7 MUST KNOW QUESTIONS TO *CONQUER*

Quadratic Equations

1	(a) Solve the equation $$\frac{4x-3}{6}+\frac{x+2}{3}=\frac{5}{2}$$	
2	Solve the following equations. (a) $5(x-3)=1-(8-x)$ (b) $\frac{y}{20}=\frac{5}{y}$ (c) $2p^2+18p=0$	
3	Solve the following equations (a) $10s^2+13s-3=0$ (b) $\frac{7p-1}{2}+1=\frac{12p+5}{3}$	
4	One of the solutions of $x^2+kx-28=0$ is $x=4$. Find (a) the value of k, (b) the other solution of the equation.	
5	Isaac is planning a cycling expedition. He explores two possible routes. (a) If he travels on route A, which is 120 km long, he expects to cover *x* km per hour. Route B, which is 5 km shorter than route A, has more challenging terrain and he would only be able to cover $(x-2)$ km per hour. Write down an expression, in terms of x, for the time he expects to take on (i) route A, (ii) route B. (b) He estimates that route A will take 40 minutes less than route B. Form an equation in *x* and show that it reduces to $2x^2+11x-720=0$. (c) Solve the equation $2x^2+11x-720=0$, give your answers correct to 3 decimal places. (d) Calculate the time, in hours and minutes, that he expects to take on route B.	

6	Mr Lee bought p apples for \$3. (a) Find an expression, in terms of p, for the cost in cents, of each apple. (b) It was found that 2 of the apples were bad, and could not be sold. Mr Lee sold each remaining apple for 10 cents more than he paid for it. Write down an expression, in terms of p, for the total sum he received, in cents, from the sale of the apples. (c) He made a profit of 20 cents from the sale of the apples. Write down an equation to represent this information, and show that it simplifies to $p^2 - 4p - 60 = 0$. (d) Solve the equation $p^2 - 4p - 60 = 0$. (e) Find the selling price of each apple.	
7	Mr. Yan bought 60 litres of apple juice. He poured the fruit juice equally into *x* bottles. (a) Write down an expression, in terms of *x*, for the volume, in litres, of apple juice in each bottle. (b) Mr. Yan bought the same amount of orange juice and poured the orange juice into $(x - 6)$ bottles. Write down an expression, in terms of *x*, for the volume, in litres, of orange juice in each bottle. (c) It is given that the volume of orange juice in each bottle is 0.5 litres more than the volume of apple juice in each bottle. Write down an equation in *x* and show that it reduces to $x^2 - 6x - 720 = 0$. (d) Solve the equation $x^2 - 6x - 720 = 0$. (e) Hence, find the volume, in litres, of apple juice in one bottle.	

Answer Key

1	Solution: (a) $x = \frac{7}{3}$ $\frac{4x-3}{6} + \frac{x+2}{3} = \frac{5}{2}$ $4x - 3 + 2(x + 2) = 3(5)$ $4x - 3 + 2x + 4 = 15$ $6x = 14$ $x = \frac{7}{3}$ Ans: $x = \frac{7}{3}$	
2	Solutions: (a) $5x - 15 = 1 - 8 + x$ $4x = 8$ $x = 2$ (b) $x^2 = 100$ $x^2 - 100 = 0$ $(x + 10)(x - 10) = 0$ $x = -10$ or $x = 10$ (c) $2p^2 + 18p = 0$ $2p(p + 9) = 0$ $2p = 0$ $p = 0$ or $p + 9 = 0$ $p = -9$ Ans: (a) $x = 2$ (b) $x = 10$ (c) $p = -9$	
3	Solutions: (a) $10s^2 + 13s - 3 = 0$ $(5s - 1)(2x + 3) = 0$ $5s - 1 = 0$ or $2s + 3 = 0$ $5s = 1$ or $2s = -3$ $s = \frac{1}{5}$ or $s = -\frac{3}{2}$ (b) $\frac{7p-1}{2} + 1 = \frac{12p+5}{3}$ $\frac{7p-1+2}{2} + 1 = \frac{12p+5}{3}$ $\frac{7p+1}{2} = \frac{12p+5}{3}$ $3(7p + 1) = 2(12p + 5)$ $21p + 3 = 24p + 10$ $24p - 21p = 3 - 10$ $3p = -7$ $p = -\frac{7}{3}$ $p = -\frac{7}{3}$ Ans: (a) $s = \frac{1}{5}$ or $s = -\frac{3}{2}$ (b) $p = -\frac{7}{3}$	

4	Solutions: (a) $16 + 4k - 28 = 0$ $k = 3$ (b) $x^2 + 3x - 28 = 0$ $(x - 4)(x + 7) = 0$ $x = -7$ Ans: (a) 3 (b) -7	
5	Solutions: (b) $2x^2 + 11x - 720 = 0$ $\frac{115}{x-2} - \frac{120}{x} = \frac{2}{3}$ $115(3)(x) - 120(3)(x-2) = 2(x)(x-2)$ $345x - 360x + 720 = 2x^2 - 4x$ $-15x + 720 = 2x^2 - 4x$ $2x^2 - 4x + 15x - 720 = 0$ $2x^2 + 11x - 720 = 0$ (c) $x = 16.422, -21.922$ (3dp) $x = \frac{-11 \pm \sqrt{11^2 - 4(2)(-720)}}{2(2)}$ $x = 16.42192, -21.92192$ $x = 16.422, -21.922$ (3dp) (d) 7h 58 mins $\frac{115}{16.42192 - 2}$ $= 7.97397$ h $= 7h$ 58 min Ans: (a)(i) $\frac{120}{x}$ (ii) $\frac{115}{x-2}$ (c) $x = 16.422, -21.922$ (3dp) (d) $= 7h$ 58 min	
6	Solutions: (a) $\frac{300}{p}$ cents (b) $(p-2)\left(\frac{300}{p} + 10\right)$ cents (c) $(p-2)\left(\frac{300}{p} + 10\right) - 300 = 20$ $300 + 10p - \frac{600}{p} - 20 - 300 = 20$ $10p - \frac{600}{p} - 20 - 20 = 0$ $10p^2 - 600 - 40p = 0$ $p^2 - 4p - 60 = 0$ (d) $p^2 - 4p - 60 = 0$ $(p - 10)(p + 6)$ $p = 10$ $p = -6$ (e) $\$3 \div 10$ $= 30c$ $= 30c + 10c = 40c$ Ans: (a) $\frac{300}{p}$ cents (b) $(p-2)\left(\frac{300}{p} + 10\right)$ cents (d) $p = -6$ (e) $40c$	

7	Solutions: (c) $\frac{60}{x-6} - \frac{60}{x} = 0.5$ $\frac{60x-60(x-6)}{x(x-6)} = 0.5$ $\frac{60x-60x+360}{x^2-6x} = 0.5$ $360 = 0.5(x^2 - 6x)$ $0.5x^2 - 3x - 360 = 0$ $x^2 - 6x - 720 = 0$ (d) $x = 30$ or $x = -24$ $(x - 30)(x - 24) = 0$ $x - 30 = 0$ or $x + 24 = 0$ $x = 30$ or $x = -24$ (e) 2 litres $\frac{60}{30} = 2litres$ Ans: (a) $\frac{60}{x}$ (b) $\frac{60}{x-6}$ (e) $2litres$	