EXERCISE SET 5 ANSWER KEY

No Calculator

1. **6/5 or 1.2** $\frac{1}{3}-\frac{1}{5}=\frac{y}{9}$

Multiply by 45: $15-9=5y$

(45 is the least common multiple of the denominators.)

Simplify: $6=5y$

Divide by 5: $6/5=y$

2. **7** $\frac{x}{x+1}+\frac{1}{x-1}=\frac{25}{24}$

Multiply by $24(x+1)(x-1)$:

$24x(x-1)+24(x+1)=25(x+1)(x-1)$

Distribute: $24x^2-24x+24x+24=25x^2-25$

Gather like terms: $0=x^2-49$

Add 49: $49=x^2$

Take square root: $\pm 7=x$

Since x must be positive, $x=7$.

3. **13/2 or 6.5** $\frac{1}{x-2}-\frac{1}{x+2}=\frac{8}{5}$

Multiply by $5(x-2)(x+2)$:

$5(x+2)-5(x-2)=8(x-2)(x+2)$

Distribute: $5x+10-5x+10=8x^2-32$

Subtract 20 and simplify: $0=8x^2-52$

Add 52: $52=8x^2$

Divide by 8: $52/8=13/2=x^2$

Remember, the question asks for the value of x^2, not x, so don't worry about taking the square root.

4. **6/17 or .353** $2-\frac{1}{z}=-\frac{5}{6}$

Multiply by $6z$: $12z-6=-5z$

Add $5z$ and 6: $17z=6$

Divide by 17: $z=6/17$

5. **28** $h(4)=\frac{g(4)}{4-a}=\frac{1}{12}$

Use definition of g: $\frac{4^2-9(4)+18}{4-a}=\frac{1}{12}$

Simplify: $\frac{-2}{4-a}=\frac{1}{12}$

Cross-multiply: $4-a=-24$

Add 24 and a: $28=a$

6. **5** $\frac{1}{2x-2}-\frac{1}{2x+1}$

Combine fractions: $\frac{(2x+1)-(2x-2)}{(2x-2)(2x+1)}$

Simplify: $\frac{3}{4x^2-2x-2}$

Since $\frac{3}{4x^2-2x-2}$ must equal $\frac{a}{4x^2-2x-b}$ for all values of x, $a=3$ and $b=2$, so $a+b=5$.

7. **D**

Since $(1-x)=-(x-1)$:

$$\frac{2}{1-x}+\frac{x}{x-1}=\frac{-2}{x-1}+\frac{x}{x-1}$$

$$=\frac{x-2}{x-1}$$

8. **C** $\frac{n+5}{n+2}>2$

Recall from Chapter 7, Lesson 9, on solving inequalities, that we need to consider two conditions. First, if $n+2$ is positive (that is, $n>-2$), we can multiply on both sides without "flipping" the inequality: $n+5>2n+4$

Subtract n and 4: $1>n$

So n must be between -2 and 1, and the integer values of -1 and 0 are both solutions. Next, we consider the possibility $n+2$ is negative (that is, $n<-2$), and therefore multiplying both sides by $n+2$ requires "flipping" the inequality:

$n+5<2n+4$

Subtract n and 4: $1<n$

But there are no numbers that are both less than -2 and greater than 1, so this yields no new solutions.

9. **C** $\frac{4(x-4)^2}{4x^2-64}$

Factor: $\frac{4(x-4)^2}{4(x-4)(x+4)}$

Cancel common factors: $\frac{x-4}{x+4}$

Substitute $x=4a$: $\frac{4a-4}{4a+4}$

Cancel common factor: $\frac{a-1}{a+1}$

Calculator

10. **15** $\frac{x}{5}-\frac{3}{x}=2$

Multiply by $5x$: $x^2-15=10x$

Add 15, subtract $10x$: $x^2-10x=15$

Notice that you should *not* worry about solving for x!

11. **2** $\frac{1}{10k}>0.001$

Use common base: $10^{-k}>10^{-3}$

Exponential Law #10: $-k>-3$

Multiply by -1: $k<3$

Therefore, the two positive integer solutions are 1 and 2.

12. **3/14 or .214** $h(9)=\frac{g(9)}{9^2+3}$

Use definition of g: $h(9)=\frac{9^2-9(9)+18}{84}$

Simplify: $h(9)=\frac{18}{84}=\frac{3}{14}$

13. **81/2 or 40.5** $\frac{1}{x+1}+\frac{1}{x-1}=9$

Combine fractions: $\frac{(x+1)+(x+1)}{(x+1)(x-1)}=9$

Simplify: $\frac{2x}{x^2-1}=9$

Multiply by 9/2: $\frac{9x}{x^2-1}=\frac{81}{2}$

14. **5** $\frac{c}{c-1}\div\frac{c+1}{2c}=\frac{10}{c^2-1}$

Convert to ×: $\frac{c}{c-1}\times\frac{2c}{c+1}=\frac{10}{c^2-1}$

Multiply: $\frac{2c^2}{c^2-1}=\frac{10}{c^2-1}$

Multiply by c^2-1: $2c^2=10$

Divide by 2: $c^2=5$

15. **2** Notice that the right-hand side of the equation is the "proper" form of the "improper" fraction on the left, and that a is the remainder when the division of the polynomials is completed:

$$\begin{array}{r|l} & 2x-1 \\ 2x+1 & 4x^2+0x+1 \\ & \underline{4x^2+2x} \\ & -2x+1 \\ & \underline{-2x-1} \\ & 2 \end{array}$$

16. **D** $\frac{1}{b}-\frac{b^2}{2}$

Common denominator: $\frac{2}{2b}-\frac{b^3}{2b}$

Combine: $\frac{2-b^3}{2b}$

17. **C** $\frac{1}{a}-\frac{1}{b}=2$

$\frac{1}{a}+\frac{1}{b}=8$

Add equations: $\frac{2}{a}=10$

Multiply by a: $2=10a$

Divide by 10: $1/5=a$

Subtract equations: $\frac{-2}{b}=-6$

Multiply by $-b$: $2=6b$

Divide by 6: $1/3=b$

Therefore, $a+b=1/5+1/3=8/15$.

18. **A** The number of pages they can edit together in an hour must equal the sum of the number of pages they can edit separately. The number of pages the first proofreader can edit per hour is $30/n$, and the number of pages the second proofreader can edit per hour is $50/m$. Since they can edit x pages per hour together, $\frac{30}{n}+\frac{50}{m}=x$.

NOTE: You can avoid the most common mistakes with this problem by paying attention to the units of each term. The units of two sides, as well as the unit of each term in a sum or difference, must "match." Notice that the unit for all of the terms is pages/hour.