Inner School Test Part B: Answers & Selected solutions

1. \( 44 + \frac{44}{4} \) or \( \sqrt[4]{4(4! + 4)} - \frac{4}{4} \)

2. -1, 1, 3

3. \( \log_{10} \frac{1}{2} \) is negative so the inequality sign (>) should have been reversed

4. 112.5 m

\[
\frac{225 \text{ km}}{h} \left( \frac{1 \text{ h}}{60 \text{ min}} \right) \left( \frac{1000 \text{ m}}{1 \text{ km}} \right) \left( \frac{1 \text{ min}}{60 \text{ sec}} \right) = 62.5 \text{ m/s}
\]

for 6 s \( \Rightarrow 375 \text{ m} \)

so \( \frac{30}{100} = \frac{x}{375} \)

\[
\begin{cases} 
2 - 2x; \ x < 0 \\
2; \ 0 \leq x \leq 2 \\
2x - 2; \ x > 2 
\end{cases}
\]

5. \( f(x) = \begin{cases} 2; & 0 \leq x \leq 2 \\ 2x - 2; & x > 2 \end{cases} \) Determine over the intervals when the values are positives and negatives.

6. since 4, 6, 8 the LCM = 24 which implies 24n - 1

7. Answer: T= 10 years Therefore \( T/4 = \text{Maxima and } (3T)/4 = \text{Minima} \)

\( 3(10)/4 = 7.5 \text{ years} \)

8. \( t = 25 \)

\( y = ax^2 + bx + c \)

\[
\begin{align*}
0 &= a(2)^2 - 4a(2) + c \\
0 &= 4a - 8a + c \\
4a &= c \\
y &= ax^2 - 4ax + 4a \\
1 &= a(3)^2 - 4a(3) + 4a \\
1 &= 9a - 12a + 4a \\
1 &= a 
\end{align*}
\]

Therefore, \( c = 4(1) = 4 \)

\( b = -4(1) = -4 \)

\( y = x^2 - 4x + 4 \) \( t = 9 - 4(-3) + 4 \) \( t = 9 + 12 + 4 \)

9. a) \( x = 78 \)  
   b) \( 3^{20} - 3 = x \)

NOTE: All logs in this answer are in base 3.

\( 40 = 20 + 5 \log (x + 3) \)  
\( 120 = 20 - 5 \log (x + 3) \)
20 = 5 log (x+3)            100 = 5 log (x+3)
4 = log (x+3)               20 + log (x+3)
X + 3 = 3^4 = 81

10. \frac{1}{2}
   TRICKY -> For those people who went through the problem to answer the question, what is the probability of getting eleven heads in a row with a fair coin?

11. 4 coins totaling 60 cents are two nickels and two quarters
   n = # of coins in her purse. 15n + 10 = 14(n+1) n=4

12. d = 10cm
   Volume of 1/2 the tank = 100cm * 40cm * 60cm = 240000cm^3
   \frac{1}{4}(240000) = 60000cm^3
d * 100cm * 60cm = 60000

13. \{0,2,-2,3,-3\} Since \ x^0 = 1 set exponent = 0 and factor.

14. 5 & 97
   \ u = 4x^2 - 3 \Rightarrow 4(\sqrt{2})^2 - 3 = 5 \ do the same for 5

15. \(x-1)^2(x+1)(x+6)(x^2+1) \ use synthetic division

16. \ y = \frac{a}{b}, \ where \ b \neq 0 \ Take limit as x approaches infinity

17. \ (-0.423, 1.577) \ Set f''(x) = 0
   \ x = \frac{6 \pm \sqrt{12}}{6}

18. 55 mph

19. 4

20. a = 1 \ b = 1

21. 41

22. [2, 1, 1, 2]

23. $334.24

24. 1.22
25. \( b^y = a^{xy} = a \) so \( x = \frac{1}{y} \)

26. Intersect in a line

27. 84 ft

28. 1025 \( a_n = 2^n + 1 \)

29. 41 cents

30. 9