1. Solve the following rational equation.

$$\frac{3}{x} + \frac{3}{x-7} = \frac{x-4}{x-7}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The solution set is { ▮ }.
   (Simplify your answer. Use a comma to separate answers as needed.)

○ B. The solution is the empty set.

ID: 7.6.37

2. How bad is the heavy traffic? You can jog 8 miles in the same time that it takes to travel 16 miles by car. If the car's rate is 8 miles per hour faster than your jogging rate, find the average rate of each.

	Distance	Rate	Time	$= \dfrac{\text{Distance}}{\text{Rate}}$
Jogging	8	x		$\dfrac{8}{x}$
Car in Heavy Traffic	16	x + 8		$\dfrac{16}{x+8}$

Your jogging rate is ☐ miles per hour.

The car's rate is ☐ miles per hour.

ID: 7.7.1

3. Solve the following rational equation.

$$\frac{18}{x-5} + 9 = \frac{9}{x-5}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The solution set is { ▮ }.
   (Simplify your answer. Use a comma to separate answers as needed.)

○ B. The solution is the empty set.

ID: 7.6.29

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4. Subtract.

$$\frac{3x + 8}{8x - 6} - \frac{x + 8}{8x - 6}$$

$\dfrac{3x + 8}{8x - 6} - \dfrac{x + 8}{8x - 6} = \boxed{}$ (Simplify your answer.)

ID: 7.3.31

5. Simplify the rational expression. If the rational expression cannot be simplified, so state.

$$\frac{3y^2 - 2y - 5}{3y^2 - 23y + 30}$$

Select the correct choice below and fill in any answer boxes in your choice.

A. $\dfrac{3y^2 - 2y - 5}{3y^2 - 23y + 30} = \boxed{}$

B. The expression cannot be simplified.

ID: 7.1.43

6. Solve the given formula for the specified variable.

$$b = \frac{pm}{p + m} \text{ for } m$$

$m = \boxed{}$

ID: 7.6.59

7. Solve the following rational equation.

$$\frac{x}{3} - \frac{3}{x} = 0$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○A. The solution set is {■}.
  (Simplify your answer. Use a comma to separate answers as needed.)
- ○B. The solution is the empty set.

ID: 7.6.19

8. Multiply.

$$\frac{x^2 + 2xy + y^2}{x^2 - 2xy + y^2} \cdot \frac{x - y}{3x + 3y}$$

$$\frac{x^2 + 2xy + y^2}{x^2 - 2xy + y^2} \cdot \frac{x - y}{3x + 3y} = \boxed{}$$ (Type the answer in factored form.)

ID: 7.2.31

9. Multiply as indicated.

$$\frac{x}{7} \cdot \frac{21}{x + 6}$$

$$\frac{x}{7} \cdot \frac{21}{x + 6} = \boxed{}$$ (Simplify your answer.)

ID: 7.2.3

10. Simplify the rational expression.

$$\frac{x^3 + 8x^2 - 7x - 56}{x + 8}$$

Select the correct choice below and fill in any answer boxes in your choice.

⊙A. $\dfrac{x^3 + 8x^2 - 7x - 56}{x + 8} = $ ▮

⊙B. The expression cannot be simplified.

ID: 7.1.49

11. Add or subtract as indicated. Simplify the result, if possible.

$$\frac{y + 7}{y} - \frac{y}{y + 7}$$

$\dfrac{y + 7}{y} - \dfrac{y}{y + 7} = $ ☐

ID: 7.4.47

12. According to the authors of a certain book, in a global village of 250 people, 30 suffer from malnutrition. How many people of the world's 6.9 billion people (2010 population) suffer from malnutrition?

The number of people of the world's population that suffer from malnutrition is ☐ billion.
(Type an integer or decimal rounded to the nearest hundredth as needed.)

ID: 7.7.21

13. In still water, a boat averages 4 miles per hour. It takes the same amount of time to travel 18 miles downstream, with the current, as it does 9 miles upstream, against the current. What is the rate of the water's current?

The rate of the water's current is ☐ miles per hour.
(Simplify your answer.)

ID: 7.7.5

14. A student must leave for campus in 10 minutes or he will be late for class. Unfortunately, he is snowed in. He can shovel the driveway in 20 minutes, and his brother claims to be able to do it in 16 minutes. If they shovel together, how long will it take to clear the driveway? Will this give enough time for the student to get to the campus?

It will take about ☐ minutes to clear the driveway together.
(Type an integer or decimal rounded to one decimal place as needed.)

Does this give enough time for the student to get to the campus?

○ A. This gives enough time for the student to get to the campus.

○ B. This does not give enough time for the student to get to the campus.

ID: 7.7.11

15. Simplify the rational expression. If the rational expression cannot be simplified, so state.

$$\frac{x}{x-1}$$

Select the correct choice below and fill in any answer boxes in your choice.

○ A. $\dfrac{x}{x-1} = $ ☐

○ B. The expression cannot be simplified.

ID: 7.1.55

16. Multiply as indicated.

$$\frac{x^2 - 6x + 9}{x^2 - 8x + 16} \cdot \frac{(x-4)^3}{(x-3)^3}$$

$$\frac{x^2 - 6x + 9}{x^2 - 8x + 16} \cdot \frac{(x-4)^3}{(x-3)^3} = \boxed{} \text{ (Simplify your answer.)}$$

ID: 7.2.23

17. A company that manufactures wheelchairs has fixed costs of $400,000. The average cost per wheelchair, C, for the company to manufacture x wheelchairs per month is modeled by the formula.

$$C = \frac{700x + 400,000}{x}$$

How many wheelchairs per month can be produced at an average cost of $720 per wheelchair?

☐ wheelchairs

ID: 7.6.69

18. Multiply as indicated.

$$\frac{10y + 4}{y^2 - 4y} \cdot \frac{y - 4}{5y + 2}$$

$\frac{10y + 4}{y^2 - 4y} \cdot \frac{y - 4}{5y + 2} = \boxed{}$ (Simplify your answer.)

ID: 7.2.13

19. Subtract.

$$\frac{8y}{y^2 - 9} - \frac{7}{y + 3}$$

$\frac{8y}{y^2 - 9} - \frac{7}{y + 3} = \boxed{}$ (Simplify your answer.)

ID: 7.4.41

20. The formula $P = \frac{N}{1 + s}$ is used to determine what amount of principal P should be invested for one year at simple interest rate s in order to have N dollars after a year. Solve the formula for s.

$s = \boxed{}$

ID: 7.6.51

21. Divide as indicated.

$$\frac{x-6}{6} \div \frac{3x-18}{12}$$

$\dfrac{x-6}{6} \div \dfrac{3x-18}{12} = \boxed{}$ (Simplify your answer.)

ID: 7.2.39

22. Simplify the rational expression.

$$\frac{15-10x}{2x^2-3x}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

◯A. $\dfrac{15-10x}{2x^2-3x} = \boxed{}$ (Simplify your answer.)

◯B. The expression cannot be simplified.

ID: 7.1.67

23. Simplify the rational expression. If the rational expression cannot be simplified, so state.

$$\frac{x+6}{x^2-2x-48}$$

Select the correct choice below and fill in any answer boxes in your choice.

◯A. $\dfrac{x+6}{x^2-2x-48} = \boxed{}$

◯B. The expression cannot be simplified.

ID: 7.1.37

24. Solve the equation and state the solution set.

$$\frac{2}{11x} + \frac{1}{4} = \frac{81}{22x} - \frac{1}{3}$$

Select the correct choice below and fill in any answer boxes in your choice.

○A. The solution set is { ▢ }. (Use a comma to separate answers as needed.)

○B. The solution set is ∅.

ID: 7.6.11

25. Find all numbers for which the rational expression is undefined. If the rational expression is defined for all real numbers, so state.

$$\frac{x}{x-5}$$

Type the values for which the rational expression is undefined. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○A. ▢ (Use a comma to separate answers as needed.)

○B. The rational expression is defined for all real numbers.

ID: 7.1.3

26. Simplify the complex rational expression by the method of your choice.

$$\frac{\dfrac{1}{9} - \dfrac{1}{z}}{\dfrac{9-z}{9}}$$

$$\frac{\dfrac{1}{9} - \dfrac{1}{z}}{\dfrac{9-z}{9}} = \boxed{}$$

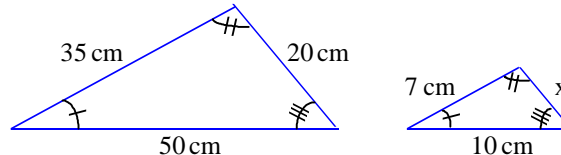(Simplify your answer. Use integers or fractions for any numbers in the expression.)

ID: 7.5.19

27. Use similar triangles and the fact that corresponding sides are proportional to find the length of the side marked with an x.

The missing length, x, is ☐ centimeters.

ID: 7.7.25

28. Divide as indicated.

$$\frac{8x^2 + 12}{x - 4} \div \frac{10x^2 + 15}{x^2 - 16}$$

$$\frac{8x^2 + 12}{x - 4} \div \frac{10x^2 + 15}{x^2 - 16} = \boxed{}$$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

ID: 7.2.49

29. In this problem, denominators are additive inverses. Add.

$$\frac{6x + 3}{x - 7} + \frac{2x}{7 - x}$$

$$\frac{6x + 3}{x - 7} + \frac{2x}{7 - x} = \boxed{}$$ (Simplify your answer.)

ID: 7.3.41

30. Find the least common denominator of the rational expressions.

$$\frac{4}{3(y + 6)} \text{ and } \frac{8}{y}$$

The least common denominator is ☐ .

ID: 7.4.7

31. Perform the subtraction.

$$\frac{x^2 - 54}{x^2 + 9x + 14} - \frac{x - 8}{x + 2}$$

$$\frac{x^2 - 54}{x^2 + 9x + 14} - \frac{x - 8}{x + 2} = \boxed{}$$

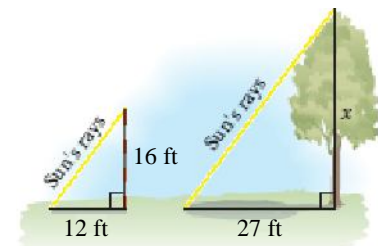(Simplify your answer. Type your answer in factored form.)

ID: 7.4.64

32. Simplify the complex rational expression.

$$\frac{9 - \dfrac{2}{x}}{9 + \dfrac{4}{x}}$$

$$\frac{9 - \dfrac{2}{x}}{9 + \dfrac{4}{x}} = \boxed{}$$ (Type a simplified rational expression.)

ID: 7.5.9

33. A tree casts a shadow 27 feet long. At the same time, a vertical rod 16 feet high casts a shadow 12 feet long. How tall is the tree?

The tree is $\boxed{}$ feet tall.

ID: 7.7.31

34. In this exercise, denominators are additive inverses. Add or subtract as indicated.

$$\frac{8}{2x-7} - \frac{5}{7-2x}$$

$\dfrac{8}{2x-7} - \dfrac{5}{7-2x} = \boxed{}$ (Simplify your answer.)

ID: 7.3.49

35. Add or subtract as indicated. Simplify the result, if possible.

$$\frac{7}{x} + 6$$

$\dfrac{7}{x} + 6 = \boxed{}$

ID: 7.4.25

36. Solve the rational equation. If the equation has no solution, so state.

$$\frac{x}{3} = \frac{x}{4} - 7$$

Select the correct choice below and, if necessary, fill in the answer box to complete your answer.

○ A. The solution set is $\{\ \boxed{}\ \}$.
   (Use a comma to separate answers as needed.)

○ B. There is no solution.

ID: 7.6.1

37. Add.

$$\frac{7}{y+2} + \frac{2}{7y}$$

$\dfrac{7}{y+2} + \dfrac{2}{7y} = \boxed{}$ (Simplify your answer.)

ID: 7.4.33

38. Divide as indicated.

$$\frac{6y^2 - 150}{y^2 + 10y + 25} \div \frac{y^2 - 8y + 15}{5y^2 + 10y - 75}$$

$$\frac{6y^2 - 150}{y^2 + 10y + 25} \div \frac{y^2 - 8y + 15}{5y^2 + 10y - 75} = \boxed{}$$ (Simplify your answer.)

ID: 7.2.57

39. Perform the indicated operation or operations. Simplify the result, if possible.

$$\frac{14y + 4}{y^2 - 4y - 12} + \frac{y}{6 - y} + \frac{y - 1}{y + 2}$$

$$\frac{14y + 4}{y^2 - 4y - 12} + \frac{y}{6 - y} + \frac{y - 1}{y + 2} = \boxed{}$$

ID: 7.4.89

40. Perform the indicated operations.

$$\frac{b^2 - 5b}{4b^2 - 24b + 35} + \frac{b^2 - 3b}{4b^2 - 24b + 35} - \frac{6b - 2b^2}{4b^2 - 24b + 35}$$

$$\frac{b^2 - 5b}{4b^2 - 24b + 35} + \frac{b^2 - 3b}{4b^2 - 24b + 35} - \frac{6b - 2b^2}{4b^2 - 24b + 35} = \boxed{}$$

(Simplify your answer.)

ID: 7.3.65

41. Divide as indicated.

$$\frac{x^2 - 4y^2}{x^2 + 3xy + 2y^2} \div \frac{x^2 - 4xy + 4y^2}{x + y}$$

$$\frac{x^2 - 4y^2}{x^2 + 3xy + 2y^2} \div \frac{x^2 - 4xy + 4y^2}{x + y} = \boxed{}$$ (Simplify your answer.)

ID: 7.2.64

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42. A pool can be filled by one pipe in 8 hours and by a second pipe in 2 hours. How long will it take using both pipes to fill the pool?

It will take about ☐ hours to fill the pool using both pipes.
(Type an integer or decimal rounded to the nearest tenth.)

ID: 7.7.15

43. Add or subtract as indicated.

$$\frac{6x}{16} + \frac{4x}{16}$$

$\frac{6x}{16} + \frac{4x}{16} = $ ☐
(Simplify your answer.)

ID: 7.3.3

44. Solve.

$$15y^{-2} + 1 = 8y^{-1}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your answer.

○ A. The solution set is { ☐ }.
(Use a comma to separate answers as needed.)
○ B. There is no solution.

ID: 7.6.65

45. Simplify the rational expression.

$$\frac{x^2y - 4x^2}{4x^3 - x^3y}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. $\frac{x^2y - 4x^2}{4x^3 - x^3y} = $ ☐ (Simplify your answer.)

○ B. The expression cannot be simplified.

ID: 7.1.73

46. Subtract.

$$\frac{x+7}{x^2+x-2} - \frac{2}{x^2-1}$$

$$\frac{x+7}{x^2+x-2} - \frac{2}{x^2-1} = \boxed{}$$ (Simplify your answer.)

ID: 7.4.71

47. Perform the indicated operation or operations.

$$\frac{6xy+ay+6xb+ab}{36x^2-a^2} \div \frac{y^3+b^3}{30x-5a}$$

$$\frac{6xy+ay+6xb+ab}{36x^2-a^2} \div \frac{y^3+b^3}{30x-5a} = \boxed{}$$ (Simplify your answer.)

ID: 7.2.71

48. Add.

$$\frac{4y-1}{4y^2} + \frac{7y+1}{4y^2}$$

$$\frac{4y-1}{4y^2} + \frac{7y+1}{4y^2} = \boxed{}$$ (Simplify your answer.)

ID: 7.3.19

49. Simplify the rational expression. If the rational expression cannot be simplified, so state.

$$\frac{2x-7}{7-2x}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. $\dfrac{2x-7}{7-2x} = \boxed{}$

○ B. The expression cannot be simplified.

ID: 7.1.61

50. Simplify the complex rational expression by the method of your choice.

$$\frac{\dfrac{9}{x^3 y} + \dfrac{2}{xy^4}}{\dfrac{2}{x^3 y} - \dfrac{3}{xy}}$$

$$\frac{\dfrac{9}{x^3 y} + \dfrac{2}{xy^4}}{\dfrac{2}{x^3 y} - \dfrac{3}{xy}} = \boxed{}$$

(Simplify your answer. Type your answer in factored form.)

ID: 7.5.38

51. Simplify the rational expression.

$$\frac{xy + 5y + 6x + 30}{x^2 + 9x + 20}$$

$$\frac{xy + 5y + 6x + 30}{x^2 + 9x + 20} = \boxed{}$$

(Simplify your answer.)

ID: 7.1.81

52. Add.

$$\frac{5}{x} + \frac{4}{x^2}$$

$$\frac{5}{x} + \frac{4}{x^2} = \boxed{}$$ (Simplify your answer.)

ID: 7.4.17

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53. In this problem, denominators are additive inverses. Subtract.

$$\frac{x-5}{x^2-9} - \frac{x-5}{9-x^2}$$

$\dfrac{x-5}{x^2-9} - \dfrac{x-5}{9-x^2} = \boxed{}$ (Simplify your answer.)

ID: 7.3.57

54. Simplify the complex fraction.

$$\frac{\dfrac{10}{x^2} - \dfrac{5}{x}}{\dfrac{10}{x} - \dfrac{25}{x^2}}$$

$\dfrac{\dfrac{10}{x^2} - \dfrac{5}{x}}{\dfrac{10}{x} - \dfrac{25}{x^2}} = \boxed{}$ (Type a simplified rational expression.)

ID: 7.5.29

55. Simplify the complex rational expression.

$$\frac{1}{1+\dfrac{5}{x}} - 1$$

$\dfrac{1}{1+\dfrac{5}{x}} - 1 = \boxed{}$

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

ID: 7.5.45

56. Solve the rational equation. If the equation has no solution, so state.

$$\frac{8}{x-6} - \frac{2}{x+2} = \frac{16}{x^2 - 4x - 12}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your answer.

- A. The solution set is {■}.
  (Use a comma to separate answers as needed.)
- B. There is no solution.

ID: 7.6.43

57. Perform the indicated operation.

$$\frac{2y}{ax + bx - ay - by} - \frac{2x}{ax + bx - ay - by}$$

$$\frac{2y}{ax + bx - ay - by} - \frac{2x}{ax + bx - ay - by} = \boxed{}$$ (Simplify your answer.)

ID: 7.3.69

58. Simplify the rational expression.

$$\frac{14x^2}{7x}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. $\frac{14x^2}{7x} = $ ■ (Simplify your answer.)
- B. The expression cannot be simplified.

ID: 7.1.21

1. A, 3

2. 8
    16

3. A, 4

4. $\dfrac{x}{4x-3}$

5. A, $\dfrac{y+1}{y-6}$

6. $\dfrac{pb}{p-b}$

7. A, $-3, 3$

8. $\dfrac{x+y}{3(x-y)}$

9. $\dfrac{3x}{x+6}$

10. A, $x^2 - 7$

11. $\dfrac{14y+49}{y(y+7)}$

12. 0.83

13. $\dfrac{4}{3}$

14. 8.9
    A

15. B

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16. $\dfrac{x-4}{x-3}$

17. 20,000

18. $\dfrac{2}{y}$

19. $\dfrac{y+21}{(y+3)(y-3)}$

20. $\dfrac{N}{P}-1$

21. $\dfrac{2}{3}$

22. A, $-\dfrac{5}{x}$

23. A, $\dfrac{1}{x-8}$

24. A, 6

25. A, 5

26. $-\dfrac{1}{z}$

27. 4

28. $\dfrac{4(x+4)}{5}$

29. $\dfrac{4x+3}{x-7}$

30. $3y(y+6)$

31. $\dfrac{1}{x+7}$

32. $\dfrac{9x-2}{9x+4}$

33. 36

34. $\dfrac{13}{2x-7}$

35. $\dfrac{7+6x}{x}$

36. $A, -84$

37. $\dfrac{51y+4}{7y(y+2)}$

38. 30

39. $\dfrac{5}{y-6}$

40. $\dfrac{2b}{2b-5}$

41. $\dfrac{1}{x-2y}$

42. 1.6

43. $\dfrac{5x}{8}$

44. $A, 3,5$

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45. $A, -\dfrac{1}{x}$

46. $\dfrac{x^2 + 6x + 3}{(x-1)(x+1)(x+2)}$

47. $\dfrac{5}{y^2 - by + b^2}$

48. $\dfrac{11}{4y}$

49. $A, -1$

50. $\dfrac{9y^3 + 2x^2}{y^3(2 - 3x^2)}$

51. $\dfrac{y + 6}{x + 4}$

52. $\dfrac{5x + 4}{x^2}$

53. $\dfrac{2x - 10}{x^2 - 9}$

54. $\dfrac{2 - x}{2x - 5}$

55. $-\dfrac{5}{x + 5}$

56. B

57. $-\dfrac{2}{a + b}$

58. $A, 2x$