

$$3. \quad \frac{x+2a-3}{x+1} - \frac{x+6}{2x} = \frac{(x+2a-3)}{x+1} \cdot \frac{2x}{2x} - \frac{x+6}{2x} \cdot \frac{x+1}{x+1}$$

$$= \frac{(x+2a-3)2x}{(x+1)2x} - \frac{(x+6)(x+1)}{2x(x+1)}$$

$$= \frac{[(x+2a-3)2x] - [(x+6)(x+1)]}{2x(x+1)}$$

$$= \frac{[2x^2 + 4ax - 6x] - [x^2 + 7x + 6]}{2x(x+1)}$$

$$= \frac{2x^2 + 4ax - 6x - x^2 - 7x - 6}{2x(x+1)}$$

$$= \boxed{\frac{x^2 + 4ax - 13x - 6}{2x^2 + 2x}}$$

$$2. \quad h(2) = \sqrt{9 \cdot 2 + 7} = \sqrt{18 + 7} = \sqrt{25} = 5$$

$$g(h(2)) = g(5) = 5(5)^2 - 2 \cdot 5 + 3$$

$$= 125 - 10 + 3 = \boxed{118}$$

8. Solve for a in $\sqrt{19-3a} + 5 = a$. ②

Soln: $\sqrt{19-3a} = a-5$ (sub. 5 from both sides)

$19-3a = (a-5)^2$ (square both sides)

(*WARNING): this may introduce false "solutions"!

$19-3a = a^2 - 10a + 25$

$0 = a^2 - 7a + 6$

(add $3a - 19$ to both sides)

$0 = (a-6)(a-1)$

(factor)

~~$a=6$ or $a=1$~~

$a-6=0$ or $a-1=0$ solve

$a=6$ or $a=1$

(*⇒) Check for false solutions:

$a=6$: $\sqrt{19-3 \cdot 6} = 6-5$

$\sqrt{19-18} = 1$

$\sqrt{1} = 1$

$1 = 1$ ✓

$a=1$: $\sqrt{19-3 \cdot 1} = 1-5$

$\sqrt{16} = -4$

$4 = -4$ ✗

Not a solution!

• So the only solution is $\boxed{a=6}$.

• The sum of all solutions is $\boxed{6}$.