is given in standard form, but it is not solved.

[1] An incorrect quadratic inequality of equal difficulty is solved appropriately.

or [1] 161, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[10] incorrect procedure.