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Algebra 2 Individual Solutions **March Regional**

1. $\boxed{C}$ The problem becomes to $\sqrt{-a^4 \cdot -b^2}$, which becomes $i^2\sqrt{a^4b^2}$, which is $-a^2b$.

2. $\boxed{A}$ Factoring as the diff. of cubes, gives $(y-(x+1))(y^2+y(x+1)+(x+1)^2)$. Simplifying gives the ans.

3. $\boxed{D}$ $\dfrac{(3x+5)^{1/3}-\dfrac{x}{(3x+5)^{2/3}}}{(3x+5)^{2/3}}=\dfrac{\dfrac{(3x+5)-x}{(3x+5)^{2/3}}}{(3x+5)^{2/3}}=\dfrac{(3x+5)-x}{(3x+5)^{4/3}}=\dfrac{2x+5}{(3x+5)^{4/3}}$

4. $\boxed{B}$ Checking the denom. gives $(x-2)(x-1)$. So, the answer is everywhere but at those points.

5. $\boxed{D}$ Plugging $\frac{1}{x}$ into the function we get, $\dfrac{\frac{1}{x}-\frac{1}{(1/h)}}{h}=\dfrac{(1/h)-x}{hx(1/h)}=\dfrac{1-hx}{xh}=\dfrac{1}{hx}-1$.

6. $\boxed{C}$ To find the inverse, we use $x=\dfrac{7}{y+2}$ and solve for $y \Rightarrow y=\dfrac{7-2x}{x}$.

7. $\boxed{C}$ The call costs 0.31 for the 1st minute + 0.24 for x minutes less the first one $\Rightarrow 0.30+0.24(x-1)$.

8. $\boxed{B}$ Squaring both sides gives $15x+4=16-8\sqrt{2x+3}+2x+3$. Getting the radical alone gives $13x-15=-8\sqrt{2x+3}$ and squaring again gives $169x^2-390x+225=64(2x+3) \Rightarrow 169x^2-518x+33=0$. Solving this gives –3 and $\dfrac{11}{169}$, but checking eliminates –3.

9. $\boxed{A}$ Putting everything on one side, getting a common denom. and simplifying gives $\dfrac{2(x+1)-3(x-1)}{(x+1)(x-1)}\le 0 \Rightarrow \dfrac{-x+5}{x^2-1}\le 0$. checking –1, 1, and 5 on a chart gives the answer.

10. $\boxed{A}$ Using log laws, log 18 = 2 log 3 + log 2. Plugging in the numbers and simplifying gives the answer.

11. $\boxed{D}$ Using log laws, $\ln\sqrt[5]{e^3x}=\frac{1}{5}(3\ln e+\ln x)=\frac{1}{5}(3+\ln x)$.

12. $\boxed{D}$ $2e^{3\ln(x+1)}=2e^{\ln(x+1)^3}=2(x+1)^3$.

13. $\boxed{C}$ Logging both sides: $2x\log 3=(x-1)\log 5 \Rightarrow 2x\log 3-x\log 5=-\log 5 \Rightarrow x(2\log 3-\log 5)=-\log 5$. Solving for x and using the calculator will give the answer.

14. $\boxed{D}$ Plugging in 2.1 for Y into the equation, then taking the ln of both sides will give the answer.

15. $\boxed{B}$ Plugging in 900 for Y into the equation, then taking the ln of both sides will give the answer.

16. $\boxed{B}$ g(-2) = 5, so $f(3,5)=3^2+2(5)^2-5=54$.

17. $\boxed{C}$ If an event can happen in p ways and fail to happen in q ways, then, if p > q, the odds are p to q in favor of the event happening. If p < q, then the odds are q to p against the event happening. In this case, p > q. So, the odds of drawing a blue marble (the event happening) are 19:10.

18. $\boxed{B}$ The given statement is equivalent to "If the trip is cancelled, it rained." This is equivalent to "If it did not rain, the trip is not cancelled." Since we are given that it did not rain, we conclude that the trip is not cancelled.

19. $\boxed{B}$ Using the facts that $\log_x x^{x^2}=x^2$, $\log_x x^{-5x}=-5x$ and $\log_x\left(\dfrac{1}{x^6}\right)=-6$, we get $x^2-5x=-6$ and $x=2,3$.

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20. $\boxed{B}$ $P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.2 + 0.6 - 0.1 = 0.7.$

21. $\boxed{A}$ $M_{23} = \begin{vmatrix} 2 & -1 \\ -5 & 2 \end{vmatrix} = -1$ and $A_3 = (-1)^{2+3} \cdot M_{11} = -1 \cdot 1 = -1$. So, the sum = -2.

22. $\boxed{E\ (8)}$ Completing the square gives $\frac{(x-2)^2}{9} + \frac{y^2}{4} = 1$. The vertices are (-1, 0) and (5, 0) and the sum of the x-coordinates is 4. The x-coordinates of the foci ($2 \pm \sqrt{5}$) have the sum of 4 also, and the total = 8.

23. $\boxed{D}$ There are C(8, 3) = $\frac{8!}{3!5!} = 56$ different ways.

24. $\boxed{C}$ Immediately after the 10th payment is made, the 10th payment has earned no interest. The 9th payment has earned interest for 1 year, the 8th payment has earned interest for 2 years, etc. If x dollars is the total amount in the sinking fund immediately after the 10th deposit is made, then $x = 25{,}000 + 25{,}000(1.12)^1 + 25{,}000(1.12)^2 + \ldots + 25{,}000(1.12)^n$. This is a geometric series and using the sum formula we get $x = \frac{25{,}000(1-(1.12)^{10})}{1-1.12} \approx \$439{,}000.$

25. $\boxed{D}$ Choose an axis so that the ellipse has major axis on the x-axis, and its center at the origin. This gives a = 24 and b = 20. Thus the equation is $\frac{x^2}{576} + \frac{y^2}{400} = 1$. Plugging in 10 for y, we get x = $12\sqrt{3}$. But 2x = the length of the base, so 2x = $24\sqrt{3}$.

26. $\boxed{A}$ $\log_{10} \sqrt[3]{4.2} = \log_{10}\left(\frac{2 \cdot 3 \cdot 7}{10}\right)^{1/3} = \frac{1}{3}(\log_{10} 2 + \log_{10} 3 + \log_{10} 7 - \log_{10} 10) = \frac{1}{3}(a+b+c+-1).$

27. $\boxed{A}$ Using composition of functions, we are looking for $f(g(8)) = \frac{1}{4}(7 \cdot 8 + 86)^2 + 90 = 5131.$

28. $\boxed{D}$ Square $x + y$ to get $x^2 + y^2 + 2xy = 40 + 2(10 - x - y) = 60 - 2(x + y)$. Let u = x + y and we get $u^2 + 2u - 60 = 0$ and $u \approx 6.81, -8.81$. We have to eliminate the negative answer, due to given conditions.

29. $\boxed{E\ \left(\frac{1}{5}\right)}$ Let R = Ram's speed and C = Cam's speed. Then the distances are Rh and Ch, where h = # of hours traveled. From passing to finish Ram covers Ch distance and Cam covers Rh distance. So, the ratio of Ram's time to Cam's time is 25:1 or $\frac{Ch}{R} : \frac{Rh}{C}$. Setting these equal, we get $\frac{25}{1} = \frac{\left(\frac{Ch}{R}\right)}{\left(\frac{Rh}{C}\right)} \Rightarrow \frac{R}{C} = \frac{1}{5}$.

30. $\boxed{A}$ It takes t – 4 minutes for one of these buses to go the same distance that Tyler walks in 12 minutes. The speed of the busses going in the same direction to Tyler's speed is given by $\frac{12-t}{12}$ and the speed of the busses going in the opposite direction to Tyler's speed is given by $\frac{t-4}{4}$. Setting these equal, $\frac{12-t}{t} = \frac{t-4}{4}$ gives t = 6.