

1. Answer: $^{-17}/_3$ A = $^8/_3$; B = -2; C = $^3/_4$; D = $^{-4}/_3$ $(^3/_4)(^{-4}/_3) + -2 - ^8/_3 = ^{-17}/_3$

2. Answer: $7\frac{14}{45}$

$(x+3)^2 - 5(x+3) - 6 = 0$	$(\log_7 x)(\log_3 7) = -2$	$\frac{1}{x} = \frac{1}{2} + \frac{1}{3}$	$x - 5 = \sqrt{x - 3}$
let $(x+3) = a$	$\frac{\log x}{\log 7} \cdot \frac{\log 7}{\log 3} = -2$	$\frac{1}{x} = \frac{5}{6}$	$x^2 - 10x + 25 = x - 3$
$a^2 - 5a - 6 = 0$	$\log_3 x = -2$	$x = \frac{6}{5}$	$x^2 - 11x + 28 = 0$
$(a-6)(a+1) = 0$	$x = \frac{1}{9}$		$(x-7)(x-4) = 0$
$a = 6$ $a = -1$			$x = 7$ $x = 4$
$x + 3 = 6$ $x + 3 = -1$			<i>4 is extraneous</i>
$x = 3$ $x = -4$			

The sum of the solutions is: $3 + -4 + \frac{1}{9} + \frac{6}{5} + 7 = 7\frac{14}{45}$

3. The correct facts are **B D E G**

4. Answer: **16** A: $f(h(-5)) = 10$ B: $h(g(5)) = -1$ C: $f(h(3)) = 0$ D: $g(f(2)) = 7$

5. Answer: **$11\sqrt{2} + 3\sqrt{3} - 18$** A: $33 - 11\sqrt{3}$ B: $18\sqrt{2} + 10\sqrt{3}$ C: $-15\sqrt{2} - 51$ D: $8\sqrt{2} + 4\sqrt{3}$

6. Answer: $\frac{-3x(x^2 + 3x + 9)}{5(x^2 - 5x + 25)}$

Factor and simplify:

$$\frac{-1(3x-4)(x+3)}{(x+5)(x^2-10x+25)} \cdot \frac{(x-3)(x^2+3x+9)}{(2x-1)(x+3)} \cdot \frac{3(x+5)(x+2)}{(3x-4)(x+1)} \cdot \frac{x(2x-1)(x+1)}{5(x-3)(x+2)}$$

7. Answer: **$50\frac{1}{3}$** A: By inspection, x and y equal 3 and 8; so $x^2 + y^2 = 73$

B: the roots are 9 and -3, the factors are $(x+3)(x-9)$; so $k = -6$

C: $x - y = -13$; $|x - y| + |x + y| = |-13| + |13| = 26$

D: Multiply both sides of equation by $15n$; we get $10n + 60 = 7n$, so $n = -20$

8. Answer: **$7/2$** Use Change of Base Property: $\frac{\log 17}{\log 13} \cdot \frac{4 \log 3}{\log 7} \cdot \frac{3 \log 7}{4 \log 5} \cdot \frac{7 \log 2}{\log 17} \cdot \frac{\log 13}{3 \log 2} \cdot \frac{3 \log 5}{6 \log 3}$; simplify.

9. Answer: **6** $3\left((9)^{-1/2}\right)^{1/2} \cdot 2 \cdot \left(3^{3/2}\right)^{1/3} = 3\left(\frac{1}{3}\right)^{1/2} \cdot 2 \cdot \left(3^{1/2}\right) = 3 \cdot 3^{-1/2} \cdot 3^{1/2} \cdot 2 = 3 \cdot 2 = 6$

10. Answer: **$1/4$**

A: $\frac{n}{d} = \frac{3}{4}$ and $\frac{n+7}{d} = \frac{4}{3}$. Cross multiply; solve the resulting system: $\begin{matrix} 3d - 4n = 0 \\ 4d - 3n = 21 \end{matrix} \Rightarrow d = 12$

B: $\frac{10t+u}{10u+t} = \frac{4}{7}$ Cross multiply; simplify to: $u = 2t$. Solutions are 12, 24, 36, and 48; largest is 48.

$\frac{A}{B} = \frac{1}{4}$

11. Answer: **89**

$$|6x+1| = 4x+5 \Rightarrow 6x+1 = 4x+5 \text{ or } 6x+1 = -4x-5 \text{ These give us } \{2, -\frac{3}{5}\} \text{ (note: } -\frac{3}{5} \text{ is not an integer)}$$

$$x-6 = \sqrt{x-6} \Rightarrow x^2 - 12x + 36 = x-6 \Rightarrow x^2 - 13x + 42 = 0 \Rightarrow (x-7)(x-6) = 0 \Rightarrow x=6, x=7.$$

Multiplying by the LCD gives:

$$x(x+4) + x-2 = 12 \Rightarrow x^2 + 5x - 14 = 0 \Rightarrow (x+7)(x-2) = 0; x = -7 \text{ (} x \neq 2 \text{)}$$

Start by letting $a = \log_3 x$. So $a^2 - 2a - 8 = 0 \Rightarrow (a-4)(a+2) = 0 \Rightarrow a = 4, a = -2$ Substituting back to the original situation, we have $\log_3 x = 4$ and $\log_3 x = -2$, so $x = 81$ and $x = \frac{1}{9}$.

12. Answer: **180 π**

A: Completing the square:

$$36(x^2 - 2x + 1) + 25(y^2 - 10y + 25) = 239 + 36 + 625$$

$$36(x-1)^2 + 25(y-5)^2 = 900$$

$$\frac{(x-1)^2}{25} + \frac{(y-5)^2}{36} = 1$$

$$\text{area} = 30\pi$$

B: Completing the square:

$$y^2 - 6y + 9 = 4x - 1 + 9$$

$$(y-3)^2 = 4(x+2)$$

$$y \text{ value of vertex} = 3$$

C: Completing the square:

$$9(x^2 - 4x + 4) - 16(y^2 - 2y + 1) = 556 + 36 - 16$$

$$9(x-2)^2 - 16(y-1)^2 + 576$$

The x -coordinate of the center is 2.

13. Answer: **16** $i + (2i)^4 - i \Rightarrow 16i^4 = 16$

14. Answer: **19**

$$1 + \frac{1}{1+x} = 3$$

$$\frac{2+x}{1+x} = 3 \Rightarrow 3+3x = 2+x \Rightarrow x = -\frac{1}{2}$$

$$13 - \frac{3}{-\frac{1}{2}} = 13 - -6 = 19$$