Algebra 2 Hustle Solutions

15	12	$x^3 - 7x + 6$	$-1, 4$	4
26	2π	$-1, 1$	$\sqrt{5}$	12
3	$2a^2$	$\frac{4}{7}$	0	50
$\frac{x}{1-x}$	21	2	$\frac{38}{3}$	12
6	$(-\infty, 3) \cup (5, \infty)$.	-1	2001001	$-\frac{39}{17}$

1. $f(x-1)$ shifts the roots to the right 1 unit so your new roots are 3 and 5 which makes their product 15.

2. $\sqrt{2x}=4 \rightarrow x=8 \Rightarrow \sqrt{2x}+x=4+8=12$

3. $f(x+2)=(x+2)^3-6(x+2)^2+5(x+2)+12=x^3-7x+6$

4. $x^2-3x+2-6=0 \rightarrow x^2-3x-4=0$ Factoring, $(x-4)(x+1)=0 \rightarrow x=4,-1$

5. The sum of the roots is zero because the roots are opposites of each other. Therefore, $\frac{-2R+8}{6}=0 \rightarrow R=4$

6. $pq=9, p^2+q^2=8 \rightarrow p^2+2pq+q^2=26$

7. $y=\sqrt{4-x^2}$is a semi-circle of radius 2 around the origin. Hence, the area is $\frac{2^2\pi}{2}=2\pi$

8. $log\, x^2=0$ to get the x-intercept of the original. The domain of f is all nonzero reals and the x intercepts are 1 and -1. The y-intercepts of the inverse, which is not a function are 1 and -1.

9. $\left(a+\frac{1}{a}\right)^2=9 \rightarrow a^2+\frac{1}{a^2}=7$. So, $\left(a-\frac{1}{a}\right)^2=a^2-\frac{1}{a^2}-2=7-2=5$. Thus, $\left|a-\frac{1}{a}\right|=\sqrt{5}$.

10. $2(x+2)(x+5)-4(Ax+B)+C(x^2+x-2)=(5x+14)(x-1)$
$2x^2+14x+20-4Ax-4B+Cx^2+Cx-2C=5x^2+9x-14$.

Matching up corresponding parts, $A=2, B=7$, and $C=3$. Therefore the sum is 12.

11. The equation has two vertical asymptotes at $x=8$ and $x=-3$, and a horizontal asymptote at $y=0$. Thus, 3 asymptotes.

12. The graph is a square with a side length of $a\sqrt{2}$. Hence, the area is $2a^2$.

13. Infinite geometric series. First term is 1, common ratio is $-\frac{3}{4}$. Hence, the sum is $\frac{1}{1+\frac{3}{4}}=\frac{4}{7}$.

14. $-8+12m^2-2m+4=0 \rightarrow 12m^2-2m-4=0 \rightarrow 6m^2-m-2=0$

$(3m-2)(2m+1)=0 \rightarrow m=\frac{2}{3}, -\frac{1}{2}$

15. In total, they are moving towards each other at 60feet per minute. This covers a 3000 foot distance in $\frac{3000}{60}=50$ minutes

16. Switch the roles of the variables to obtain $x=\frac{y}{y+1} \rightarrow xy+x=y$. Solving for y, $xy-y=-x \rightarrow y=\frac{x}{1-x}$

17. $\begin{array}{c} x+y-z=7 \\ x+y+z=5 \\ (x-y)^3+(y-z)^3=(x-z)^3 \end{array} \rightarrow x+y=6,$ then $z=-1$. Substituting back into the system we find that $x=7$ and $y=-1$. Therefore, $3x+y-z=21$.

18. $3(x+1)^2+3\left(y-\frac{1}{3}\right)^2=\frac{107}{12}+\frac{36}{12}+\frac{1}{12} \rightarrow (x+1)^2+\left(y-\frac{1}{3}\right)^2=4$. Therefore the radius is 2.

19. If $x+5=2x-7 \rightarrow x=12$. If $-x-5=2x-7 \rightarrow x=\frac{2}{3}$. Hence, $12+\frac{2}{3}=12\frac{2}{3}\ or \frac{38}{3}$.

20. Completing the square yields $\frac{(y-3)^2}{9}-\frac{(x+5)^2}{36}=1$. The conjugate axis has length $2b$, where $b=\sqrt{36}=6$. Hence, it has length 12.

21. Using log properties, we obtain $(x-2)(2x-3)=x^2$. Expanding, $2x^2-7x+6=x^2$, so $x^2-7x+6=0$. Factoring, $(x-6)(x-1)=0 \rightarrow x \in \{1,6\}$. But, 1 is extraneous, as the argument of a log cannot be negative therefore the answer is 6.

22. The factor 2^xdoes not affect the domain. The domain of $log(x^2-8x+15)$ is $x \in \mathbb{R}$ such that $x^2-8x+15>0$. Factoring, $(x-3)(x-5)=0 \rightarrow x=3,5$. Checking intervals, when $x>5$, this product is positive, as is when $x<3$. The interval between results in a negative product. Hence, the domain is $(-\infty,3) \cup (5,\infty)$.

23. Adding both equations together, we have $a^2-8a+b^2+10b=-41$. Completing the square for both variables yields $a^2-8a+16+b^2+10b+25=0$, or $(a-4)^2+(b+5)^2=0$. For the sum to be 0, both terms must be 0. Hence, $a=4, b=-5$, and $a+b=-1$.

24. Using Remainder Theorem, we evaluate $f(-1)$. Doing so results in $f(-1)=(1+2+3+4+...+2000)+1$. Hence, the remainder is $\frac{2000\cdot 2001}{2}+1=2001001$.

25. $x = \frac{\begin{vmatrix} 3 & -2 \\ 6 & 9 \end{vmatrix}}{\begin{vmatrix} -1 & -2 \\ -4 & 9 \end{vmatrix}} = -\frac{39}{17}$